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July 9, 2015

RECEIVED
JUL 11 2015
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

VIA OVERNIGHT MAIL

Public Utilities Commission
Capitol Building, 1st floor
500 E. Capitol Ave.
Pierre, SD 57501-5070
Attention: Tina Douglas

Re: Exhibits for KXL Pipeline / Docket HP14-001

Dear Tina:

Enclosed please find a flash drive containing Dakota Rural Action's exhibits for the upcoming hearing on the proposed Keystone XL pipeline. The files consist of both non-confidential and confidential documents, each of which has been designated as such per the Exhibit List we filed on Tuesday, July 7.

Per our discussion, I will e-file a notice that the exhibits have been transmitted to the Public Utilities Commission, and will notify all parties to the proceedings on the service list that I will provide a download link to the files from our firm's secure cloud server should they so desire.

Please do not hesitate to contact me should you have any questions.

Yours truly,

Robin S. Martinez

Encl.

cc: Bruce Ellison
Sabrina King

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September 21, 2007

Writer's E-mail: koenecke@magt.com

Dear Intervenors:

Enclosed please find the direct testimony filed by TransCanada Keystone LP in support of its application for a siting permit as indicated. You should have seven testimonials with attachments:

Direct Testimony of Robert Jones
Direct Testimony of Scott Ellis
Direct Testimony of Brian Thomas
Direct Testimony of Michael Koski
Direct Testimony of Meera Kothari
Direct Testimony of L. A. Gray
Direct Testimony of Heidi Tillquist

If you have questions you may wish to consult with your own counsel, Kara Semmler, PUC staff attorney, or myself.

Sincerely,

MAY, ADAM, GERDES & THOMPSON LLP

BRETT KOENECKE

BK:lar
Enclosures

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **CERTIFICATE OF SERVICE**

I hereby certify that the following documents were served upon all of the parties listed on the attached Service List on the 21st day of September, 2007, either electronically or by mailing a true and correct copy thereof to them by first class mail, postage prepaid, at their last known mailing to email addresses.

Direct Testimony of Robert Jones
Direct Testimony of Scott Ellis
Direct Testimony of Brian Thomas
Direct Testimony of Michael Koski
Direct Testimony of Meera Kothari
Direct Testimony of L. A. Gray
Direct Testimony of Heidi Tillquist

MAY, ADAM, GERDES & THOMPSON LLP

BY: _____
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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **DIRECT TESTIMONY OF SCOTT ELLIS**

1. Please state your name and address for the record.

Answer: Scott L. Ellis, home address 2055 Bonner Spring Ranch Road, Laporte, Colorado.

2. What is your role with the TransCanada Keystone Pipeline project?

Answer: I am an employee of ENSR, the lead environmental contractor for the Keystone Pipeline Project.

3. Please state your professional qualifications.

Answer: I have been employed at ENSR, an environmental and engineering consulting company, for the past 32 years. My primary experience has been the preparation of Environmental Impact Statements for pipeline construction projects and other large industrial developments throughout the United States; and the supervision of data collection programs necessary to prepare applications for federal and state permits. My technical background is in the area of plant ecology. I am a graduate of Cornell University.

4. Have you provided your resume?

Answer: Yes, a copy of my resume is attached to my testimony as Exhibit A.

5. What are your responsibilities on the Keystone Project?

Answer: As part of a team, I am responsible for overseeing the collection of information needed to prepare federal and state applications for permits needed to construct and operate the Keystone pipeline system.

6. Are you responsible for portions of the application that Keystone has filed with the South Dakota Public Utilities Commission seeking a siting permit for the Keystone Pipeline?

Answer: Yes.

7. For which portions of Keystone's application are you responsible?

Answer: I assisted with and am responsible for the following sections:

- 5.1 Environmental Information Filed with the Department of State
- 5.2 Summary of Environmental Impacts
- 5.3 Physical Environment
- 5.5 Terrestrial Ecosystems
- 5.6 Aquatic Ecosystems
- 5.7 Land Use and Local Land Controls (with the exception of 5.7.4 Local Land Use Controls)
- 5.9 Air Quality
- 6.2.6 Cultural and Historical Resources
- 6.4.3 Noise Impacts
- 6.4.4 Visual Impacts

8. Describe the environmental information compiled by Keystone and filed with the U.S. State Department described in Section 5.1 of the Application.

Answer: Keystone is required to obtain a Presidential Permit from the Department of State in order to construct pipeline facilities across the international border. As required by the National Environmental Policy Act (NEPA) the Department of State is preparing an Environmental Impact Statement (EIS) with respect to the project. On August 10, 2007, the Department of State issued a Draft EIS, which tentatively concluded that the Keystone project would result in limited adverse environmental impacts both during construction and operation, and would be an environmentally acceptable action. The comment period on the Draft EIS closes on September 24, 2007 and a Final EIS is expected in November or December 2007. The environmental submittals that Keystone has provided to the Department of State and which support the South Dakota siting permit application are described in Section 5.1. of Keystone's application in this proceeding, and are included in Exhibit C to the application.

9. Describe consultations with federal and state agencies that were used to develop this application.

Answer: Consultations were conducted with the U.S. Army Corps of Engineers (USACE), and the U.S. Fish and Wildlife Service (USFWS) in connection with seeking permits and approvals from those federal agencies. Consultations and meetings were also completed during 2006 and 2007 with staff from the following South Dakota state agencies: South Dakota State Historical Society (State Historic Preservation Officer), Public Utilities Commission, Department of Environment and Natural Resources (Surface Water Quality Program, Fish and Game Department, Air Quality Program), Department of Transportation, and State Land.

10. Describe the information contained in Section 5.2 Summary of Environmental Impacts of the South Dakota application.

Answer: Table 3 in this section provides a summary of the impacts on: (a) air quality, (b) geology, minerals and paleontology, (c) soils and agriculture production, (d) water resources, (e) vegetation, (f) wildlife, (g) aquatic resources, (h) sensitive species, (i) land use and (j) cultural resources. Other issues summarized in this table include: Native American Consultation, Socioeconomic conditions; and Public Health and Safety.

11. What does Section 5.3 of the application comprise?

Answer: The various subsections in Section 5.3 describe the physical environment through which the Keystone project will pass and delineate the effects of the proposed facility on the physical environment.

12. Describe the information and impact evaluation contained in Section 5.3.1 -- Land Forms and Topography.

Answer: The pipeline will cross terrain of low relief and elevation changes of 150 feet or less. The primary land forms crossed by the pipeline route are the Dakota-Minnesota Drift and Lake-bed Flats, extending from the state boundary with North Dakota to the James River watershed.. The James River and the Missouri River constitute the only major river valleys to be crossed. These land forms consist almost entirely of geologically recent glacial deposits. Aerial photograph maps that indicate topography of the Keystone pipeline route in South Dakota are provided in Exhibit A to Keystone's application.

13. Describe the information and impact evaluation contained in Section 5.3.2 -- Geology and Paleontology.

Answer: The pipeline route crosses glacial till deposits across the nearly entire length of the South Dakota project segment. There are very limited bedrock exposures at the surface, consisting of shale, sandstone, and limestone. Limestone formations are deeply buried and pose

little risk of subsidence from fissures and sinkholes (karst). Keystone will investigate subsidence risk from potential karst hazards prior to construction and design the pipeline to account for such hazards. Glacial deposits may occasionally contain large vertebrate mammalian fossils. Keystone does not propose to recover or study mammalian fossils that are inadvertently discovered during construction. No unique geologic features protected by state or federal agencies would be crossed by the pipeline route.

14. Describe the information and impact evaluation contained in Section 5.3.3 Economic Mineral Deposits.

Answer: The pipeline will not cross currently active mineral extraction operations. The pipeline route does not cross known underlying oil, gas, coal, or metallic ore deposits. Day and Clark Counties are important producers of sand and gravel and Hanson County is a major producer of crushed stone. However, glacial sand and gravel deposits do occur over a large area within South Dakota and any limited loss of access due to the installation of the Keystone pipeline will be very small relative to the available supply.

15. Describe the information and impact evaluation contained in Section 5.3.4 -- Soils.

Answer: As detailed in Section 5.3.4 of the application, soil maps were provided for the South Dakota route in Exhibit A. The Keystone pipeline route crosses soils formed in glacial deposits consisting of clay, sand, gravel, and cobbles. From Miner County to the Nebraska state line, soils have formed in glacial deposits as well as wind-deposited loess. The majority of the soils crossed by the project are deep, with a well-developed topsoil horizon. These soils are used for row crop agriculture and pastureland. Poorly drained soils formed in glacial till with a high clay content support pothole wetlands and wet meadows. Wetlands also occupy sandy and

gravelly soils where the water table is at or near the soil surface. The predominant occurrences of soils dominated by wetlands are in Marshall and Day Counties. During construction, potential impacts to soils will be minimized by segregating topsoil from subsoils during trench excavation, by relieving compaction by ripping in heavy equipment travel areas, and by stabilizing disturbed soils using standard erosion control measures outlined in the Keystone project Construction Mitigation and Reclamation Plan (CMR Plan), submitted as Exhibit B to Keystone's application.

16. Describe the information and impact evaluation contained in Section 5.3.5 -- Erosion and Sedimentation.

Answer: Approximately five percent of the overall project surface disturbance will affect highly erodible soils. Potential impacts to soils will be minimized or mitigated through the use of the measures identified in CMR Plan.

17. Describe the information and impact evaluation contained in Section 5.3.6 -- Seismic, Subsidence and Slope Stability risks.

Answer: The Keystone Project will be located mostly in relatively level terrain in South Dakota. Where the pipeline route crosses moderately steep slopes, some grading will be required. Steep slopes need to be graded to gentler slopes for operation of construction equipment and to accommodate pipe bending limitations. Slopes will be reconstructed to their original contours during restoration. South Dakota lies within an area considered to be at the lowest possible risk for earthquakes in the U.S. There have been no earthquakes of a magnitude capable of damaging welded steel pipelines within South Dakota during historical times. The risk of significant seismic risk in South Dakota is extremely low. The risk of subsidence was previously discussed under geology and paleontology.

18. Describe the information and impact evaluation on vegetation communities and wildlife habitat contained in Section 5.5 -- Terrestrial Ecosystems.

Answer: Construction of the pipeline will disturb approximately 97 acres (three percent of the proposed corridor in South Dakota) of wetland/riparian areas. These wetlands are almost entirely palustrine emergent wetlands (wet meadows) – only 0.2 acre of forested wetlands will be affected. To mitigate the potential for impacts, Keystone will implement specific procedures as outlined in the CMR Plan. Pipeline construction through wetlands must comply, at a minimum, with USACE Section 404 permit conditions. Section 404(b)(1) guidelines restrict the discharge of dredged or fill material into wetland areas where a less environmentally damaging practicable alternative exists.

Construction of the pipeline will disturb approximately two acres (0.1 percent of the proposed corridor) of forested areas in South Dakota. Construction of the pipeline will necessitate clearing of the ROW and permanent conversion of the affected wooded areas for the permanent ROW.

Over the operational life of the pipeline, woody vegetation in forested wetlands and areas will be removed periodically above the pipeline (approximately 15 feet on each side of the centerline) to maintain visibility of the area above the pipeline for aerial pipeline observation and to permit access to all areas along the pipeline in the event of an emergency.

Of the 2,928 acres of construction ROW, approximately 752 acres represent potential wildlife habitat. The majority of this habitat consists of grasslands and pasturelands. The effects of long-term habitat loss on native wildlife populations will be relatively small since the majority of habitat disturbance will be located in agricultural habitats. Since the project involves very minimal tree clearing, the potential for disturbance of raptors is minor. Impacts resulting from

increased noise and human presence are also expected to be temporary and minor. Important wildlife habitats that will be crossed by the project route include approximately 0.5 mile of a SDGFD designated Game Production Area and the Missouri River.

Normal pipeline operations will have negligible effects on terrestrial wildlife resources. In order to reduce potential impacts to important wildlife resources as a result of maintenance activities, Keystone will consult with the appropriate state wildlife agencies prior to the initiation of maintenance activities beyond standard inspection measures.

19. With respect to Section 5.5.3 – Threatened and Endangered Species -- how were agency consultations conducted for terrestrial threatened and endangered species and other biological resources, and what surveys were completed for the Keystone Project in South Dakota?

Answer: Keystone developed general wildlife habitat and occurrence information from published sources, data bases, and interviews with state and federal agency staff. This information is included in the environmental reports in Exhibit D of the application. Keystone coordinated with the USFWS, the South Dakota Game, Fish & Parks Department, and the South Dakota Natural Heritage programs in order to initiate biological surveys in the summer of 2006 and the winter of 2006-2007. Based on consultations with the SDGFP Department and the USFWS, survey plans were developed and provided to the USFWS and SDGFP Department for review and approval. Field surveys were completed in 2006 and 2007 for the following habitats and species:

- General raptor nest surveys. A winter raptor nest survey was conducted by helicopter along the proposed pipeline route in South Dakota in January 2007. Observed nest structures in trees were located with Global Position System (GPS) instruments, and

mapped. The report on this survey was submitted to the Department of State in March 2007, and was provided to the SDPUC in response to a data request.

- Bald eagle winter roost surveys. A bald eagle winter roost survey was completed in January 2007. No roosts were observed in South Dakota within one mile of the pipeline route. The report on this survey was submitted to the Department of State in March 2007, and was provided to the SDPUC in response to a data request.
- Least tern and piping plover surveys. A nesting season survey was conducted in May 2007 at the proposed Missouri River crossing at Yankton. One pair of piping plovers was observed foraging within 0.25 mile of the pipeline centerline, but no nests or nesting behavior were observed. No least terns were observed at this crossing location. The report for this survey will be filed with the Department of State in late September 2007.
- Dakota skipper butterfly. Surveys for suitable native grassland habitat for this species were conducted in September 2006 and again in May 2007 to address pipeline routing changes. As the result of the two habitat surveys, two tracts (one in Day County, one in Yankton County) appeared to be highly suitable for Dakota Skipper occurrence. These two tracts were examined by Mr. Dennis Skadsden, a South Dakota skipper expert in late June 2007. Dakota skippers were found to be present on one tract crossed by the pipeline route in Day County. The report for the 2006 habitat survey was filed with the Department of State in November 2006; the 2007 habitat and adult skipper butterfly skipper surveys will be filed with the Department of State in September 2007.
- Western prairie fringed orchid. Surveys for suitable native grassland habitat for this species were conducted in September 2006 and again in May 2007 to address pipeline routing changes. As the result of the two habitat surveys, seven habitat sites were

examined in late June 2007 by Dr. Don Hazlett, a botanist specializing in prairie flora. No populations of the western prairie fringed orchid were found on any of these sites. The report for the 2006 habitat survey was filed with the Department of State in November 2006; the 2007 habitat and orchid surveys will be filed with the Department of State in September 2007.

20. Did Keystone consult with the U.S. Fish & Wildlife Service regarding the wetland and grassland easements that would be crossed by the pipeline?

Answer: On June 8, 2006 the U.S. Fish & Wildlife Service provided a letter regarding segments of the proposed route that would cross Fish & Wildlife Service grassland and wetland easements in South Dakota. The letter included potential re-route recommendations which would reduce the extent of wetland and grassland impacts. A re-route proposal was developed in response and presented to the Fish & Wildlife Service Refuge staff in a meeting in Fargo on July 18, 2006. As a result of the meeting, Keystone agreed to: (i) refine its route to move the route away from Day County grasslands and Raymond prairie chicken leks; and (ii) make a minor re-route to avoid the Miner County grassland easement. On September 11, 2006, Keystone provided revised route maps for the entire segment in South Dakota to the USFWS for its review and comment. Additional minor route adjustments were made to avoid wetlands within wetland easements as the result of additional USFWS comments, and supplemental wetland surveys completed in May 2007.

21. Describe the information and impact evaluation on aquatic communities contained in Section 5.6 -- Aquatic Ecosystems.

Answer: Wetlands and riverine habitats occupy approximately four percent of the proposed pipeline route. Approximately 95 percent of the wetlands crossed are characterized as

palustrine, which includes classifications such as marshes, bogs, and prairie potholes. The remaining five percent are riverine or areas that are contained within a channel. To mitigate the potential for impacts, Keystone will implement procedures as outlined in the CMR Plan.

Five perennial streams are crossed by the proposed pipeline route in South Dakota, including the Missouri River. Keystone will directionally drill the Missouri River crossing. Open-cut trenching will be used at the other perennial streams and can cause the following impacts: loss of in-stream habitat through direct disturbance, loss of bank cover, disruption of fish movement, direct disturbance to spawning, water quality effects and sedimentation effects. Impacts will be mitigated through implementation of procedures outlined in the CMR Plan.

Hydrostatic testing of the pipeline will also have minor effects on five perennial streams in South Dakota. Relatively small one-time withdrawals will occur in accordance with withdrawal permits. The discharge of hydrostatic test water will follow state permit requirements, which will reduce potential effects on water quality or aquatic organisms.

22. How were agency consultations conducted for aquatic threatened and endangered species and other biological resources, and what surveys were completed for the Keystone Project?

Answer: Seven water bodies crossed by the proposed route in South Dakota contain known or potential habitat for federally and state-listed species fish and mussel species. These include Foster Creek (Topeka shiner), South Fork Pearl Creek (Topeka shiner), Redstone Creek (Topeka shiner), Rock Creek (Topeka shiner), Wolf Creek (Topeka shiner), James River (pallid sturgeon and winged mapleleaf mussel), and the Missouri River (pallid sturgeon and scaleshell and Higgins' eye mussels).

Field surveys were completed in 2006 and 2007 for the following habitats and species:

- Topeka shiner. A Topeka Shiner habitat survey was completed in the fall of 2006 at 21 stream crossings. It was concluded that seven streams should be surveyed in 2007 to verify presence or absence of this species. Field surveys were conducted during June 2007 at seven stream crossings. A population of the Topeka shiner was verified as present in one stream in Miner County. The report on the 2006 habitat surveys was filed with the Department of State in November 2006, and attached to the SDPUC April 2007 application. The results of 2007 presence/absence surveys will be filed with the Department of State in late September 2007.
- Mussels. A field survey was conducted for the federally endangered Winged Mapleleaf and Scaleshell Mussels at the James River crossing in September 2006. Neither of these species were present, but eight species of native mussels were found. The report for this survey was filed with the Department of State in November 2006, and was attached to the SDPUC April 2007.

23. Has a Biological Assessment been submitted to the U.S. Fish and Wildlife Service for this project?

Answer: A draft Biological Assessment was submitted to Mr. John Cochnar, the USFWS lead for the Keystone project in early September 2007. Mr. Cochnar and his staff are currently reviewing this document, and feedback to the Department of State and Keystone is expected by mid-October 2007.

24. Describe the information and impact evaluation on Land Use contained in Sections 5.7.1 -- Existing Land Use, Section 5.7.2 -- Displacement, and Section 5.7.3 -- Compatibility with Existing Land Use and Measures to Ameliorate Adverse Impacts.

Answer: Section 5.7.1 of the application describes existing land uses affected by the pipeline corridor. Table 7 on page 49 summarizes this information. Of the 219.9 mile route in South Dakota, all but 0.5 mile is privately owned. The 0.5-mile segment is state-owned and managed. No Tribal or federal lands are crossed by the proposed route. No homes or residents will be displaced by the construction or operation of the Keystone Pipeline. Eighteen residences are within 500 feet of the proposed pipeline centerline.

To account for short pipeline reroutes, the lengths of land uses crossed summarized Keystone's April 2007 application were re-interpreted and recalculated for inclusion in the data request response submitted to the SDPUC on August 17, 2007 (Data Response 2-5).. The pipeline length as the result of this reinterpretation is nearly identical to that provided in the April 2007 application, and the relative lengths of land uses crossed are nearly the same.

25. Will any homes or residents in South Dakota be displaced by the construction or operation of the Keystone Pipeline?

Answer: No homes or residents will be displaced as stated in Section 5.7.2 of the application.

26. Is the Keystone Pipeline compatible with the predominant land use along the chosen route?

Answer: The Keystone Pipeline will be compatible with the predominant land use, which is rural agriculture, because the pipeline will be buried to a depth of four feet in agricultural areas, and will not interfere with normal agricultural operations. Approximately 2,251 acres or 77 percent of land disturbance will affect land in current or previous agricultural use. In most locations, the pipeline will be placed below agricultural drain tiles and drain tiles that are damaged will be repaired. The only above-ground facilities will be pump stations and block

valves located at intervals along the pipeline. The pipeline will be located away from existing rural residences and farmsteads reducing the likelihood of interference with construction of future structures and the future installation of buried utilities.

27. Describe the information and impact evaluation on air quality contained in Section 5.9 -- Air Quality.

Answer: No hydrocarbon combustion sources will operate at pump stations because the pumps will be powered by electricity provided by an electrical utility. Mobile sources include the vehicles and equipment used during construction. Fugitive sources include road dust and dust generated by construction activities along the right of way. Keystone will limit dust impacts in residential and commercial areas adjacent to pipeline construction by utilizing the dust minimization techniques in accordance with the CMR Plan, Exhibit B.

28. Describe the information and impact evaluation contained in Section 6.2.6 -- Cultural and Historical Resources.

Answer: Based on research designs approved by the South Dakota State Historic Preservation Office (SHPO), an intensive pedestrian field survey of selected segments of the proposed route was conducted in areas with high potential to contain archaeological resources in 2006. Approximately 38 miles of the proposed 219.9-mile route in South Dakota were selected for an intensive pedestrian field survey of a 300 foot construction corridor. Through 2006, 17 cultural resources and two isolated finds were located during the field surveys. Site records for five previously recorded historic railroads located within the project area were updated. The 12 cultural resources included prehistoric lithic scatters, two rock cairns, historic foundations, a house, shed, and farmstead. Of these, the two rock cairns and one archaeological artifact scatter

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were recommended as potentially eligible for the NRHP. Both of the rock cairns and the artifact scatter were avoided by rerouting the proposed pipeline centerline.

If previously undocumented sites are discovered within the construction corridor during construction activities, all work that might adversely affect the discovery will cease until Keystone, in consultation with the appropriate agencies such as SHPO, can evaluate the site's eligibility and the probable effects. If a previously unidentified site is recommended as eligible to the NRHP, impacts will be mitigated pursuant to the Unanticipated Discovery Plan submitted to the SHPO. Treatment of any discovered human remains, funerary objects, or items of cultural patrimony found on federal land will be handled in accordance with NAGPRA. Construction will not resume in the area of the discovery until the authorized agency has issued a notice to proceed. If human remains and associated funerary objects are discovered on state or private land during construction activities, construction will cease within the vicinity of the discovery and the county coroner or sheriff will be notified of the find. Treatment of any discovered human remains and associated funerary objects found on state or private land will be handled in accordance with the provisions of applicable state laws.

Reports on field surveys have been filed with the South Dakota SHPO as they have been generated. 2007 field survey reports will be filed with the Department of State in September 2007, and will also be furnished to the South Dakota SHPO. The survey reports contain preliminary site eligibility determinations. Concurrence for these determinations are pending from the Department of State and further consultations between the SHPO and Keystone are planned. All Native American consultation is being conducted by the Department of State.

29. Describe the information and the evaluation of noise impacts on sensitive land uses contained in Section 6.4.3.

Answer: Noise impacts from peak construction will be short-term (estimated to be a week to 30 days), and will occur in rural areas. There are estimated to be 18 residences within 500 feet of the pipeline route. Pump station electrical pumps will be long-term noise sources. Keystone will attenuate noise levels at any nearby residences to insure that noise from these facilities will comply with applicable federal, state, and local regulations.

30. Describe the information and the evaluation of impacts on visual resources contained in Section 6.4.4.

Answer: An analysis of recreational data bases did not identify any designated public scenic outlooks or viewing areas crossed by the pipeline route. Visual resource impacts from construction activities will be of short duration due to implementation of soil stabilization and revegetation measures contained in the CMR Plan. Pump stations will be the only aboveground components. They will represent small industrial facilities within a site of no more than five acres within a rural landscape.

31. Do you adopt those sections of the application referenced above and all of the information and analysis contained therein, as well as the data responses discussed above, as your testimony in this proceeding?

Answer: Yes.

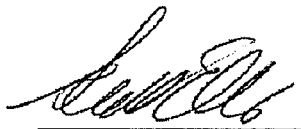
32. Do the portions of the application for which you are responsible support the granting of a permit by the Commission for the Keystone Pipeline Project?

Answer: Yes they do.

33. Does this conclude your testimony?

Answer: Yes it does.

Dated this 21st day of September, 2007.



SCOTT ELLIS

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Scott L. Ellis

Years Experience: 31

Technical Specialties

- Management of Environmental Studies Required for State and Federal Permits
- Design and Execution of Baseline and Impact Assessment Studies
- Biological Assessment for Threatened and Endangered Species

Professional History

- ENSR

Education

- BA (Biology and English) Cornell University

Representative Project Experience

A. Pipelines

Trow Engineering/TransCanada Keystone Pipeline. Current regulatory project manager for the acquisition of environmental permits for a crude oil pipeline from Alberta, Canada to refinery and pipeline interconnections destinations near Saint Louis, Illinois, and Cushing, Oklahoma. The proposed pipeline would cross the states of North and South Dakota, Nebraska, Kansas, Oklahoma, Missouri, and Illinois. Responsible for supervising environmental data collection programs (i.e. cultural resources, wetlands, and biological resources); coordination with state and federal permitting agencies concerning permit requirements; and oversight of environmental permit application preparation. Participation on a team to identify the initial project pipeline routes and land use constraints. Routing studies included reviews of state data bases, aerial photography, and aerial flyovers. Internal team responsibilities include representation of the environmental programs in team progress meetings, supervision of field office coordination teams, and overall financial responsibility for work performed by ENSR staff and 7 subcontractor companies.

BLM, Shell New Mexico Products Pipeline. Project manager for the preparation of a a third party impact statement in 2003 for a the conversion of an existing 16-inch crude oil pipeline to petroleum products service. This pipeline extends from Odessa, Texas to Bloomfield, New Mexico. The BLM was the lead federal agency, and the Bureau of Indian Affairs was a cooperating agency. The Office of Pipeline Safety provided technical review of safety aspects of the conversion process. Major issues included the operational safety of a 1950's era pipeline, and potential spill effects on aquifers and surface water supply sources.

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EXHIBIT A

BLM, U.S. Forest Service, and Federal Energy Regulatory Commission, Questar, Williams, and Kern River (QWK) Pipeline Projects Environmental Impact Statement. Project manager for an environmental impact statement project for three pipeline projects (75- and an 82-mile natural gas pipelines; 460-mile petroleum products pipeline) in the states of New Mexico, Colorado, and Utah. Major issues include the risk of petroleum product spills and natural gas releases, geologic hazards, Forest Service roadless areas, and cumulative impacts. Mr. Ellis was responsible for supervising internal staff and four specialty subcontractors.

BLM Farmington District/Mid-America Pipeline Company, Four Corners Natural Gas Liquids Loop Project Environmental Assessment and Environmental Permits. Project manager for the preparation of a BLM Environmental Assessment for a 400-mile, 12-inch natural gas liquids pipeline extending from northwest to southeast New Mexico. Primary issues for the project included a large number of sensitive species potentially affected by the project (approximately 100), extensive cultural resources, and construction methods for stream and river crossings. Responsibilities included scoping meeting organization and participation, directing staff preparing the Environmental Assessment and Biological Assessment, and coordinating with the BLM, and the Bureau of Indian Affairs, which represented the Navajo Nation and Santa Ana and Zia Pueblos. The Environmental Assessment was completed on an expedited schedule of 7 months.

Mr. Ellis also supervised construction monitoring and inspection for sensitive plant and animal species, and sensitive stream crossings and wetland areas. The inspection and monitoring team included up to 5 staff stationed at various locations.

BLM Utah State Office/Williams Pipeline Company, Rocky Mountain System Natural Gas Liquids Loop Project Environmental Assessment and Environmental Permits. Project manager for the preparation of an Environmental Assessment for a 412-mile natural gas liquids 11-to 16-inch natural gas liquids loop pipeline between Bloomfield, New Mexico, and Browns Park, Utah. Responsibilities included supervision of the preparation of the environmental assessment, the biological assessment, sections of the project Plan of Development, 404 Permit Applications, and Storm Water and Hydrostatic Test Discharge Permit Applications. ENSR also provided biological resource and water quality protection measure compliance surveys and inspection during construction. Mr. Ellis supervised internal staff and two specialty biological subcontractor firms.

FERC, BLM , Entrega Natural Gas Pipeline EIS. Project manager for the preparation of a third party impact statement in 2005 for a 328-mile 36 to 42-inch diameter pipeline from the Piceance Basin of Colorado to the vicinity of Cheyenne, Wyoming. FERC was the lead federal agency, and the BLM a cooperating agency. Major issues included river

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crossings, and cumulative impacts with other existing and proposed pipeline projects sharing the same pipeline corridor.

FERC, BLM, WIC Piceance Basin Expansion Natural Gas Pipeline EIS. Project manager for the preparation of a third party impact statement in 2005 for a 142-mile 24-inch diameter pipeline from the Piceance Basin of Colorado to the vicinity of Wamsutter, Wyoming. FERC was the lead federal agency, and the BLM a cooperataing agency. Major issues included river crossings, and cumulative impacts with other existing and proposed pipeline projects sharing the same pipeline corridor.

BLM, U.S. Forest Service, Federal Energy Regulatory Commission/ KN Energy, Questar, TransColorado Pipeline Environmental Impact Statement and Environmental Permits. Project manager for the preparation of a third-party environmental impact statement in 1992 for a 300-mile natural gas pipeline from northwestern Colorado to northwestern New Mexico. Lead agencies were the Federal Energy Regulatory Commission, BLM, and the U.S. Forest Service. Major issues included pipeline routing alternatives in relation to land use and natuaral resources, expansion of existing utility corridors, threatened and endangered species, air quality in Class I areas, and visual effects. Technical field studies included effects on municipal water supply areas, effects of saline soils, and potential effects on threatened and endangered species, including the Mexican spotted owl, black-footed ferret, and bald eagle. Mr. Ellis was responsible for all aspects of environmental impact statement preparation including facilitation of scoping meetings, hearings, and interagency review meetings. In 1998, Mr. Ellis supervised the preparation of a Supplement to the final environmental impact statement that addressed new issues that emerged since 1992.

Mr. Ellis directed field studies required for U.S. Fish and Wildlife Service Section 7 consultation, COE 404 permit applications, and was responsible for oversight of a major cultural resource program that included mitigation of numerous large archaeological sites in southwestern Colorado and northwestern New Mexico.

Mr. Ellis also directed biological compliance inspections and surveys during pipeline construction, and participated in the processing of construction variance requests. Mr. Ellis was the primary contact with TransColorado and the agencies during the permitting period and construction. The permitting portion of the project was completed in 9 months under an expedited schedule so that construction could begin during the summer of 1998; construction was completed in 6 months.

BLM/Burlington Resources/Enron Capital and Trading, Lost Creek Gathering System Environmental Assessment, Wyoming. Project manager for a 150-mile natural gas gathering pipeline system. Supervised the preparation of a BLM environmental assessment, Biological Assessment for threatened and endangered species, 404 application, water quality applications and plans, and air quality permit applications.

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Other studies included cultural resource surveys, aerial and ground surveys for endangered species, and wetland delineations. Special considerations included pipeline route selection that involved evaluation of the risk of encountering contaminated groundwater at trench depth near at a uranium mill site being closed under Nuclear Regulatory Commission oversight, and mitigation for multiple crossings of the Oregon Trail and other historic trails near Jeffrey City.

Mr. Ellis supervised pre-construction and construction monitoirng surveys for raptors, sage grouse, and other sensitive species during the construction and reclamation period.

BLM/Amoco Production Company, Cave Creek Sour Gas System Environmental Assessment. Manager for the Cave Creek Sour Gas Project, a 40-mile sour gas gathering system. Key issues on this environmental assessment were risks from sour gas (hydrogen sulfide) releases and pipeline routing options that would minimize the risk of sour gas exposure to humans, wildlife, and fish.

Federal Energy Regulatory Commission and California State Lands, Questar Southern Trails Environmental Impact Statement/Environmental Impact Report. Project manager for a 675-mile crude-oil to natural gas pipeline conversion project from northwestern New Mexico, across Arizona to Long Beach, California. ENSR was the environmental impact statement/environmental impact report contractor under the direction of Federal Energy Regulatory Commission and California State Lands. Major issues included urban construction effects, construction across Navajo Nation and Hopi lands, seismic hazards, and threatened and endangered species. Mr. Ellis was responsible for supervision of internal staff, and four specialty subcontractor firms.

Federal Energy Regulatory Commission and California State Lands, Tuscarora Natural Gas Pipeline Environmental Impact Statement/Environmental Impact Report. As a subcontractor to Resource Management, Inc, assistant project manager responsible for physical resource discipline sections for a joint federal and state Environmental Impact Statement/Environmental Impact Report for an approximately 300-mile, 20-inch natural gas pipeline form southeastern Oregon to Reno, Nevada. ENSR staff conducted field reviews, prepared Environmental Impact Statement/Environmental Impact Report sections, and participated in agency review meetings during the document preparation process.

Federal Energy Regulatory Commission and BLM/Tuscarora Pipeline Company, Hungry Valley Natural Gas Lateral Federal Energy Regulatory Commission Resource Reports and Environmental Assessment. Project manager for preparation of land use and soils sections of Federal Energy Regulatory Commission resource reports for a 15-mile natural gas pipeline lateral located on the north side of Reno, Nevada. Major issues included pipeline construction effects within residential areas, and cumulative effects among various development projects.

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Washington Energy Facility Siting Council, TransMountain Pipeline Preliminary Study. Participant in a scoping study to determine environmental impact statement issues for a controversial crude oil pipeline project that would cross Puget Sound along both underwater and overland segments. The major project issue was the relative oil spill risks of pipeline operation versus the existing tanker traffic across the Sound. Responsible for participating in public meetings and providing a framework for evaluating oil spill risk issues in the environmental impact statement.

El Paso Natural Gas Co., All-American Pipeline Conversion Project. Principal-in-charge for conversion of an existing crude oil pipeline to natural gas service for the California segment of the pipeline. Oversight of Federal Energy Regulatory Commission resource report preparation, field surveys, and coordination with state and federal agencies.

Fluor Engineering, Champlain Pipeline Project. Environmental studies manager for a Federal Energy Regulatory Commission open-season application for a 300-mile natural gas pipeline project that crosses Vermont, New Hampshire, and Massachusetts. Managed technical staff, report production, and state and federal agency interactions.

K N Energy, Pony Express Pipeline Project Federal Energy Regulatory Commission Resource Reports, Applicant-Prepared Environmental Assessment, and Environmental Permits. Project manager for the preparation of Federal Energy Regulatory Commission resource reports and applicant-prepared Environmental Assessment for an 800-mile crude oil to natural gas conversion project in Wyoming, Nebraska, Colorado, Kansas, and Missouri. Major issues included cultural resources and threatened and endangered species. ENSR prepared all required storm water, COE 404 permit applications, coordinated with the State Historic Preservation Officers in the respective states, and obtained concurrence letters from the U.S. Fish and Wildlife Service. ENSR provided biological compliance survey support during construction. Mr. Ellis was responsible for managing five cultural resources contractors for various work locations along the pipeline, and for supervising the preparation of project construction compliance documents and environmental inspector training. Mr. Ellis provided primary coordination with Federal Energy Regulatory Commission staff during resource report and Environmental Assessment preparation, and supported K N Energy during negotiations with the Federal Energy Regulatory Commission concerning Certificate environmental conditions.

Northern Tier Pipeline Co., Northern Tier Crude Oil Pipeline Project. Vegetation task manager for a multi-state crude oil pipeline originating in Washington. Responsible for vegetation mapping, evaluating impacts, preparing revegetation guides, and conducting threatened and endangered plant surveys.

Williams Brothers Engineering, ARCO Ferndale Pipeline. Assistant project manager for a 34-mile, 16-inch natural gas pipeline from Sumas to Cherry Point, Washington. Prepared Federal Energy Regulatory Commission environmental report in 2 months. Issues included shoreline permits, wetlands, fisheries, endangered species, and cultural resources

B. Oil and Gas Field Development

BLM, Forest Service/Exxon et al., Riley Ridge Natural Gas Environmental Impact Statement. Vegetation task manager for a third-party Environmental Impact Statement for a gas field development in western Wyoming. Coordinated soil/vegetation correlation and impact assessment activities.

ICATEC S.A./PEMEX, Chicontepec Paleocanal Development Project. Land use task manager for a comprehensive oil field/infrastructure impact analysis for a large oil field in the state of Veracruz, Mexico. Responsible for defining land use patterns and identifying land use constraints in locating drilling sites and pipelines.

BLM/Wildrose Resources, Wildrose Pariette Unit Waterflood Project Environmental Assessment. Project manager for evaluating the effects of using surface water for an oil field waterflooding project in the Uinta Basin of Utah. Issues included effects on wildlife habitats in an adjacent Area of Critical Environmental Concern, and additional surface disturbance associated with construction of injection wells.

BLM/Chevron, Brennan Bottom Waterflood Project Environmental Assessment. Project manager for evaluating the effects of using surface water obtained from the Green River for an oil field waterflooding project in the Uinta Basin of Utah. Environmental Assessment issues included potential water withdrawal effects on threatened and endangered species inhabiting the Green River, and surface disturbance from construction of 14 new producing wells and 11 injection wells within the 1,200-acre Brennan Bottom Unit.

BLM/Coastal Oil and Gas Corporation, Natural Buttes Unit Environmental Assessment. Project manager for an infill expansion of an existing natural gas field in the Uinta Basin of Utah. This expansion consisted of the addition of up to 875 wells within the 78,000-acre Natural Buttes Unit. Environmental Assessment issues included visual resource effects seen from the White River, which is frequented by recreational boaters, and potential effects on nesting raptors and on threatened and endangered species.

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BLM/Enron Oil and Gas Company, Chapita Wells Unit Environmental Assessment. Principal-in-charge and senior reviewer for an infill expansion of an existing natural gas well field in the Uinta Basin of Utah. The expansion consisted of drilling 99 additional wells within the 12,000 Chapita Wells Unit. Environmental Assessment issues included visual resource effects of drill sites seen from the White River, which is frequented by recreational boaters; drill sites potentially seen from Fantasy Canyon, a unique geologic area; and potential effects on nesting raptors and on threatened and endangered species.

BLM/Resource Development Group, Resource Development Group Natural Gas Field Development Environmental Assessment. Principal-in-charge and senior reviewer for a new and existing natural gas field development project in the southern Uinta Basin of Utah. The proposed project consisted of drilling 970 wells on an 80-acre spacing within an area of approximately 80,000 acres. Environmental Assessment issues included loss of mule deer winter range and winter range use and mitigation of these losses; effects on sage grouse; effects on threatened and endangered species; development effects on areas that may be proposed for wilderness in the future; and cumulative effects of oil and gas development across the Uinta Basin.

BLM/Wexpro Company, Island Unit Environmental Assessment. Principal-in-charge and senior reviewer for an expansion of an existing natural gas field development in the Uinta Basin of Utah. The proposed project consisted of drilling 97 wells on 40-acre spacing within a 6,900 unit. Environmental Assessment issues included concerns about threatened and endangered species, construction in floodplains, and cumulative effects on air and water resources.

BLM/BIA/Costilla Energy, Hill Creek Unit Environmental Assessment. Principal-in-charge and senior reviewer for an expansion of an existing natural gas field development in the Uinta Basin of Utah. The proposed project consisted of drilling 47 wells on 40-acre spacing within a 5,350 unit located on BLM and the Uintah/Ouray Indian Reservation. Environmental Assessment issues included and amendment to the BLM Book Cliffs Resource Management Plan; concerns about threatened and endangered species, construction in floodplains, and cumulative effects on air and water resources.

H. Water Resource Development and Management

Basin Electric Power Cooperative, Grayrocks Dam. Participated in public hearings on downstream effects of water withdrawals on the Platte River resulting from construction of the Grayrocks Dam on the Laramie River. Presented testimony on the environmental variables that affect vegetation encroachment into the Platte River channel.

Denver Water Department, Two Forks Dam Threatened and Endangered Species Studies. Technical specialist responsible for the preparation of biological assessments for federally listed and candidate species that would be potentially affected by the construction and operation of the Two Forks Dam west of Denver, Colorado.

Responsible for the design and execution of population field studies for the Pawnee Montane Skipper butterfly, and for providing witness testimony on Platte River use by threatened and endangered species during agency hearings on the project.

Wyoming Attorney General, Technical and Litigation Support for Threatened and Endangered Species Issues, Platte River. Project manager responsible for providing technical support and expert testimony on endangered species potentially affected by water management changes in the North Platte and Platte River systems. Provided expert witness testimony on Platte River use by threatened and endangered species during instream flow hearings conducted by Nebraska water agencies.

Platte River Whooping Crane Habitat Maintenance Trust, Monitoring Plan. Project manager for developing a habitat monitoring plan for the Big Bend region of Nebraska. The plan included procedures for developing an automated land cover mapping system and employing habitat suitability models to measure the importance of habitat changes.

Bureau of Reclamation, Niobrara River Whooping Crane Habitat Study. Project manager for evaluating the effects of constructing the Norden Dam on the Niobrara River in Nebraska on whooping crane nesting and feeding habitat. The purpose of the project was to define operational criteria that could be used to maintain crane habitat after dam construction between the Bureau of Reclamation and U.S. Fish and Wildlife Service.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **DIRECT TESTIMONY OF ROBERT JONES**

1. Please state your name and address for the record.

Answer: Robert Jones. My address is 56 Straddock Cres SW, Calgary, Alberta, Canada

2. What is your position with TransCanada ?

Answer: I am a Vice President of TransCanada Pipelines, responsible for the implementation of the Keystone Pipeline project. In that capacity, I am responsible for overall leadership and direction of the TransCanada Keystone Pipeline project.

3. Please state your professional qualifications.

Answer: I am a professional engineer. I am registered to practice in the Province of Alberta.

4. Have you provided your resume?

Answer: Yes my resume is attached to my prepared testimony as Exhibit A.

5. Are you responsible for portions of the application which TransCanada Keystone Pipeline, LP (Keystone) has filed with the South Dakota Public Utilities Commission seeking a siting permit for the Keystone Pipeline?

Answer: Yes.

6. Is Section 1, the Introduction to the Application, one of those sections of the application for which you are responsible?

Answer: Yes.

7. Can you summarize the information in that portion of the application?

Answer: Section 1.1 describes the project purpose, which is to transport crude oil production from the Western Canadian Sedimentary Basin (WCSB) to meet growing demand by refineries and markets in the United States. This supply will serve to replace U.S. reliance on less stable and reliable sources of offshore crude oil. The demand for the Keystone project is addressed in greater detail later in my testimony and in Chapter 3 of the application.

Section 1.2 provides a project overview and general site description. Keystone proposes to construct and operate a crude oil pipeline and related facilities from a crude oil supply hub at Hardisty, Alberta to Wood River and Patoka, Illinois and to Cushing, Oklahoma. The initial phase of the project to Wood River and Patoka will have a nominal capacity of 435,000 barrels per day (bpd). As the result of a successful second open season, Keystone has now received sufficient shipper commitments to support the proposed extension to Cushing, which will include additional pumping capacity to expand the nominal capacity of the pipeline to 591,000 bpd. The pipeline is proposed to enter South Dakota in Marshall County and extend southerly, exiting the state underneath the Missouri River near Yankton, South Dakota. The length of the pipeline in South Dakota will be approximately 220 miles and will cross 10 counties.

Section 1.3 states that the total estimated cost of equipment and installation of the Keystone project in South Dakota is expected to be approximately $302 million (U.S.).

Section 1.4 states that Keystone proposes to commence construction of the pipeline in South Dakota in April, 2008, and to complete construction in November, 2009. Construction in

South Dakota will be conducted in three spreads. One spread will be constructed in 2008 and the remaining two spreads will be constructed in 2009. Keystone expects to place its pipeline in service in November 2009. This in-service date is consistent with meeting the requirements of the shippers who have made the contractual commitments that underpin viability and need for the project.

Section 1.5 indicates that the permit applicant and sole participant in the project at this time is TransCanada Keystone Pipeline, LP.

Section 1.6 identifies those individuals authorized to receive communications regarding Keystone's application.

Section 1.7 states that Keystone anticipates that the pipeline will be wholly owned, managed, and operated by TransCanada Keystone Pipeline, LP., and identifies the project manager for the project.

Section 1.8 indicates that, in addition to the siting permit required from the South Dakota Public Utilities Commission, Keystone is required to obtain a Presidential Permit from the U.S. Department of State to cross the international border. As required by the National Environmental Policy Act (NEPA), the Department of State is preparing an Environmental Impact Statement (EIS) with respect to the project. On August 10, 2007, the Department of State issued a Draft EIS, which tentatively concluded that the Keystone project would result in limited adverse environmental impacts both during construction and operation, and would be an environmentally acceptable action. The comment period on the Draft EIS closes September 24, 2007, and a Final EIS is expected in November or December 2007. The principal additional Federal and South Dakota permits required are listed in Table 1 of the application.

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8. Mr. Jones, is Keystone connected or related to the proposed Hyperion refinery at Elk Point, South Dakota?

Answer: No it is not. Keystone is a 591,000 bpd pipeline with 495,000 bpd in firm contracts. The average term of those contracts is 18 years. Keystone's firm contracts require oil to be delivered at Wood River, IL, Patoka, IL, and Cushing, OK. Hyperion is not included as a firm shipper. Keystone has not negotiated any shipping contracts or connection contracts with the proposed Hyperion refinery or any other proposed refinery.

9. Are you responsible for Section 2.1 Nature of Proposed Project"?

Answer: Yes.

10. Can you summarize the information in that portion of the application?

Answer: Section 2.1.1 states that approximately 220 miles of pipeline will be constructed in South Dakota. Detailed route maps for the project are provided at Appendix A of the Application. There will be aboveground facilities including four pump stations, isolation valves, and densitometers. Powerlines required to provide power to pump stations, remotely activated isolation valves, and densitometers will be permitted and constructed by local utilities, not by Keystone.

Section 2.1.2 addresses future expansion. As I stated, sufficient shipper commitments have been obtained to support expansion of the pipeline to Cushing, and to a nominal capacity of 591,000 bpd, which will require the addition of one to three additional electric pumps within the footprint of the proposed pump stations located in South Dakota.

11. Are you responsible for Section "3.0 Demand for Facility"?

Answer: Yes.

12. Can you summarize the information in that portion of the application?

Answer: Yes I can. The need for the project is dictated by a number of factors including increasing crude oil demand in the United States, and decreasing United States' domestic crude oil supply, opportunity to reduce U.S. dependence on foreign off-shore sources of crude oil, increasing WCSB crude oil supply, insufficient pipeline capacity, and binding shipper commitments to utilize the Keystone Pipeline Project. The United States' demand for petroleum products continues to increase at the same time domestic crude oil supplies continue to decline. The United States historically has compensated for decreases in domestic production through increased imports in Canada and off-shore sources. Keystone will provide opportunities for refiners in the United States to utilize Canadian crude oil and will provide the United States with access to secure and growing Canadian crude oil supplies. Access to that Canadian crude oil supply provides an opportunity for the U.S. to decrease its dependence on off-shore foreign crude oil. Established crude oil reserves in the WCSB are estimated at 179 billion barrels of oil. Therefore, Canada has the second largest amount of crude oil reserves in the world.

As discussed at the South Dakota public input hearings, TransCanada and Keystone neither produce nor own the crude oil. TransCanada is a regulated utility providing owners of the crude oil or shippers with a means to transport their commodity to market. The Keystone Project will provide initially 435,000 bpd of capacity and will provide up to 591,000 bpd. Keystone conducted a binding open season in December, 2005, and a subsequent expansion open season in April 2007 to provide shippers an opportunity to participate in the Project by entering into commitments for pipeline capacity. Binding contracts for 495,000 bpd have been executed. These binding commitments demonstrate the need for incremental pipeline capacity and access to Canadian crude supplies. Keystone expects the remainder of the excess capacity will be utilized by non-contract shippers at the tariff rate to be approved by FERC.

13. Does the proposed Hyperion refinery or any other proposed refinery have an impact on the need for the Keystone project?

Answer: No, Keystone is not dependent on the construction of the Hyperion refinery or any other proposed refinery.

14. Are you responsible for Section 6.1.5 "Taxes"?

Answer: Yes.

15. Can you summarize the information in that portion of the application?

Answer: Section 6.1.5 of Keystone's application estimates that, based on current tax rates, the Keystone pipeline will generate approximately $6.5 million in tax revenues to the state in the first year after construction. During construction, the Keystone project will pay sales tax and contractor's excise tax. Based on an estimated construction cost of $300 million and state sales and use tax at 4%, Keystone would pay approximately $12 million in state sales and use tax over the construction of the project. Contractor's excise tax is 2% additional, which would result in another $6 million. This would result in an estimated $18 million in sales and use taxes for the construction of the project. I am informed that there is a provision in current South Dakota law providing for a refund of sales taxes which may apply to the project. Thus, it is quite possibile that Keystone could receive a 75% refund of those taxes, which would result in a refund amount of $13.5 million.

It is difficult to state with certainty what the eventual property taxes of the system will be. The pipeline itself will be centrally assessed under state law, assigned a value by the South Dakota Department of Revenue and Regulation, and the values sent back to the county for application of their mill levies. Further, the four pump stations will be assessed most likely as

industrial property by the counties in which they are situated and those tax revenues will go directly to those counties as well.

Keystone does believe that the property taxes paid to each county will be counted as "local effort" as far as the state's education funding formula under current state law.

16. Are you responsible for Section "6.1.6 Other Economic Benefits"?

Answer: Yes.

17. Can you summarize the information in that portion of the application?

Answer: Keystone intends to purchase fuel and associated equipment and will require equipment rentals, maintenance and repair during construction of the project. All of these additional expenditures will produce economic benefits in the state.

18. Are you responsible for providing the information requested in Data Request 1-1?

Answer: Yes.

19. Please summarize your response to Data Request 1-1.

Answer: Delay or termination of the project would have substantial adverse impacts upon the local economies, Keystone shippers, US refiners and US consumers. Delay or termination would prevent Keystone from meeting the needs of these constituencies in providing them with needed crude oil necessary to meet demand as outlined in the response.

20. Are you responsible for providing the information requested in Data Request 1-8?

Answer: Yes.

21. Please summarize your response to Data Request 1-8.

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Answer: Construction of the pipeline will create positive impacts upon the income of the communities near the pipeline in the short term. In the long term, the pipeline is not expected to have a significant impact on the income, occupational distribution or cohesion of the local communities.

22. Are you responsible for providing the information requested in Data Request 1-11?

Answer: Yes.

23. Please summarize your response to Data Request 1-11.

Answer: Keystone anticipates three full time employees in South Dakota, including two journeyman electricians and one pipeline technician. We expect that there will be from 50-60 part time contractual positions for various aspects of operation.

24. Do you adopt the information in the above Sections of Keystone's application, and the above data responses as your testimony in this proceeding?

Answer: Yes I do.

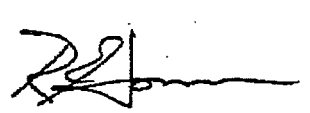
25. Do the portions of the application for which you are responsible support the granting of a siting permit by the Commission for the Keystone Pipeline Project?

Answer: Yes they do.

26. Does this conclude your testimony?

Answer: Yes it does.

Dated this 21 day of September, 2007.



ROBERT JONES

009706

ROBERT E. JONES
56 Straddock Cres. S.W.
Calgary, Alberta, Canada
T3H 2T2

Robert E. Jones, P.Eng.

PROJECT ROLE:

VICE PRESIDENT KEYSTONE OIL PIPELINE

QUALIFICATIONS:

- *B.Sc. Engineering – University of Alberta, 1983*
- *International Finance Certificate*
- APEGGA - *Professional Engineer*

EXPERIENCE SUMMARY:

Appointed Vice President of the Keystone Oil Pipeline project in June 2006. Lead developer of the Keystone project from initial concept in 2003.

Worked in the Business Development group for TransCanada since 2000 with responsibilities to identify new business opportunities and providing commercial and market expertise. These efforts include TransCanada's re-entry into Mexico, market analysis of LNG proposals, and commercial analysis of pipeline acquisition opportunities.

Over twenty three years of professional experience in Business Development, Management, Engineering, and Operations of natural gas and liquid hydrocarbon pipeline systems. Highly skilled in negotiating, relationship management, selling, project management, and business analysis. Effective in finding new business opportunities, developing and signing large, complex deals.

TRANSCANADA

12/1997 – Present

TransCanada PipeLines

Director Eastern Business Development — Calgary, AB

- accountable for developing pipeline projects in the US Northeast and lead developer of the Northwinds project
- Management committee representative on Iroquois, Millennium and Portland partially owned pipeline entities

Director Operations Services — Calgary, AB

- Engineering & Operations Process Optimization initiative

TransCanada International

Venture Manager Calgary, AB

- Bid Manager – Jose Crude Oil Storage and Ship Loading Terminal
- US $400 million Acquisition, Build, Own & Operate Bid
- Bid Manager – Bare/Aguasay Gas Compression and Processing Project
- US $200 million Build, Own and Operate Bid

ENBRIDGE

02/1996 – 12/1997

IPL International

Manager Venezuela Operations Caracas, Venezuela

- Business Development
- TAP, Oriente, Cerro-Negro and PetroZuata Pipeline proposals

Project Specialist Calgary, AB

- OCENSA PRB member
- Proposals in Russia, Thailand and Venezuela

09/1987 - 02/1996

Interprovincial Pipeline

Project Manager Edmonton, AB

- System Expansion Program Phase I & II

ENBRIDGE

Senior System Development Engineer Edmonton, AB

Team Leader, Pipeline Integrity Edmonton, AB

Senior Operations Engineer Edmonton, AB

Operations Engineer. District 2 Regina, SK

Project Engineer Edmonton, AB

NOVA

06/1983 – 09/1987

Nova Corporation

Pipeline Engineer, Operations Edmonton, AB

District Engineer, Brooks Brooks, AB

EIT, Western Operations Edmonton, AB

05/1981 – 08/1981, 05/1982 – 08/1982 Edmonton, AB
Gas Control

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **DIRECT TESTIMONY OF BRIAN THOMAS**

1. Please state your name and address for the record.

Answer: My name is Brian Thomas. My address is 237 Wolf Willow Crescent, Edmonton, Alberta, Canada.

2. What is your role with the TransCanada Keystone Pipeline project?

Answer: I am the president of BRIWEST Energy Ltd. and I am currently providing consulting services to the Keystone project.

3. Please state your position with Keystone and provide a description of your areas of responsibility.

My position with Keystone is Coordinator, Oil Movements. My areas of responsibility for the Keystone project include the areas of Oil Movements and Operations. More specifically, Oil Movements includes the Operations Control Center along with the associated systems, as well as the pipeline scheduling and oil accounting functions. My responsibilities in the Operations area include the further development of Keystone's Emergency Response Plan (ERP) or Oil Spill Response Plan.

4. Please state your professional qualifications and experience with pipeline operations.

Answer: I am a registered professional engineer in the province of Alberta, Canada. I have approximately 27 years of technical, operations and management experience in pipeline, facilities development and operations.

5. Have you provided a resume?

Answer: Yes, my resume is attached as Exhibit A.

6. Are you responsible for portions of the application which Keystone has filed with the South Dakota Public Utilities Commission seeking a siting permit for the Keystone Pipeline?

Answer: Yes.

7. Are you responsible for the information provided in Section 2.3.2 of the application, on "Abnormal Operations"?

Answer: Yes I am.

8. Would you please describe Keystones responsibilities with respect to abnormal operations?

Answer: Keystone must comply with the Code of Federal Regulations including 49 CFR Part 195.402 with respect to the preparation of manuals and procedures for responding to abnormal operations. Section 195.402(a) requires a pipeline operator to prepare and follow a manual of written procedures for conducting normal operations and maintenance activities and handling abnormal operations and emergencies.

Section 195.402(d) (Abnormal Operation) requires the manual to include procedures for the following to provide safety when operating design limits have been exceeded:

(1) Responding to, investigating, and correcting the cause of:

(i) Unintended closure of valves or shutdowns;

(ii) Increase or decrease in pressure or flow rate outside normal operating limits;

(iii) Loss of communications;

(iv) Operation of any safety device;

(v) Any other malfunction of a component, deviation from normal operation, or personnel error which could cause a hazard to persons or property.

(2) Checking variations from normal operation after abnormal operation has ended at sufficient critical locations in the system to determine continued integrity and safe operation.

(3) Correcting variations from normal operation of pressure and flow equipment and controls.

(4) Notifying responsible operator personnel when notice of an abnormal operation is received.

(5) Periodically reviewing the response of operator personnel to determine the effectiveness of the procedures controlling abnormal operation and taking corrective action where deficiencies are found.

Section 195.402(e) (Emergencies) requires the manual to include procedures for the following to provide safety when an emergency condition occurs:

(1) Receiving, identifying, and classifying notices of events which need immediate response by the operator or notice to fire, police, or other appropriate public officials and communicating this information to appropriate operator personnel for corrective action.

(2) Prompt and effective response to a notice of each type emergency, including fire or explosion occurring near or directly involving a pipeline facility, accidental release of hazardous

liquid or carbon dioxide from a pipeline facility, operational failure causing a hazardous condition, and natural disaster affecting pipeline facilities.

(3) Having personnel, equipment, instruments, tools, and material available as needed at the scene of an emergency.

(4) Taking necessary action, such as emergency shutdown or pressure reduction, to minimize the volume of hazardous liquid or carbon dioxide that is released from any section of a pipeline system in the event of a failure.

(5) Control of released hazardous liquid or carbon dioxide at an accident scene to minimize the hazards, including possible intentional ignition in the cases of flammable highly volatile liquid.

(6) Minimization of public exposure to injury and probability of accidental ignition by assisting with evacuation of residents and assisting with halting traffic on roads and railroads in the affected area, or taking other appropriate action.

(7) Notifying fire, police, and other appropriate public officials of hazardous liquid or carbon dioxide pipeline emergencies and coordinating with them preplanned and actual responses during an emergency, including additional precautions necessary for an emergency involving a pipeline system transporting a highly volatile liquid.

(8) In the case of failure of a pipeline system transporting a highly volatile liquid, use of appropriate instruments to assess the extent and coverage of the vapor cloud and determine the hazardous areas.

(9) Providing for a post accident review of employee activities to determine whether the procedures were effective in each emergency and taking corrective action where deficiencies are found.

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Section 195.402(f) (Safety-related condition reports) requires the manual to include instructions enabling personnel who perform operation and maintenance activities to recognize conditions that potentially may be safety-related conditions that are subject to the reporting requirements of 49 CFR Section 195.55.

9. Would you please describe Keystones responsibilities with respect to normal operation?

Answer: Keystone must comply with Federal Regulations including 49 CFR Part 195.402 (c) with respect to the preparation of manuals and procedures as follows to provide safety during maintenance and normal operations:

(1) Making construction records, maps, and operating history available as necessary for safe operation and maintenance.

(2) Gathering of data needed for reporting accidents under subpart B of this part in a timely and effective manner.

(3) Operating, maintaining, and repairing the pipeline system in accordance with each of the requirements of this subpart and subpart H of this part.

(4) Determining which pipeline facilities are located in areas that would require an immediate response by the operator to prevent hazards to the public if the facilities failed or malfunctioned.

(5) Analyzing pipeline accidents to determine their causes.

(6) Minimizing the potential for hazards identified under paragraph (c)(4) of this section and the possibility of recurrence of accidents analyzed under paragraph (c)(5) of this section.

(7) Starting up and shutting down any part of the pipeline system in a manner designed to assure operation within the limits prescribed by § 195.406, consider the hazardous liquid or

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carbon dioxide in transportation, variations in altitude along the pipeline, and pressure monitoring and control devices.

(8) In the case of a pipeline that is not equipped to fail safe, monitoring from an attended location pipeline pressure during start-up until steady state pressure and flow conditions are reached and during shut-in to assure operation within limits prescribed by § 195.406.

(9) In the case of facilities not equipped to fail safe that are identified under paragraph 195.402(c)(4) or that control receipt and delivery of the hazardous liquid or carbon dioxide, detecting abnormal operating conditions by monitoring pressure, temperature, flow or other appropriate operational data and transmitting this data to an attended location.

(10) Abandoning pipeline facilities, including safe disconnection from an operating pipeline system, purging of combustibles, and sealing abandoned facilities left in place to minimize safety and environmental hazards. For each abandoned offshore pipeline facility or each abandoned onshore pipeline facility that crosses over, under or through commercially navigable waterways the last operator of that facility must file a report upon abandonment of that facility in accordance with § 195.59 of this part.

(11) Minimizing the likelihood of accidental ignition of vapors in areas near facilities identified under paragraph (c)(4) of this section where the potential exists for the presence of flammable liquids or gases.

(12) Establishing and maintaining liaison with fire, police, and other appropriate public officials to learn the responsibility and resources of each government organization that may respond to a hazardous liquid or carbon dioxide pipeline emergency and acquaint the officials with the operator's ability in responding to a hazardous liquid or carbon dioxide pipeline emergency and means of communication.

(13) Periodically reviewing the work done by operator personnel to determine the effectiveness of the procedures used in normal operation and maintenance and taking corrective action where deficiencies are found.

(14) Taking adequate precautions in excavated trenches to protect personnel from the hazards of unsafe accumulations of vapor or gas, and making available when needed at the excavation, emergency rescue equipment, including a breathing apparatus and, a rescue harness and line.

10. Could you briefly describe how Keystone will operate its pipeline?

Answer: Keystone will utilize a Supervisory Control and Data Acquisition (SCADA) system to remotely monitor and control the pipeline system. In summary, highlights of Keystone's SCADA system will include:

- Redundant fully functional Backup system available for service at all times
- Automatic features installed as integral components within the SCADA system to ensure operation within prescribed pressure limits
- Additional automatic features installed at the local pump station level will also be utilized to provide pipeline pressure protection in the event communications with the SCADA host are interrupted

11. Could you describe the leak detection systems and methods Keystone will employ?

Answer: Keystone will have a number of complimentary leak detection methods and systems available within the Operations Control Center (OCC), which is manned on a 24(hrs/day) x 7(days/week) basis. These methods and systems are overlapping in nature and progress in leak detection thresholds.

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- The first leak detection method is remote monitoring performed by the OCC Operator. Remote monitoring consists primarily of pressure and flow data received from pump stations and valve sites fed back to the OCC by the Keystone SCADA system. Remote monitoring is typically able to detect leaks down to approximately 25% – 30% of pipeline flow rate.
- Next are software based volume balance systems that monitor injection and delivery volumes. These systems are typically able to detect leaks down to approximately 5% of pipeline flow rate.
- Next are Computational Pipeline Monitoring or model based leak detection systems that break the pipeline system into smaller segments and monitor each of these segments on a mass balance basis. These systems compensate for line pack and are typically capable of detecting leaks down to a level approximately 1.5% - 2% of pipeline flow rate.
- Finally, we will use direct observation methodologies, which include aerial patrols, ground patrols and public and landowner awareness programs that are designed to encourage and facilitate the reporting of suspected leaks and events that may suggest a threat to the integrity of the pipeline.

12. Are there any corrections you would like to make to Section 2.3.2 of Keystone's application?

Answer: I would like to make two corrections. First, the last sentence of Section 2.3.2 at page 16 should be deleted. If a reportable leak were to occur, the USDOT regulations do not require the agency's approval prior to resuming operations. Second, at Section 2.3.2.1, page 16, the second sentence of the second paragraph should read "The ERP will be submitted to the USDOT for review, prior to operation." The USDOT then advises the operator of any concerns with the ERP.

13. Are you responsible for Section 6.4.2 of Keystone's application?

Answer: I am responsible, in part, for this section. My responsibilities are to ensure compliance with the operational requirements prescribed by the US DOT. This includes the areas of pipeline operation, maintenance and emergency response all of which are intended to ensure public and environmental protection and prevent accidents and failures. Keystone has submitted a preliminary Emergency Response Plan (ERP) to the Department of State. The ERP outlines the measures that will be undertaken to mitigate the impact of a crude oil release.

14. At the PUC public comment sessions, it was suggested that a leak of 1.5% of the pipeline volume could remain undetected for 90 days. Is this the case?

Answer: Keystone has indicated within its application that a leak under the detectable range of the Computational Pipeline Model (CPM) leak detection system could take up to 90 days to detect. This was intended to provide a very conservative estimate as to how long a minor leak (in the nature of drips/hr) might take to detect. However, it was not intended to indicate that a leak at or just slightly below the 1.5% - 2.0% CPM detection threshold would take 90 days to detect.

15. How long will it take Keystone to detect a leak below the CPM detection threshold?

Answer: Keystone has estimated the minimum detectable leak rate of its Computational Pipeline Monitoring System to be in the range of 1.5% - 2.0% of pipeline flow rate. A leak at that threshold level is expected to be detected in 140 minutes or less. It is only leaks below the 1.5% to 2% threshold that could remain undetected for periods of time longer than 140 minutes. Leak detection time thresholds for leaks below the minimum detectable limit of the CPM system can not be definitively estimated. These small leaks will not generate alarms via the CPM

009717

system; however, there are other systems and methods in place that will serve to identify leaks of this size. For example, the OCC operators will monitor the CPM system and other volume balance systems for discrepancies. In the event that discrepancies are observed, OCC procedures such as a pipeline shutdown, callout of first responders, and shut in pressure testing will be employed. In addition, small leaks may also be detected and reported to the OCC by direct observation methods, including aerial patrol, employee, contractor, or other third party observation.

16. In the event Keystone suspects a leak or a leak is reported to the Operations Control Center, how would Keystone respond?

Answer: Keystone Operations Control Center would respond with an emergency pipeline shutdown. This would involve stopping all operating pumping units at all pump stations. Depending on the flow rate at the time of the incident this would mean stopping 2 – 3 pumping units at each of Keystones 39 pumping stations in the U.S. and Canada. This line shutdown is estimated to take approximately 9 minutes. Once all the operating pumping units have been shutdown, the OCC Operator would close the sectionalizing or isolation valves in the vicinity of the leak to limit any further drain down at the leak site. Closure of these isolation valves would take an additional 3 minutes. Therefore, from when the leak was reported or alarm received, it would take approximately 12 minutes to shutdown and isolate the pipeline.

17. Has Keystone prepared an Emergency Response Plan for its pipeline system?

Answer: TransCanada maintains a comprehensive Incident Management System, which includes emergency response plans for all facilities that it operates. Keystone has filed a preliminary Emergency Response Plan (Oil Spill Response Plan) under Exhibit C of the application and can be found with the file entitled July 06 Supplemental Filing.

009718

18. Why ERP is not completed before permit granted.

Answer: Keystone's Emergency Response Plan cannot be completed and finalized until items including routing and designs are finalized since it is a very detailed and specific document related to the location of the pipeline and other facilities. Given the overall scope of the document that is prescribed under 49 CFR Part 194, it will take thousands of man hours to develop.

19. When will the ERP be finished and who is responsible for reviewing the ERP in the interest of the public?

Answer: Keystone's ERP will be completed in the first quarter of 2009 and submitted to the U.S. Department of Transportation's ("DOT") Pipeline and Hazardous Materials Safety Administration ("PHMSA") prior to commencing operations.

20. Who will respond in the event of a pipeline incident?

Answer: Keystone will maintain personnel on call on a 24(hrs/day) x 7(days/week) basis. These first responders will consist of both employees and contract personnel and will be based at various locations along the length of the pipeline.

21. How many responders will be on the emergency response team?

Answer: The number of emergency responders comprising specific response teams will be determined upon completion of Keystone's Emergency Response Plan (Oil Spill Response Plan) in the first quarter of 2009. Emergency responders will meet or exceed the requirements of 49 CFR Part 194.115, as further described within Keystone's response to Staff's Data Request 2-10.

Typically, emergency response teams would be comprised of Hazardous Waste Operations and Emergency Response ("HAZWOPER") trained personnel as follows:

Tier 1: 8 HAZWOPER trained personnel (includes Emergency Site Manager and Command Post Safety Officer).

Tier 2: 12 HAZWOPER trained personnel.

Tier 3: 24 HAZWOPER trained personnel.

22. In event of a leak under adverse situations, e.g. poor road conditions, bad weather, pipeline located in middle of a field, how do you get equipment out to assess and fix a leak?

Answer: Responders will be dispatched from multiple locations and will have access to alternative means of transportation if weather or other conditions limit access. Alternative means of transportation will include fixed wing aircraft, helicopter, boats and other watercraft, all terrain vehicles and snowmobiles.

23. Please provide the spill volumes and possible spill containment scenario for a catastrophic failure of the pipeline along the South Dakota portion of the route.

Answer: The spill volumes corresponding to the large event size provided in response to Staff's Data Request 2-14 are considered representative of a catastrophic failure.

24. Please explain spill volumes, personnel, equipment, response time and procedures for a spill at the Missouri River crossing at Yankton.

Answer: The following outlines a typical response scenario including the strategies for containment, recovery of product, and site restoration activities for a potential spill in the vicinity of the Missouri River crossing near Yankton, South Dakota.

Upon notification of a potential spill, as described in the response to Data Request 2-12, Keystone's Operations Control Center ("OCC") operator will perform an emergency pipeline

shutdown and close remotely operable isolation valves. Estimated time to complete an emergency pipeline shutdown and close remotely operable isolation valves are as follows:

- Stop pumping units at all pump station locations: 9 minutes
- Close remotely operable isolation valves: 3 minutes
- Total time: 12 minutes

In the case of the Missouri River crossing, Keystone will install a remotely controlled isolation valve on the upstream side of the crossing and an emergency flow restricting device ("EFRD") or check valve on the downstream side of the crossing. This EFRD automatically closes and prevents flow in the reverse direction to further limit any potential spill volume associated with product drain down.

In addition, as indicated in response to Staff Data Request 2-7, Keystone will have a pipeline maintenance facility located at Yankton. Accordingly, emergency responders including a Regional Emergency Operations Center ("EOC") Manager and other resources more fully described in response to Staff Data Request 2-8 will also be based in Yankton.

Following execution of the emergency pipeline shutdown, the OCC operator will perform internal notifications as described in the response to Staff Data Request 2-12 and dispatch first responders to the location identified. Key individuals would then be notified and Keystone's Oil Spill Response Plan activated as follows:

First Responder

- Notification of potential spill and dispatch received from OCC;
- Spill verified;
- Notification of Emergency Services, if required; and
- Verify with OCC:

- Pipeline shutdown and status;
- Pipeline segment isolation; and
- Regional EOC Manager and Qualified Individual (QI) notified.

Regional EOC Manager (QI)

- Notification received from OCC;
- Notification of spill details received from First Responder;
- Oil spill response plan activated;
- Emergency Site Manager (QI) notified;
- Regional EOC activated
- Mobilize response resources requested by Emergency Site Manager (QI);
- Corporate EOC Manager contacted; and
- Agency contacts including the National Response Center and other State and Local agencies contacted.

Emergency Site Manager (QI)

- Notification received from Regional EOC Manager (QI);
- On site First Responder contacted to obtain briefing on spill;
- On Site Command Post activated;
- Regional EOC advised of resource requirements; and
- First Responder relieved.

Response efforts are first directed to preventing or limiting any further contamination of the waterway, once any concerns with respect to health and safety of the responders have been addressed. This is typically accomplished primarily with containment booms and berms. The Emergency Site Manager assumes responsibility for selecting the appropriate locations for

construction of berms and deployment of booms as well as communicating any additional resource requirements to the EOC Manager.

Efforts are initially directed toward containing any spilled product on land prior to it reaching the waterway. With the approval of authorities having jurisdiction, activities such as digging ditches and building berms would be undertaken on the down slope of the spill site, to prevent any overland flow of spilled product from entering the waterway. In some cases it may be possible to use a combination of ditches and berms to divert the overland flow of spilled product to a collection point.

To contain the spilled product once it has reached the waterway, efforts are typically directed toward the deployment of containment boom as close as practical and safe downstream of the of the spill location. With the approval of the authorities having jurisdiction, the Emergency Site Manager assumes responsibility for selecting a suitable location for the deployment of containment booms, based upon the waterway site specific conditions, including flow velocity and avoidance of rapids and falls to ensure the effectiveness of the containment booms.

Product is typically recovered from the surface of water and transferred to containment facilities by a combination of mechanical skimming, vacuum recovery and sorbent materials. Typical methods for the recovery and transfer to containment facilities for product spilled on land include vacuum recovery and sorbent materials.

The cleaning of shorelines and other affected natural or manmade structures is typically performed by traditional methods including, wiping, hot water and low or high pressure wash down and the use of surfactants and emulsifiers or other agents. Water and other liquids used for wash down purposes for onshore applications are typically contained and collected using a

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combination of ditches and berms as described above. All site specific cleaning methods and materials to be utilized are subject to the approval of the authorities having jurisdiction.

Product laden soils are typically either removed or treated with bioremediation in the event such intrusive cleanup techniques are not appropriate. These and other methods of clean up including natural recovery, burning, dispersants and other chemical usage can be considered in accordance with and at the discretion of the authorities having jurisdiction.

Site restoration activities including the sampling and analysis of the remaining soils and water vary considerably dependant upon site specific conditions and are coordinated with the various Federal, state and local authorities having jurisdiction.

25. What is the expected response time to a possible spill located at the farthest point in South Dakota from the emergency responders?

Answer: As noted in the response to DR 2-12, Keystone's Operations Control Center ("OCC") operator will follow prescribed procedures in responding to possible spills that may be reported from sources such as:

- Abnormal pipeline condition observed by OCC operator;
- Leak detection system alarm;
- Employee reported; and
- Third party reported.

Upon receipt of notification as outlined above, the OCC operator will execute the following procedures:

- Follow prescribed OCC operating and response procedures for specific directions on abnormal pipeline condition or alarm response;
- Dispatch First Responders;

- Shutdown pipeline within a predetermined time threshold if abnormal conditions or leak alarm can not be positively ruled out as a leak; and
- Complete internal notifications as outlined below:

Estimated time to complete an emergency pipeline shutdown and close remotely operable isolation valves are as follows:

- Stop pumping units at all pump station locations: 9 minutes
- Close remotely operable isolation valves: 3 minutes
- Total time: 12 minutes

Consistent with industry practice and in accordance with regulations including 49 CFR Part 194.115, Keystone's response time to transfer such additional resources to a potential leak site will follow an escalating or tier system. Dependant upon the nature of site specific conditions and resource requirements, Keystone will meet or exceed the following requirements, along the entire length of the pipeline system:

49 CFR Part 194	**Tier 1 Resources**	**Tier 2 Resources**	**Tier 3 Resources**
High volume area*	6 hours	30 hours	54 hours
All other areas	12 hours	36 hours	60 hours

* High volume area means an area with an oil pipeline having a nominal outside diameter of 20 inches or more, crosses a major river or other navigable waters, which because of the velocity of the river flow and vessel traffic on the river, would require a more rapid response in the case of a worst case discharge or the substantial threat of such a discharge.

Tier 1, 2 and 3 resources will typically include equipment as described in response to Data Request 2-9, along with additional HAZWOPER trained response personnel, as required to

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effectively respond to site specific conditions and as directed by the Emergency Site Manager (Qualified Individual).

The primary task of the Tier 1 response team is to minimize the spread of product on the ground surface or water in order to protect the public and unusually sensitive areas, including ecological, historical and archeological resources and drinking water locations. The Emergency Site Manager (Qualified Individual) will make an assessment of the site specific conditions such as:

- The nature of the spilled product;
- Source of the spill;
- Direction(s) of spill migration;
- Known or apparent impact of subsurface geophysical feature that may be affected;
- Overhead and buried utility lines, pipelines, etc.;
- Nearby population, property or environmental feature that may be affected; and
- Concentration of wildlife and breeding areas.

The Emergency Site Manager (Qualified Individual) will request additional resources in terms of personnel, equipment and materials, from the Tier 2 and if necessary the Tier 3 response teams. Once containment activities have been successfully concluded, efforts are then directed toward the recovery and transfer of free product. Site cleanup and restoration activities then follow, all of which are conducted in accordance with the authorities having jurisdiction.

26. Will initial emergency response to a pipeline spill be conducted by Keystone employees or a contractor or both?

Answer: Keystone will utilize both employees and contractors as emergency responders within its initial response efforts in the event of a pipeline spill. In the case of contractors and

other spill response organizations, Keystone will have agreements in place identifying and ensuring the availability of the specified personnel, consistent with industry practice and in compliance with the applicable regulations, including 49 CFR Part 194 and 49 CFR Part 195.

27. Where will Keystone emergency personnel be stationed to respond to matters in South Dakota?

Answer: The location of these resources will be determined as Keystone completes its Oil Spill Response Plan. Due to its proximity to the Missouri River pipeline crossing and other operational reasons, Keystone has identified Yankton, South Dakota as a location for a pipeline maintenance facility and will have emergency responders and other resources based accordingly. Emergency response personnel will be based at various locations along the length of the pipeline in compliance with the applicable regulations, including 49 CFR Part 194 and 49 CFR Part 195. Consequently, emergency responders will be based in closer proximity to the following areas:

- Commercially navigable waterways and other water crossings,
- Populated and urbanized areas, and
- Unusually sensitive areas, including drinking water locations, ecological, historical and archaeological resources.

The specific locations of other emergency responders will be determined upon conclusion of the pipeline detailed design and the completion of Keystone's Emergency Response Plan (Oil Spill Response Plan).

28. What are the positions on the emergency response team and the qualifications and training needed for each position?

Answer: As described in DR 2-11, positions and training requirement for on site personnel have been identified as follows:

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Position	Specialized Training to Meet Oil Spill Response Duties
First Responders	• Hazardous Waste Operations and Emergency Response (HAZWOPER) training to Hazmat Technician Level 3 with annual refresher, as required • Keystone Emergency Management System ("EMS") training • National Fire Protection Association ("NFPA") training
Emergency Site Manager – Qualified Individual	• HAZWOPER training to Hazmat Level 4 Specialist with annual refresher, as required • ICS Communication training • Keystone EMS training • NFPA training
Command Post Media	• Keystone EMS training • Keystone Media Relations training
Command Post Safety	• Keystone EMS training • Advanced safety related training
Command Post Documentation	• Keystone EMS training

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Position	Specialized Training to Meet Oil Spill Response Duties
Command Post Site Security	• Keystone EMS training
Command Post Resource Mobilization	• Keystone EMS training
Command Post Technical	• Keystone EMS training
Command Post Staging Leader	• Keystone EMS training
Regional EOC Resource Mobilization	• Keystone EMS training
Regional EOC Community Evacuation Leader	• Keystone EMS training
Regional EOC Administration Support	• Keystone EMS training

29. What kinds and number of emergency response equipment will be pre-positioned and where will it be located in the event of a spill in South Dakota?

Answer: Consistent with industry practice and in compliance with the applicable regulations, including 49 CFR Part 194 and 49 CFR Part 195, the types of emergency response equipment that will be pre-position for access by Keystone are highlighted below:

- Pick-up trucks, one-ton trucks and vans;
- Vacuum trucks;
- Work and safety boats;
- Containment boom;
- Skimmers;
- Pumps, hoses, fittings and valves;
- Generators and extension cords;
- Air compressors;
- Floodlights;
- Communications equipment including cell phones, two way radios and satellite phones;
- Containment tanks and rubber bladders;
- Expendable supplies including absorbent booms and pads;
- Assorted hand and power tools including shovels, manure forks, sledge hammers, rakes, hand saws, wire cutters, cable cutters, bolt cutters, pliers and chain saws;
- Ropes, chains, screw anchors, clevis and other boom connection devices;
- Personnel Protective Equipment ("PPE") including rubber gloves, chest and hip waders and H_2S, O_2, LEL and benzene detection equipment; and
- Wind socks, signage, air horns, flashlights, megaphones and fluorescent safety vests

Additional equipment including helicopters, fixed wing aircraft, all-terrain vehicles ("ATV's"), snowmobiles, backhoes, dump trucks, watercraft, bull dozers and front-end

loaders may also accessed depending upon site specific circumstances. Other types, numbers and locations of equipment will be determined upon conclusion of the pipeline detailed design and the completion of Keystone's Emergency Response Plan (Oil Spill Response Plan). This plan will be completed in the first quarter of 2009 and submitted to the U.S. Department of Transportation's ("DOT") Pipeline and Hazardous Materials Safety Administration ("PHMSA") prior to commencing operations.

30. What kind of training and specialized equipment will be provided for local fire departments?

Answer: Local emergency responders may be required to initially secure the scene and ensure the safety and security of the public. Keystone's Integrated Public Awareness Program will provide local emergency responders with the training necessary to ensure their preparedness for responding to such events.

In the unlikely event of a fire associated with a pipeline rupture, the scene will be secured by local emergency responders and Keystone personnel to ensure the safety and security of the public and any fire would be allowed to burn itself out in a controlled fashion. Any secondary fires would be addressed by local emergency responders and Keystone personnel.

31. To what extent would Keystone rely on local responders for emergencies?

Answer: Keystone's ERP will include plans for resources including personnel and equipment for responding to a worst case discharge. This worst case discharge is determined by calculating the largest possible spill volume and ensures resources are more than adequate for responding to a smaller leak. Accordingly, Keystone will not have any expectations of small towns with respect to manpower resources since all requirements will be prearranged with a combination of company and contract personnel.

32. Are you responsible for providing the information requested in Data Requests 2-7, 2-8, 2-9, 2-10, 2-11, 2-12, 2-13, 2-14, 2-15 and 2-16?

Answer: Yes, however Data Request 2-14 was prepared in conjunction with Meera Kothari.

33. Do you adopt the Sections of Keystone's application referenced above and the responses to the reference data requests as your own testimony in this matter?

Answer: Yes I do.

34. Do the portions of the application for which you are responsible support the granting of a permit by the Commission for the Keystone Pipeline Project?

Answer: Yes they do.

35. Does this conclude your testimony?

Answer: Yes it does.

Dated this 21 day of September, 2007.

BRIAN THOMAS

Introduction

Mr. Thomas has gained approximately 25 years of technical, operations and management experience in all aspects of pipeline facilities development, construction and operations with Enbridge Pipelines Inc. He resigned in August, 2005 to create BRIWEST Energy Ltd. and is currently engaged in providing consulting services to various clients.

Background

Held various positions within project teams associated with the engineering design, procurement and construction of pipeline, pump station and terminal facilities. Highlights include the Norman Wells Pipeline project and a Line 1 replacement project that consisted of 335 miles of pipeline from Regina, SK to Gretna, MB. Went on to hold positions of increasing responsibility in the Operations area, including Oil Movements Engineer and Operations Advisor. Solely responsible for the coordination and scheduling of all maintenance activities throughout the Enbridge mainline pipeline system, throughout many years of apportioned service and capacity expansion programs. Duties also included the evaluation of pipeline performance and implementation of operating procedures, pressure allowables and restrictions. Proceeded to serve as Terminal Foreman and Supervisor of Area Operations at Edmonton, AB Terminal where duties included the supervision of approximately 25 staff including, operations shift workers, mechanical, electrical and laboratory personnel.

Key Experience

Manager, Pipeline Control (1996 – 1999)

- Duties included the supervision of approximately 30 staff engaged in the remote operation of the Enbridge pipeline system.
- Successfully integrated the remote operation of the Norman Wells Pipeline and Line 14 (Superior, WI to Mokena, IL) and laid the framework to allow the system wide consolidation of Mainline and Terminal operations, within the Edmonton Control Centre.
- Completed temporary assignments as Manager, Terrace Operations and with ETI on Suncor's North Tank Farm Modernization Project.

Manager, Athabasca Pipeline (1999 – 2002)

- Managed all aspects of Enbridge's first contract carriage liquid pipeline, including the successful integration of operations from Suncor.
- Successfully negotiated contracts including facility requirements with Petro-Canada, Encana and with Suncor for additional crude oil movements.

Manager, Oil Loss Investigations (2002 – 2003)

- Completed an all encompassing review of the entire Enbridge common carrier pipeline system in response to significant financial exposure to physical losses, degradation and revaluation expenses.
- Successfully implemented procedures within various departments including Operations, Shipper Services and Oil Accounting to control financial exposure.

BRIWEST Energy Ltd.

Manager, Petroleum Quality and Measurement (2003 – 2005)

- Responsibilities included all aspects of product quality and measurement throughout the Enbridge liquid pipeline system, including the supervision of approximately 12 professional staff.
- Successfully implemented quality and measurement related policies and procedures for crude oil movements on new and acquired systems including the Hardisty Caverns, Spearhead and Cushing Pipeline Systems.
- Played a key role within 2005 Incentive Tolling negotiations concerning crude oil quality and held responsibilities for measurement and accounting requirements related to SOx compliance.

Key Achievements

- Represented Enbridge as "Northern Business Coordinator" in the development and award of contracts to ensure financial commitments to northern businesses were successfully achieved on the Norman Wells Pipeline.
- Represented the Oil Movements Department and particularly the Control Centre staff in the redevelopment of Enbridge's SCADA system. This system incorporated numerous significant enhancements to the operators' HMI and remains virtually intact, since completed approximately 20 years ago.
- Coordinated the modernization of measurement facilities at Edmonton Terminal and successfully interfaced with the affected shippers and feeder pipelines.
- Supervised the development and implementation of the Edmonton Control Centre on-line operating standards and procedures, including emergency response procedures.
- Successfully negotiated various projects and initiatives with shipper and CAPP representatives including the Line 7 & 11 reconfiguration, Terrace Expansion, Line 14 operations, additional facilities and volumes for the Athabasca pipeline, Hardisty Caverns and Incentive Tolling negotiations related to quality metrics.
- Developed and implemented the Rules & Regulations for the Athabasca Pipeline which was the first contract carriage pipeline within the Enbridge system.
- Successfully negotiated facility requirements with shippers on the Athabasca Pipeline for the Mackay Pipeline, Enbridge's first hot oil pipeline, Kirby Terminal, Athabasca Truck Terminal and integrated these operations and additional crude oil volumes.
- Undertook numerous initiatives including implementation of the "CutPoint Calculator" system to limit degradation volumes, designed equipment and established a crude oil butane blending monitoring program as well as implemented other operational and accounting procedures that successfully limited financial exposure to oil loss expenses.
- Served as a long standing member of Enbridge's Pipeline Control Committee, Oil Measurement Committee, and the Strategic Mergers and Acquisitions Team.

Professional Qualifications

Bachelor of Science in Civil Engineering; University of Alberta
Professional Engineer: Alberta Association of Professional Engineers, Geologists and Geophysicists

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **DIRECT TESTIMONY OF MICHAEL KOSKI**

1. Please state your name and address for the record.

Answer: Michael Koski. TROW Engineering Consultants, Inc. 1300 Metropolitan Boulevard, Suite 200, Tallahassee, Florida, 32308.

2. What is your role with the TransCanada Keystone Pipeline project?

Answer: I am Vice President of Energy Services of Trow Engineering Company. I am Project Director of the Technical Team for the TransCanada Keystone Pipeline, L.P. (Keystone) project.

3. Please state your professional qualifications.

Answer: I received a Bachelors degree in engineering in 1988. I have 19 years of experience with pipeline routing and permitting including oil, refined product, natural gas, water and slurry pipelines throughout North America and in other parts of the world.

4. Have you provided your resume?

Answer: Yes, a resume of my qualifications and experience is attached to my prepared testimony as Exhibit A.

5. Are you responsible for portions of the application which Keystone has filed with the South Dakota Public Utilities Commission seeking a siting permit for the Keystone Pipeline?

Answer: Yes.

6. Mr. Koski, Are you responsible for Section 4.1 of the application, which focuses on route selection?

Answer: Yes

7. Can you summarize the testimony regarding route selection?

Answer: The route selection process is one of numerous iterations involving the participation of multiple disciplines. The process involves a number of steps including the identification of objectives, gathering of data, identification of constraints and opportunities, definition of control points, and the development and assessment of alternatives based on these data. The assessment of alternatives includes the solicitation of input from the public and relevant agencies and the completion of environmental and cultural resources surveys.

8. Mr. Koski, are you responsible for Section 4.2 of the application regarding route refinement?

Answer: Yes I am

9. Can you summarize the information in that section?

Answer: Yes. Subsequent to the identification of a preferred alternative, agency discussions resulted in input which resulted in further refinements to the route.

10. Can you address the major route refinements that Keystone has undertaken in South Dakota?

Answer: Yes. First, subsequent to submitting its initial application to the U.S. Department of State for a Presidential Permit, and the accompanying Environmental Report, Keystone developed a route alternative in North and South Dakota to respond to environmental, land use and operational issues. The 55-mile Hecla Sands route alternative is located in Sargent County,

North Dakota and Marshall and Day Counties, South Dakota. In response to US Fish and Wildlife Service (USFWS) input, this alternative shifts the proposed route west to avoid crossing environmentally sensitive areas consisting of USFWS grassland easements within a stabilized dune field called the Hecla Sandhills. Specific concerns were stabilization and revegetation of sand dunes over the long term, the presence of listed and sensitive plant and animal species, and the lack of existing access to a proposed pump station site within the sandhills.

Subsequently, Keystone conducted a review of shallow aquifers in the area. The USFWS also expressed concern about crossing grassland easements. Moreover, field reconnaissance indicated extensive wetlands along the proposed route in South Dakota. As a result, of this review and input, Keystone developed a revised version of the Hecla Sands reroute. This reroute is located in existing farmland, crosses less wetland acreage, avoids all USFWS grassland easements, and traverses only one mile of USFWS wetland easements. This route change was filed with the Department of State in January 2007.

Second, the USFWS requested that Keystone minimize impacts to an area of native prairie protected by USFWS easements in Day County. To minimize impacts to these easements, Keystone shifted its route to a maximum deviation of approximately 0.5 miles to the west of the original route.

Third, the USFWS requested that Keystone minimize impacts to Raymond Prairie Chicken Leks habitat, in an area of tall grass surrounded by intensively farmed cropland. To minimize impacts to this habitat, Keystone shifted its route to a maximum deviation of one mile to the east of the original route.

Finally, as the result of discussions with the City of Yankton, Keystone has completed route refinement work in the vicinity of the City of Yankton to accommodate future growth in the area.

11. Mr. Koski, are you responsible for Section 4.3 of the application?

Answer: Yes I am.

12. Can you tell us to what extent the reliance on eminent domain power could be reduced by use of an alternative site?

Answer: Yes I can. All practical route alternatives for the Keystone project involve crossing privately owned lands. Accordingly there is no known viable alternative route which would reduce the possibility for reliance on eminent domain powers.. As a 220-mile linear facility, Keystone requires easements from a large group of landowners. Keystone is endeavoring to negotiate easements will all landowners on a voluntary basis, It is not possible, however, to site the project on a route where the project will impact only landowners who are willing to grant easements on a voluntary basis.

13. Mr. Koski, are you responsible for Section 7.1 of the application, which addresses monitoring of impacts?

Answer: Yes I am.

14. Can you summarize the information contained in that section?

Answer: Yes I can. Keystone will implement a detailed environmental training, inspection and monitoring programs. Keystone will require all construction personnel to undergo environmental training prior to being allowed to work on the project. All contractor personnel will attend a 1 to 2 hour group training session. All supervisory personnel will attend a full day session. Training will be designed to ensure awareness of environmental issues and

regulatory conditions and commitments. During construction , Keystone will deploy a team of environmental inspectors to monitor construction to ensure compliance with conditions and commitments.

Following construction, keystone will conduct post-construction monitoring to ensure successful reclamation of disturbed areas and as required by specific permits.

15. Mr. Koski, do you adopt each of the above sections of Keystone's application as your testimony in this proceeding?

Answer: Yes I do.

16. Was collocation along any existing rights of way considered in routing the Keystone pipeline and, if so, what was considered?

Answer: Yes. During the route selection process, Keystone assessed the availability of existing linear facilities that could serve as possible collocation opportunities. Keystone is currently collocated with the following linear facilities.

Milepost	County	Feature	Distance Collocated
302.0 to 303.1	Clark	414th Ave	6100'
371.6 to 372.2	Hanson	428th Ave	3300'
427.2 to 427.8	Yankton	Kaneb pipeline	3200'
435.3 to 436.3	Yankton	Proposed Road	5600'
436.4 to 436.7	Yankton	Bramble road	1330'
436.7 to 437.6	Yankton	Kaneb pipeline	4900'

In addition, a high level route alternative was considered early in the route concept identification process, which was collocated with portions of Interstate Route 29. Details as to why this was not adopted as a preferred option are described later in my testimony.

17. Mr. Koski, is it your opinion that the proposed location of the Keystone Pipeline has minimal adverse affects on the environment, natural resources and citizens of the state of South Dakota?

Answer: Yes.

18. Mr. Koski, was Exhibit A to the application prepared under your supervision and direction?

Answer: Yes it was.

19. Can you tell us what Exhibit A to the application is?

Answer: Exhibit A to the application is a general soil map of soil associations within South Dakota and a superimposed map of the pipeline route over aerial photography of South Dakota and images of the pipeline route superimposed over land use types along the route in South Dakota.

20. Mr. Koski, can you generally describe how the route in South Dakota was chosen?

Answer: Yes I can. The route in South Dakota was selected through the iterative process noted above. This first involved the identification of control points. Control points which affect the route in South Dakota include the point where the route crosses the international border with Canada and the proposed crossing location of the Missouri River near Yankton, South Dakota. The crossing of the international border coincides with the optimum utilization and conversion of

an existing natural gas pipeline in Canada. The location of the Missouri River crossing was determined as described later in my testimony.

Based on these control points, a general study area was established. Physical data relevant to pipeline route selection was collected to establish constraints and opportunities for consideration. A multi-disciplinary team was established to review these data and to establish a preferred route. This route was presented at public open houses and in agency discussions to solicit input on the route. Input received through this process was utilized to refine the route as described earlier in my testimony.

21. Mr. Koski, how did Keystone determine the location of the Missouri River crossing at Yankton?

Answer: Given the project objective of Cushing Oklahoma and the point where the alignment crosses the US/CDN border, the pipeline must cross the Missouri River. Large rivers such as the Missouri River can offer a significant impediment to pipeline routing and accordingly the selection of an appropriate crossing location can significantly influence the overall routing of the pipeline. In the general region of the required crossing, the Missouri River is either impounded with dams forming significant lakes or is being allowed to meander naturally within its valley. Accordingly, the selection of a relatively stable portion of the river which will experience minimal lateral migration is preferred. Additionally, the selection of a location which is relatively narrow is also preferred.

- Based on these requirements, Keystone gathered topographic information for the area, defined the limits of special designated reaches of the river, and searched for existing buried utility crossings to serve as possible collocation opportunities. Based on these data, a number of possible crossing locations were determined on a preliminary basis.

These preliminary crossing locations included the impounded areas west of Yankton, an existing pipeline crossing at Yankton, and a point downstream of the Recreational River designation near Ponca State Park. Based on environmental and construction issues, the existing pipeline crossing location at Yankton was considered preferred since it was in a relatively stable section of the river, was relatively narrow and was adjacent to two existing pipeline crossings. However, the crossing location was within a designated section of the river. Keystone carried out a series of meetings with the National Park Service (NPS), USACOE, and the City of Yankton to discuss a crossing at this location. Through a series of meetings, a crossing plan utilizing the Horizontal Directional Drilling technique was developed and proposed. The HDD would drill under the river and the NPS jurisdictional lands on each side of the river.

22. Mr. Koski, can you explain why the I-29 corridor was not selected as the best route for the Keystone Pipeline?

Answer: Keystone considered the use of the I-29 corridor at one point in the project development.

- Keystone did not consider locating the project within the I-29 corridor, as this is not allowed due to safety issues and the impediment the facility would create to highway maintenance and expansion.
- Keystone rejected the option of locating adjacent to the I-29 right of way for the following reasons:
    - I- 29 includes numerous overpasses and interchanges which would require the route to deviate away from the corridor at frequent locations – increasing the length and impact of the pipeline.

- Interstate highways such as I-29 tend to connect areas of development and in fact can spur development at interchanges. These areas of residential and commercial development result in the need for additional deviation from the corridor, further increasing the length and impact of the project. Examples of developed areas along I-29 in South Dakota include Watertown, Brookings, and Sioux Falls.
- I-29 is not consistent with basic control points influencing the project – being the U.S./Canada border crossing and the Missouri River crossing. A route which both traversed along I-29 and respected these control points would increase the overall length and environmental impact of the project.

RESPONSES TO DATA REQUESTS

23. Are you responsible for providing the information requested in the Public Utility Commission's Data Request 1-2?

Answer: Yes.

24. Please summarize your response to Data Request 1-2.

Answer: Keystone provided maps as requested, showing project location with respect to cemeteries, places of historical significance, other facilities, political subdivisions and the like.

25. Are you responsible for providing the information requested in Data Request 1-3?

Answer: Yes.

26. Please summarize your response to Data Request 1-3.

Answer: The data response indicates that subsidence risk can be related to earthquake and slope stability risks, which are discussed in subsection 5.3.6 of the Application. Subsidence

can also be caused by bedrock dissolution in karst terrain (areas with underlying limestone bedrock near the surface). The national karst maps (Davies et al. 1984, Tobin and Weary 2005) were reviewed to determine areas of karst terrain. These areas can be visualized in the attached Karst Geological Areas Map (Figure 1), based on Tobin and Weary 2005.

The overall subsidence hazard risk from sinkholes that form in karst terrain is considered low. Deep (generally 50 feet or more) glacial drift deposits overlie karst terrain in South Dakota. This deep and interbedded glacial material matrix limits the potential for sinkholes to cause fractures and soil displacement at the surface.

27. Are you responsible for providing the information requested in Data Request 1-4?

Answer: Yes.

28. Please summarize your response to Data Request 1-4.

Answer: With the exception of the potential for landslide hazards, there are no other significant geological hazards that limit the design, construction or operation of the Keystone Pipeline. Overall, landslide potential is considered a low hazard along the Keystone Pipeline route in South Dakota. Keystone will assess the need for remediation techniques and utilize them where necessary.

29. Are you responsible for providing the information requested in Data Request 2-3?

Answer: Yes.

30. Please summarize your response to Data Request 2-3.

Answer: Keystone provided shape files containing all the latest routing data available and containing the following:

- Centerline;
- Permanent easement;
- Temporary easement;
- Mile posts;
- Extra workspaces;
- Pump stations; and
- Access Roads.

31. Are you responsible for providing the information requested in Data Request 2-4?

Answer: Yes.

32. Please summarize your response to Data Request 2-4.

Answer: Keystone provided shape file that contained the most up to date valve locations at the time.

33. Do you adopt the above data responses as part of your testimony in this proceeding?

Answer. Yes.

34. Do the portions of the application for which you are responsible support the granting of a permit by the Commission for the Keystone Pipeline Project?

Answer: Yes they do.

35. Does this conclude your testimony?

Answer: Yes it does.

Dated this _____ day of September, 2007.

MICHAEL KOSKI

Trow

Michael J. Koski, P.Eng.
Vice President, Energy Services Division

Michael Koski is currently the Vice President of Energy Services with Trow Engineering Consultants Inc. He has been with Trow since 1988 when he was a project engineer in the Thunder Bay, Ontario office. In 1992, Mr. Koski was moved to Winnipeg to open and manage a Trow branch office in that location. In October 1995, Mr. Koski was appointed manager of the newly formed Pipeline Services Division and operates out of Tallahassee, Florida. Due to the unprecedented growth of the division and corresponding increase in the scope of services offered, the division was renamed the Energy Services Division in 1998.

Mr. Koski has extensive experience in engineering and environmental issues, particularly with respect to the pipeline and mining industries. This unique blend of expertise has enabled him to serve as a key execution team member for several major pipeline projects involving capital costs in excess of 1 billion dollars. His experience includes the design and construction planning of pipeline routes, pipeline river crossings, erosion and sediment control, right-of-way reinstatement planning, hydrology/hydraulic studies, slope and excavation stability assessments, dewatering system design, directional drilling assessments, construction control and environmental permit negotiations. He is considered an expert with regards to pipeline river crossings having provided expert testimony in hearings and litigation, served on technical panels, presented at industry conferences and authored several related manuals for governmental and industry.

Mr. Koski's project experience encompasses both the Canadian and US regulatory environments. He has considerable experience with both the NEB and FERC processes as they relate to natural gas pipeline projects.

The following references may be contacted to verify Mr. Koski's experience and performance with respect to project management of major pipeline projects.

Mr. Steve Marr
North American Pipeline Investments
Transcanada
(403) 920-2056

Mr. Larry Drader
Vice President
Alberta Energy Company
(403) 266-8306

009746
EXHIBIT A

Education

B.Eng. in Civil Engineering, first class standing, Lakehead University, 1988

Basic Spills, Response, Lampton College of Applied Arts and Technology, 1989

IECA Short Courses: Erosion and Sediment Control, Bioengineering, Streambank stabilization, 1994 and 1995

Professional Affiliations

Association of Professional Engineers of Ontario
International Erosion Control Association

Employment

1999 – Present
Trow Engineering Consultants, Inc.
Vice President, Energy Services Division
Tallahassee, Florida, USA

1995 – 1999
Trow Engineering Consultants, Inc.
Manager, Pipeline Services Division
Tallahassee, Florida, USA

1992 – 1995
Trow Consulting Engineers, Ltd.
Winnipeg Branch Manager
Winnipeg, Manitoba, Canada

1988 – 1992
Trow Consulting Engineers, Ltd.
Project Engineer
Thunder Bay, Ontario, Canada

Typical Experience

Pipelines

- Designed route selection and review procedures for large diameter cross country pipeline projects and managed the multidisciplinary teams necessary to complete the selection process.
- Conducted preliminary route reviews involving the determination of features, which would ultimately affect the permitting, construction, operation or cost of a specific project. Reviews conducted using a combination of remote sensing and field reconnaissance techniques.
- Prepared numerous environmental management and construction plans for pipeline river and wetland crossings.
- Prepared and maintained project execution plans for the design and construction of pipeline systems.
- Championed environmental permitting activities including the development and implementation of negotiation strategy.
- Developed a technique to efficiently conduct sediment transport assessments to assess the degree and extent of impaired water quality and sedimentation expected to occur as a result of pipeline water crossings.
- Developed and evaluated specialized pipeline water crossing techniques.
- Evaluated the erosion potential and developed a system of erosion control planning for pipeline river crossings.
- Designed right-of-way reinstatement procedures and specifications and managed their subsequent implementation.
- Conducted extensive on-site inspections and managed teams of inspectors for various aspects of pipeline construction..
- Conducted desk top and field terrain analyses related to route selection and assessment.
- Managed the development of contract bid documents including project descriptions, contracts, drawings and specifications. Participated in the bid review and contractor selection process.
- Assisted in the development of Request for Proposal packages for Engineering and Procurement services.

Geotechnical

- Conducted geotechnical investigations for a variety of projects including: commercial buildings, municipal services, buried storage tanks, communication towers, pipe jacking and directional drilling operation, streets and highways, outfall structures and airports.
- Conducted groundwater and seepage studies for the clean up of contaminated properties, design of waste disposal sites and subsurface construction activities.

- Designed numerous dams, diversion berms, and spillways for mine tailings and water retention projects.
- Conducted granular borrow source evaluations involving the determination of the quantity and quality of aggregate present for concrete, asphalt and general fill purposes.
- Conducted excavation and slope stability evaluations.
- Designed and supervised the implementation of subsurface drainage systems.

Environmental and Water Resources

- Performed hydrologic and hydraulic studies for bridge and culvert design, marine construction planning, revetment design, and mine tailings disposal design.
- Prepared storm water management and sediment control plans for construction activities adjacent to sensitive streams and rivers.
- Performed assessments to determine the degree and extent of increased suspended solids concentrations and sedimentation expected to occur as a result of marine excavations.
- Supervised the clean up of environmentally hazardous materials including the delineation of contaminated areas, containment and removal.
- Supervised the performance of asbestos audits and the required abatement for numerous facilities.

Project Management

- Prepared project execution plans for the design and construction of pipelines, tailings dams, and other civil projects.
- Prepared schedule and budget reporting and control procedures.
- Provided long term on-site construction supervision.
- Formulated construction plans to define proposed construction methods, schedules, and environmental management procedures.

Key Projects

- Senior Design Engineer and Project Manager for Trow involvement for the Gulfstream Natural Gas System pipeline project involving approximately 750 miles of 36 inch and 24 inch pipeline from Mississippi and Alabama to Florida.

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- Project Engineer and project management committee member for the Viking Voyageur Gas Transmission project, involving approximately 800 miles of 42" pipe from Emerson, Manitoba to Chicago, Illinois. Responsible for the development and execution of route selection, route review, and FERC filing data collection aspects of the project. Managed a team of professionals for the completion of these activities.

- Engineering Coordinator and project management committee member for the 512 mile US portion of the Express Oil Pipeline in Montana and Wyoming. Responsible for the development and execution of the environmental permitting strategy which involved the control of all state and federal agency negotiations, activities of consultants, and liaison with engineering, environmental and legal personnel.

- Geotechnical Coordinator for the Transgas de Occidente project in Colombia South America involving approximately 200 miles of 20" pipeline and 240 miles of small diameter laterals. Responsible for the development and review of construction and restoration procedures, route selection, and slope stability analysis. Managed a team of engineers to review right-of-way reinstatement activities during construction.

- Prime author of the Water Crossing Design and Installation Manual prepared for the American Gas Association. The manual includes guidance and specifications for the design, permitting, construction, restoration, and maintenance of pipeline water crossings in Canada and the United States.

- Managed the completion of geotechnical investigations and preparation of erosion and sediment control plans for over 3,000 kms of new large diameter (42" and 48") pipelines for TransCanada Mainline expansion in Quebec, Ontario, Manitoba and Saskatchewan. Supported agency negotiations for environmental permitting.

- Project Manager for the design for the Sunshine Pipeline project involving approximately 800 miles of 30" pipeline in Mississippi, Alabama, and Florida. Participated in the design of river crossings, permit application/negotiation and route selection/review activities before the project was canceled in 1994.

- Project Manager for engineering, procurement and construction management for 32 miles of water and slurry pipelines for the Stillwater Mining Company in Montana.

- Expert testimony for construction claim litigation associated with permitting and construction of a natural gas pipeline in eastern Canada.

- Route selection oversight for the Southern Natural Gas Palmetto Pipeline project.

- Water-crossing design and construction specification development for the Southern Natural Gas North Alabama Pipeline project.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **DIRECT TESTIMONY OF MEERA KOTHARI**

1. Please state your name and address for the record.

Answer: Meera Kothari, 450 1st Street SW Calgary Alberta T2P 5H1 Canada.

2. Are you an employee of TransCanada Keystone?

Answer: Yes I am.

3. Please state your professional qualifications.

Answer: I am a professional engineer with TransCanada; I am responsible for pipeline design and integrity management. I have over 10 years of oil and gas industry experience, six of which focus on the design, construction technologies and integrity management of liquid and natural gas pipelines in North and South America.

4. Have you provided a resume?

Answer: Yes, my resume is attached as Exhibit A.

5. Are you responsible for portions of the application which Keystone has filed with the South Dakota Public Utilities Commission seeking a siting permit for the Keystone Pipeline?

Answer: Yes.

6. Are you responsible for the information provided in Section 2.2.1 of the application?

Answer: Yes

7. Will you please summarize the information in that part of the application?

Answer: Yes. As shown in the application, the pipeline will be designed, constructed, tested and operated in accordance with all applicable requirements, including but not limited to US DOT regulations at 49 CFR Part 195. These regulations, administered by the Pipeline Hazardous Materials and Safety Administration (PHMSA), are intended to ensure adequate protection for the public and the environment and to prevent crude oil pipeline accidents and failures. Exhibit 3 is a mechanical flow diagram for the first 600 miles of pipeline in the U.S. Approximately 220 miles are located in South Dakota. No lateral lines will be constructed in South Dakota. The pipeline will be constructed at a maximum flow rate of 591,000 bpd. The maximum operating pressure is 1440 pounds per square inch.

8. Are you responsible for the information provided in Section 2.2.2 of the application?

Answer: Yes.

9. Will you please summarize the information in that part of the application?

Answer: Yes. The four pump stations in South Dakota will be in Day, Beadle, Miner and Hutchinson counties. The stations and the pumps are electrically driven and will be required to pump the crude oil through the line. Pump units will be installed to meet the nominal design flow rate of 591,000 bpd.

10. Are you responsible for the information provided in Section 2.2.3 of the application?

Answer: Yes

11. Will you please summarize the information in that part of the application?

009753

Answer: Yes. Fourteen mainline valves will be installed in South Dakota. This is an update from Keystone's application, which stated that there would be 15 valves in South Dakota. Seven valves will be remotely controlled, to isolate sections of line in the event of an emergency to minimize impacts or for operational or maintenance reasons (these are along the pipeline or at the pump station), four valves are check sets which are comprised of one manual valve and one check valve. Check sets are installed downstream of water bodies which meet a specific design criteria (e.g. Logan/Fordham Dam and Wolf Creek).

12. Are you responsible for the information provided in Section 2.3.1 of the application?

Answer: Yes.

13. Will you please summarize the information in that part of the application?

Answer: Yes. The pipeline will be inspected aerially 26 times per year, not to exceed three weeks, in accordance with Federal regulations, found at 49 CFR Part 195. The ROW will be maintained to allow for accessibility, free of trees and woody growth extending a minimum of 10-15 feet on either side of the pipeline centerline, but cultivated crops and grass will be allowed to grow on the permanent ROW. Keystone will continually monitor the pipeline to identify any potential integrity concerns. Operation and maintenance records are required to be kept in accordance with US DOT regulations. Keystone will comply.with those regulations. A Supervisory Control and Data Acquisition (SCADA) system will be used to monitor the pipeline at all times, as outlined in other testimony. In addition, the last sentence of this section should state that "Serious abnormal situations that are not investigated will initiate automatic pipeline shutdown systems at the affected pipeline segments."

009754

14. Are you responsible for the information provided in Section 6.4.2 of the application?

Answer: Yes, in part.

15. Are you responsible for Section 6.4.2 of the application?

Answer: I am responsible in part for that section. Pipeline safety is administered by the federal government through the Pipeline Hazardous Materials Safety Administration, an agency of the United States Department of Transportation. There are a number of federal regulations which have been instituted to insure public and environmental protection and to prevent accidents and failures. Keystone will comply with all regulations which are not superseded by the special permit, addressed later in my testimony, authorizing Keystone to operate using a 0.8 design factor. I adopt as my testimony the information found in 6.4.2 at pages 64 and 65 of the application.

16. Are you responsible for the information provided in Exhibit 3 of the application?

Answer: Yes, this exhibit shows the pipeline's mechanical flow schematic.

17. Are you responsible for the information provided in Exhibit 4 of the application?

Answer: Yes, this exhibit shows a typical pump station layout.

18. At the public hearing there was some testimony about a TransCanada website that reported 576 spills in the past six years. Can you explain the context of the posted spill information?

Answer: TransCanada sets industry-leading targets that provide a focus to monitor and improve our programs and continually improve our performance. As part of this effort,

009755

TransCanada tracks all spills of any size or type, or near-spills, even though they are cleaned up with no net impact to the environment. We include third-party spills affecting TransCanada property or work. TransCanada then reports and posts all of these spills, as well as any and environmental non compliance events, as part of our annual social/corporate responsibility report posted on our corporate website. Most of these spills are of a nature that they are not required to be reported under the applicable regulations.

19. Tell me specifically about the 576 spills posted on TransCanada's website?

Answer: Most importantly, none of these spills represent pipeline operational leaks. Nearly 80 percent of the reported spills were due to equipment-related leaks of hydraulic oil, lube oil, glycol and fuel typically of low volume (<1.3 gallons). The threshold reportable spill volume to US DOT is five barrels or 158 gallons.

Our internal incident management process defines spills as follows:

> Minor - A spill/release, onsite, that poses no adverse affect to the environment nor impact neither to a water body nor to groundwater. The spill may or may not be reportable to a regulatory agency
>
> Serious - A spill/release, onsite or off-site/off-right-of-way, that poses an adverse affect to the environment but no impact to a water body nor to groundwater. Serious spills are reportable to a regulatory agency
>
> Major - A spill/release, onsite or off-site/off ROW, that poses an adverse affect to the environment including an impact to a water body or to groundwater. Major spills are reportable to a regulatory agency

Critical - Emergency response for containment or clean up is required. A spill/release, onsite or off-site/off ROW, that poses an adverse affect to the environment including an impact to a water body or to groundwater. Critical spills are reportable to a regulatory agency and require invoking the Emergency Response Plan.

Under TransCanada's spill classification system, between 2000-2005, there were 576 spills. Of the 576 spills, 20 were near misses, 523 spills were classified as Minor, 28 were classified as Serious, four spills were classified as Major and one as Critical. In the case of all four "major" spills, less than 20 gallons in total were spilled. The "critical" spill involved the release of approximately 100 gallons of various liquids such as lube oils.

20. Can you please describe the nature of the 183 "non-compliance events" that are posted on TransCanada's website?

Answer: The non-compliance environmental reports were typically administrative in nature or self reporting non-compliance with TransCanada procedures during construction. None of the non-compliance reports resulted in any danger to the pipeline integrity or any substantive pipeline operational problems.

21. Has TransCanada ever had a failure on a crude oil pipeline?

Answer: Yes, in 1996 a failure occurred on the Platte Pipeline at a pump station. The failure was due to corrosion. TransCanada was a 50% (Joint Venture) owner with Alberta Energy Corporation (now EnCana), although TransCanada was not the operator at that time. Approximately 220 barrels of oil were released within a pump station; none recovered. No habitat, resources, or people were affected.

22. How many known miles of hydrocarbon pipeline are there in South Dakota?

Answer: There is known to be 6,364 miles of hydrocarbon pipeline in South Dakota, of which 420 miles are liquid pipelines which carry refined oil products. There are no crude oil pipelines currently operating in South Dakota.

23. How many pipeline failures have occurred in South Dakota in the last 10 years?

Answer: Five failures have occurred in the last 10 years, according to PHMSA statistics. two in 1998 and one in 2004, on pipelines carrying refined products. Two have been on natural gas distribution pipelines.

24. What are the causes of the failures on the liquid pipelines?

Answer: One was caused by corrosion and two were caused by third-party excavation.

25. Has TransCanada adopted safeguards and measures to protect against threats to the integrity of the Keystone pipeline?

Answer: Yes, Keystone conducted a pipeline threat analysis as part of the requirements for the NEPA process, using the pipeline industry published list of threats under ASME B31.8S and PHMSA to determine the applicable threats to the Keystone pipeline. Keystone then developed safeguards to protect against these potential threats.

The potential threats to this pipeline are:

Manufacturing Defects – flaws in the seam of the pipeline created during the manufacturing process

Construction Damage – flaws such as dents, cracks, nicks in the coating which are as a result of transport, or construction

Corrosion – internal and external – defects that develop over time during operation

Mechanical Damage – contact with the pipeline

Hydraulic Event – overpressure of the pipeline.

26. Has Keystone reacted to this analysis?

Answer: Yes it has. Keystone has developed safeguards for this specific pipeline project.

27. What safeguards have been developed and put in place specifically for this pipeline to mitigate manufacturing defects?

Answer: Safeguards have been implemented during design, and will be implemented during construction and operations of the pipeline. Steel suppliers, mills and coating plants are pre-qualified using a formal qualification process consistent with ISO standards. The pipe is engineered with stringent chemistry for such compounds as carbon to ensure weldability during construction. Each batch of pipe is mechanically tested to prove strength, fracture control and fracture propagation properties. The pipe is hydrostatically tested. The pipe seams are visually and manually inspected and also inspected using ultrasonic instruments. Each piece of pipe is traceable; each pipe joint is traceable to the steel supplier and pipe mill shift during production. The coating is inspected in the plant with stringent tolerances on roundness, nominal wall thickness. A formal quality surveillance program is in place at the steel mill and coating plant.

28. What construction damage safeguards are in place specifically for this pipeline?

Answer: Construction Damage can be flaws such as dents, cracks, nicks in the coating which are as a result of transport, or construction. Pipe joints which are susceptible to transportation fatigue (joints that stacked on the bottom) are examined for cracks in the seam, using ultrasonic inspection, once it is offloaded from rail cars prior to transport to the stock pile site. All pipe welds are examined 100% of the circumference using ultrasonic or radiographic

009759

inspection. The coating is inspected and repaired if required prior to lowering into the trench. After construction, the pipeline is hydro-tested in the field to 125% of its maximum operating pressure. After the hydro test, a caliper tool is run to check for dents and ovality.

29. What safeguards are in place specifically for this pipeline to mitigate corrosion?

Answer: Corrosion can be both internal and external. Corrosion defects are defects which develop over time during operation. Fusion bonded epoxy (FBE) is a protective coating that is applied to external surface of the pipe to prevent corrosion. A cathodic protection system is installed, comprised of engineered metal alloys or anodes, which are connected to the pipeline. A low voltage direct current is applied to the pipeline, the process corrodes the anodes rather than the pipeline. The two combined mitigate external corrosion.

A tariff specification of 0.5% solids and water by volume is contained in Keystone's transportation agreement with its shippers. This specification is lower than the industry standard of 1% to minimize the potential for internal corrosion. The pipeline is designed to operate in turbulent flow to minimize water drop out, which is also a potential cause of internal corrosion. During operations, the pipeline is cleaned using in-line inspection tools. The pipeline is inspected with a smart in-line inspection tool, which measures and records internal and external metal loss.

30. What is TransCanada's experience with the pipe, coating, and corrosion protections that will be used in the Keystone pipeline project?

Answer: TransCanada has thousands of miles of this particular grade of pipeline steel installed and in operation. TransCanada pioneered the use of FBE, which has been in use on our system for over 28 years. There have been no leaks on this type of pipe installed by

009760

TransCanada with the FBE coating and cathodic protection system during that time. When TransCanada has excavated pipe to validate FBE coating performance, there has been no evidence of external corrosion.

31. What safeguards are in place specifically for this pipeline to mitigate mechanical damage?

Answer: Mechanical Damage is damage caused by contact with the pipeline. The Keystone pipeline will be buried with four feet of cover. This reduces the likelihood of mechanical damage, according to pipeline industry research, by 80% in undeveloped areas and 41% in developed areas. The steel specified for the pipeline is high strength steel with engineered puncture resistance of approximately 51 tons of force. According to pipeline industry research, 99% of excavators in the United States do not have a digging force capable of exceeding 40 tons. Bi-weekly aerial patrols, TransCanada's public awareness programs, pipeline marker signage and participation in the State's One Call program are all additional safeguards against mechanical damage.

32. What safeguards are in place specifically for this pipeline to mitigate against hydraulic damage?

Answer: A Hydraulic Event is characterized by overpressure of the pipeline. This is avoided by the systems in place to monitor the pipeline, known as the SCADA system. The SCADA system is the subject of other testimony. Keystone will also rely on operator training - operators are trained using a transient model which emulates the pipeline operation this will occur prior to the pipeline being in service. This allows for simulation of a number of operational conditions to train the operator. Operators must train periodically in accordance with US DOT and industry recommended practices.

009761

33. Are you aware of any studies performed on the impact of petroleum based hydrocarbons on PVC pipe and gaskets?

Answer: Yes I am aware of one study currently underway by the American Water Works Association (AWWA). The study is not complete as per my conversation with the AWWA project manager but two papers have been published on the topic.

34. Could you describe your understanding of these projects/papers?

Answer: The first paper describes the experimental method used to derive an equation which can be used to predict the external concentration which will result in exceeding the maximum concentration limit for benzene or toluene in PVC pipe water after a period of contamination exposure. The product used in the experiment was premium gasoline, which is a refined oil product and not the same commodity which is being transported by Keystone.

In the second paper, a study was performed where statistical information was gathered on existing water transportation infrastructure. One hundred fifty one utilities across Western Canada and the entire United States were surveyed. The total was 83,600 miles of water mains, of which only 0.54% was considered at risk. Of the total 5,444,218 PE/PVC service connections only 0.31% were considered at risk. Permeation incidents were reported at a frequency of one per 14,000 miles of mains and one per 1,000,000 PE/PVC service connections. Of the total six reported permeation incidents on water mains, three were gasoline, one chlorinated solvent and two unknown for the water pipelines. Of the 44 permeation incidents reported on service connections, 36 involved polybutelyne from gasoline, the rest were chlorinated solvents and asphalt solvents for the service connections. The study also reported successful use of water mains and service connections in contaminated areas at one per 1,800 miles of mains and one per 2,500,000 service connections.

009762

The study in the lab showed that PVC is highly resistant to gasoline and water saturated gasoline. PVC pipe exposed to gasoline showed no permeation to BTEX during the first 10 months of exposure. PVC pipe exposed to pure solvents showed permeation within 6.5 days for pure trichloroethylene and 16 days for pure toluene. No permeation was shown in the first 4.5 months to saturated aqueous solutions of benzene, toluene and trichloroethylene. Saturated solutions of benzene or TCE permeated after 8 months and toluene after 12 months.

The technical conclusion is that PVC can be safely used in soils contaminated with gasoline, regardless of contamination levels, and PVC is highly resistant to permeation by benzene, toluene and TCE in all but the most extreme conditions. Applying this conclusion to crude oil, with lower relative concentrations of these compounds, demonstrates an even lower likelihood of harm to PVC.

35. Could you please describe the special permit granted to Keystone by PHMSA?

Answer: Yes, Keystone applied for a permit to design the pipeline using an 0.8 design factor which is above the current pipeline code design factor of 0.72. Physically this would translate into a change in the wall thickness of 0.043". However, to implement this, many technical requirements have been engineered into the steel specification, construction and integrity management plan to meet or exceed safety standards. Keystone's application for the special permit included measures Keystone would implement above and beyond those required by regulations to ensure the safety of the pipeline. In addition, the permit specified more than 50 conditions for the design and operation of Keystone that also are above and beyond the normal requirements for a pipeline. In granting the permit, PHMSA found that these measures "provide

009763

a level of safety equal to, or greater than, that which would be provided if the pipelines were operated under existing regulations."

36. Why did Keystone apply for this permit?

Answer: Keystone applied for this permit for several reasons. The Canadian portion of the Keystone pipeline (approximately 760 miles) is designed to operate at 0.8 design factor in accordance with CSA-Z662-03 Canadian pipeline code. The US pipeline industry and the USDOT has moved to adopt this design factor for new and existing U.S. natural gas pipelines as of 2006, as evidenced by the Alliance Pipeline and the Kinder Morgan Rockies Express Pipeline. As a new crude oil pipeline, Keystone is confident it can meet or exceed all design and safety requirements for hazardous liquid pipelines. Lastly, there is an economic benefit to the project which is passed on to the shippers and ultimately the consumer as Keystone is a regulated utility.

37. Does the permit allow Keystone to operate at a higher pressure?

Answer: No. The pipeline's maximum operating pressure is 1440 psi. The engineering equation used to calculate the pipeline's pressure (Barllow's Equation) is a function of the design factor, wall thickness, grade of steel and operating pressure. All variables are fixed except for the design factor to determine the new wall thickness. Federal regulation allows the pipeline to exceed the MOP by 10% as a result of an abnormal operation event and such would be a reportable event.

38. Does thinner wall pipe make it unsafe?

Answer: No. The pipe is engineered with puncture resistance, fracture control that exceeds the requirements of current codes and standards for crude oil pipelines. The pipeline safety factor does not decrease as a result of the 0.8 design factor. The pipe is hydrostatically tested in the mill to a pressure which represents a 0.95 design factor in order to operate at 0.8.

009764

For pipelines that operate using a 0.72 design factor, the current code requirement is to hydrostatically test to a pressure in the mill equivalent to 0.9 design factor. In addition, proactive integrity management programs such as in-line inspection and repairs, cathodic protection monitoring and public awareness programs mitigate any issues.

39. Does TransCanada currently operate any pipelines with the same .8 design factor?

Answer: TransCanada currently operates about 11,000 miles of pipeline at this design factor.

40. Are there any provisions made when crossing foreign pipelines?

Answer: Federal pipeline regulations require pipelines to have a minimum clearance of 12 inches from foreign utilities. Typical industry practice is to under cross an existing utility.

41. Would casing the pipeline when crossing a foreign pipeline be an appropriate safeguard?

Answer: No, casings have been proven to be a significant risk for the development of corrosion. TransCanada, along with the rest of the pipeline industry, has moved away from designing and building pipelines that are cased.

42. Would thicker pipe at foreign pipeline crossings be an appropriate safeguard?

Answer: No, the pipe is designed with a great number of safety factors inherently built in. Thicker pipe is only required at crossing locations such as railways, roads and rivers where the construction boring method requires thicker pipe in order to avoid buckling the pipe due to any stress exerted during the horizontal directional drilling operation.

009765

43. Are you responsible for providing the information requested in Data Request 1-12?

Answer: Yes I am.

44. Please summarize your response to Data Request 1-12.

Answer: I provided the requested mechanical flow diagram.

45. Are you responsible for providing portions of the information requested in Data Request 2-14?

Answer: Yes I am.

46. Please summarize your response to Data Request 2-14.

Answer: Full details of the spill assessment study methodology and environmental consequences can be found within Exhibit C that was submitted as part of the Application. It is contained in the "3 risk assessment 03-30-07.pdf" and "4 DNV Report RA Appendix A deliverable.pdf" files found in the "ExhibitC_DOS filing\5 March 2007 filing\Risk Assessment" folder.

With respect to the State of South Dakota, Figure 1 and Figure 2 below provide both the calculated risk profile of the pipeline due to potential excavation damage, as well as the potential spill volumes associated with such an event. Excavation damage was identified within the spill assessment study as the leading pipeline threat and is discussed further in this response.

Spill volumes were calculated based upon the potential leak rate, time to isolate the pipeline and draindown occurring within the isolated pipeline segment. The assessment does not take in to account any reduction in spill volume due to actions to control the source aside from pipeline shutdown and closure of isolation valves. Consequently, procedures to reduce spill volume involving depressurization and draindown are not estimated or included.

009766

In assessing the distribution of damage sizes, the failure mechanism and pipe material properties were also considered. The size of the damage is a function of many factors.

47. Do you adopt the referenced portions of Keystone's application and the referenced data responses as part of your testimony in this proceeding?

Answer, Yes, I do.

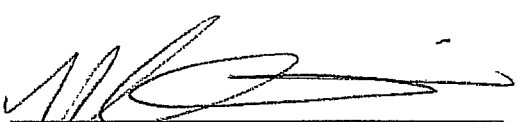
48. Do the portions of the application for which you are responsible support the granting of a permit by the Commission for the Keystone Pipeline Project?

Answer: Yes they do.

49. Does this conclude your testimony?

Answer: Yes it does.

Dated this 21st day of September, 2007.



MEERA KOTHARI

Meera Kothari P.Eng.
450 1st Street SW Calgary Alberta T2P 5H1
403.920.6038 meera_kothari@transcanada.com

Employment History

Project Engineer, Keystone Pipeline Project

Project Engineer ~3000 km pipeline project

October 2, 2005 – Present, TransCanada PipeLines Ltd, Calgary, Alberta

Technical Responsibilities

- Plan, review and ensure timely completion of regulatory baseline technical data, engineering design, permit application preparation and submittal in Canada and the US Federal and State level
- Develop and review specifications, standards, procedures & DBM for new construction, pipeline conversion and above ground facilities
- Pipeline route planning, facilities siting, development of emergency response plan, pipeline risk and integrity assessments and oil spill analysis
- Manage engineering service contractors
- Prepare and analyze project budgets & expansion cases
- Develop scope of work, bid analysis and award of project RFP
- Technical spokesperson at public consultation project open houses

Project Engineer, Cogeneration Power Plan Project

Project Engineer ~500 MW combined cycle power plant

May 1, 2005 – October 1, 2005 Energie TransCanada, Trois Rivières, Québec

Technical Responsibilities

- Developed & implemented inside battery limit plant construction quality plan
- Conducted witness point inspections and audit of equipment fabrication & equipment installation
- Conducted plant hazard assessment recommendation close out
- Validated work package estimates for outside battery limit pipeline system project bid award
- Developed hazardous material philosophy
- Prepared RFP scope for gas and chemical supply contracts
- Developed community investment risk matrix
- Provided French guided plant tours for various stakeholders

Project Controls Responsibilities

- Prepared monthly project status report, management presentations and HS&E statistics
- Analyzed and validated cost and schedule for various work packages
- Developed management operating system compliance tracking report

Operations & Engineering Technical Support & Technology Manager, Asset Reliability

Pipeline Integrity & Operations Engineer for rehabilitation programs, management of small projects

July 1, 2003 – April 30, 2005 TransCanada PipeLines Ltd, Calgary, Alberta

Technical Responsibilities

- Conducted engineering critical assessment for pipeline defect assessment, maintenance repair, pipeline pressure derating, unsupported pipe lengths, blasting/explosives, coating systems
- Managed urban development encroachments, foreign utility, road and vehicle crossing application review focused in the areas of integrity verification, stress analysis, population growth tracking for the purpose of code compliance and conflicts with facilities that may impact the ability to maintain integrity, access for maintenance, emergency response accessibility and compatible land uses
- Conducted failure analysis of in service pipe body leaks, pipeline ruptures and hydrostatic test failures

- Conducted R&D in the areas of SCC & MFL In-Line Inspection, NDT techniques, pipeline repair techniques, mainline and joint coating systems, welding of new materials
- Conducted risk analysis for new pipeline construction projects
- Developed engineering & integrity budget and programs for due diligence and acquisitions
- Developed commercial agreements with Provincial Governments, private developers and construction contracts for pipeline upgrade/rehabilitation project
- Coordinated Facilities Integrity R&D Program reviews and budgeting cycles
- Liaised with Regulators (National Energy Board, Transportation Safety Board and Alberta Energy and Utilities Board) with respect to integrity management issues and incidents
- Provided direction during emergency maintenance activities to various groups within the organization

Pipeline Integrity Program Developer, Asset Reliability

Pipeline Integrity Engineer In Training developing risk based maintenance programs

July 1, 2001 – June 30, 2003 TransCanada PipeLines Ltd, Calgary, Alberta

Technical Responsibilities

- Developed annual integrity maintenance program using quantitative risk modeling software
- Coordinated research & development projects for risk management, corrosion and SCC threats
- Coordinated peer review team for evaluation of projects feasibility and cost management
- Performed value/benefit analysis for integrity projects
- Directed contractors & field technicians to perform technical tasks

Engineering Support Information Services Analyst

Full Summers & Part Time (20 hrs/week) during University

June 1, 1998- June 30, 2001, Petro-Canada Oil & Gas Ltd, Calgary, Alberta

Technical Responsibilities

- Developed data and Technology architecture for Bitumen Recovery Scheme, De-sulferization Upgrade Facility, Transportation Developments and Natural Gas Liquids (NGL) facilities

Education

Industry Courses

- Pipeline Pump Fundamentals
- Design of Gas Turbine Combined Cycle & Cogeneration Systems
- Pipeline Design & Construction, Pipeline Defect Assessment & Repair Methods
- Tools & Techniques of Project Management
- ASM Fundamentals of Non Destructive Testing, Principles of Failure Analysis

Post Secondary

- University of Calgary Bachelor of Science – Engineering Mechanical/Manufacturing
  09/97 – 06/01

Publications & Industry

- Member of the Association of Professional Engineers, Geologists, and Geophysicists of Alberta
- Chair Person: In-Line Inspection Session, Banff Pipeline Integrity Workshop, Banff, 2005
- M. Kothari, S. Tappert, U. Strohmeier, J. Larios and D. Ronsky, "Validation of EMAT In-Line Inspection Technology for SCC Management," Proceedings of the International Pipeline Conference, Calgary, 2004.
- R. Worthingham, M. Cetiner, M. Kothari, "Field Trial of Coating Systems for Artic Pipelines," Proceedings of the International Pipeline Conference, Calgary, 2004.
- Oil & Gas Journal "Two coating systems pass tests for arctic use" November 15, 2004
- Pipeline and Gas Technology Magazine "Using Emat for Crack Detection" June 2005

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **DIRECT TESTIMONY OF L.A. GRAY**

1. Please state your name and address for the record.

Answer: Loys A. "Buster" Gray, 9032 N Britt, Kansas City, Missouri.

2. By whom are you employed?

Answer: I am employed by Universal Ensco, Inc of Houston, Texas.

3. What is your position with the Keystone Pipeline Project?

Answer: I am engineering and Construction Manager for the US portion of the pipeline.

4. Please state your professional qualifications.

Answer: I have a BS in Civil Engineering, am a licensed professional engineer in 35 states including South Dakota and am entering my 30th year of engineering and construction work in the pipeline industry.

5. Have you provided a resume?

Answer: Yes, it is attached hereto as Exhibit A.

6. Are you responsible for portions of the application which Keystone has filed with the South Dakota Public Utilities Commission seeking a siting permit for the Keystone Pipeline?

Answer: Yes.

7. Are you responsible for the information provided in Section 2.2.4, 2.2.5, and 2.2.6 of the application?

Answer: Yes

8. Will you please summarize the information in that part of the application?

Answer: Section 2.2.4 addresses the land requirements for construction of the pipeline and pump stations, and for support sites like contractor yards and pipe yards. This section includes a typical detail of the proposed 110' construction right of way.

Section 2.2.5 describes the anticipated number of pipeline contractors and the "assembly line" of construction crews that are utilized in pipeline construction. Also, Keystone's Construction Mitigation and Reclamation Plan (CMR Plan) is described. This document addresses construction mitigation and reclamation in all types of lands including uplands, wetlands, and water bodies. Uplands include agricultural, grass, pasture, and forested lands as well as lands for residences and businesses.

Section 2.2.6 describes the special construction procedures which Keystone will use where the specific site conditions warrant or require them. These site-specific techniques include construction at road, highway, and railroad crossings; waterbody crossings; and construction measures to minimize impacts to grazing and livestock movement. .

9. Are you responsible for the information provided in Section 5.4.1 of the application?

Answer: Yes

10. Will you please summarize the information in that part of the application?

Answer: This section addresses surface water drainage and summarizes the waterbody crossing methods that will be implemented during construction of the pipeline. These methods

include wet open cut, dry open cut, and horizontal directional drill crossings. Each of these crossing methods include techniques to minimize environmental impacts to waterbodies.

Permitting of waterbody crossings, which is currently underway, will ultimately determine the construction method to be utilized., Keystone presently anticipates that most waterbodies in South Dakota will be open cut. However, the Missouri River at Yankton will be crossed utilizing horizontal directional drilling.

11. Are you responsible for the information provided in Section 5.4.3 of the application?

Answer: Yes

12. Will you please summarize the information in that part of the application?

Answer: This section addresses water use and sources and summarizes the uses of water during construction of the pipeline. The only significant water use is hydrostatic testing of the pipeline where the pipeline, once completed, is filled with water and tested to 125% of its maximum operating pressure. Water is sourced from water body crossings and returned to those waterbody-crossing watersheds. Since the pipeline is cleaned prior to introduction of the water, the water from the pipeline after testing is not contaminated. The discharge water quality is monitored and samples taken and tested during discharge.

13. Are you responsible for the information provided in Section 5.4.4 of the application?

Answer: Yes

14. Will you please summarize the information in that part of the application?

Answer: This section is describes the use, prevention, countermeasures, and containment of spills of fluids such as diesel, gasoline, water coolants, and hydraulic fluid from construction equipment during construction of the pipeline.

15. Are you responsible for the information provided in Section 5.7.4 of the application?

Answer: Yes

16. Will you please summarize the information in that part of the application?

Answer: This section addresses local land use and controls and summarizes the types of local permits that must be acquired for construction of the pump station facilities.

17. Are you responsible for the information provided in Section 5.10 of the application?

Answer: Yes

18. Will you please summarize the information in that part of the application?

Answer: This section addresses solid wastes and summarizes the types of solid wastes and how they are handled and disposed of during construction of the pipeline.

19. Are you responsible for the information provided in Section 6.1.1 of the application?

Answer: Yes

20. Will you please summarize the information in that part of the application?

Answer: This section is on construction labor, local labor needs and benefits, and local labor resources and summarizes the estimated numbers and types of labor necessary for construction of the pipeline. It also addresses that large diameter cross country pipeline construction is performed by specialty contractors utilizing organized labor.

21. Are you responsible for the information provided in Section 6.1.2 of the application?

Answer: Yes. This section addresses mitigation of impacts to agriculture, crop land, grassland, rangeland, and irrigated land.

22. Are you responsible for the information provided in Section 6.1.3 of the application?

Answer: Yes

23. Will you please summarize the information in that part of the application?

Answer: This section addresses impacts to the local commercial and industrial sectors and summarizes the types of economic benefits from increased payroll taxes and non-resident expenditures to the commercial sector during construction of the pipeline.

24. Are you responsible for the information provided in Section 6.1.4 of the application?

Answer: Yes

25. Will you please summarize the information in that part of the application?

Answer: This section addresses land values and summarizes the compensation to landowners for easements and crop damages, the impacts to land use during construction of the pipeline, and the restrictions on land use on the 50' permanent easement during operations of the pipeline.

26. Are you responsible for the information provided in Section 6.2.1 of the application and Data Request 2-1(a)?

Answer: Yes.

27. Will you please summarize that information?

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Answer: That material addresses housing and summarizes the types of housing and locations non-resident construction workers will utilize during construction of the pipeline.

28. Are you responsible for the information provided in Section 6.2.2of the application and Data Request 2-1(l)?

Answer: Yes.

29. Will you please summarize that information?

Answer: This section addresses energy and summarizes where electricity will be sourced for the pump stations and related facilities, the responsibility for new electric transmission power lines, and the temporary, short term electricity requirements during construction of the pipeline.

30. Are you responsible for the information provided in Section 6.2.3 of the application and Data Requests 2-1 (c) and (d)?

Answer: Yes.

31. Will you please summarize that information?

Answer: This section addresses sewer and water and summarizes the impacts of the influx of construction workers during construction of the pipeline. Keystone does not anticipate that there will be significant effects on these resources during construction.

32. Are you responsible for the information provided in Section 6.2.4 of the application and Data Request 2-1 (e)?

Answer: Yes.

33. Will you please summarize that information?

Answer: This section addresses solid waste management and summarizes the impacts of increased solid wastes on existing solid waste management facilities during construction of the

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pipeline. There will be no solid waste generated of any unusual nature. The solid waste disposal sites along the route are capable of handling the solid waste which will result from construction.

34. Are you responsible for the information provided in Section 6.2.5 of the application and Data Request 2-1(g)?

Answer: Yes.

35. Will you please summarize that information

Answer: This section addresses transportation and summarizes the types of permits necessary for the construction and impacts to local roads during construction of the pipeline. Keystone will obtain all necessary permits. Keystone will bore all improved road crossings and will open cut only those road crossings which are unimproved.

36. Are you responsible for the information provided in Section 6.3.1 of the application and the response to Data Request 2-1(i)?

Answer: Yes.

37. Will you please summarize that information?

Answer: This section addresses health services and summarizes the impacts of the influx of non-resident construction workers during construction of the pipeline. Keystone will rely on the health service providers in the area, but does not expect to require services above and beyond that which is ordinarily offered.

38. Are you responsible for the information provided in Section 6.3.2 of the application and Data Request 2-1(b)?

Answer: Yes

39. Will you please summarize that information?

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Answer: This section addresses schools and summarizes the impacts of the influx of non-resident construction workers during construction of the pipeline. Keystone anticipates that very few workers will bring their families along for the construction and that any schools along the route will be able to accommodate them.

40. Are you responsible for the information provided in Section 6.3.3 of the application and Data Request 2-1(j)?

Answer: Yes

41. Will you please summarize that information?

Answer: This section addresses recreation and summarizes the impacts of the influx of non-resident construction workers during construction of the pipeline. Some temporary workers will buy licenses and engage in hunting and fishing during the construction period. Long work days and work weeks will curtail impacts to local recreation facilities.

42. Are you responsible for the information provided in Section 6.3.4 of the application and Data Request 2-1(f)?

Answer: Yes

43. Will you please summarize that information?

Answer: This section addresses public safety (law enforcement) and summarizes the impacts of the influx of non-resident construction workers during construction of the pipeline.

44. Are you responsible for the information provided in Section 6.4.1 of the application?

Answer: Yes

45. Will you please summarize the information in that part of the application?

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Answer: This section addresses population and demographics and summarizes the impacts of the influx of non-resident construction workers during construction of the pipeline.

46. Are you responsible for the response to Data Request 2-1 (h)?

Answer: Yes I am.

47. Will you please summarize the information?

Answer: This section addresses fire protection during construction. Keystone contractors will provide fire protection equipment to prevent fires and to control fires in the event one should occur.

48. Are you responsible for the information provided in Tables 2, 6,7, 8, 9 and 10 of the application?

Answer: Yes

49. Will you please summarize the information in that part of the application?

Answer: These sections are on water use and sources and summarize the uses of water during construction of the pipeline.

50. Are you responsible for the information provided in Exhibit 2 of the application?

Answer: Yes

51. Will you please summarize the information in that part of the application?

Answer: This exhibit depicts the pipeline route, the location of pipeline pump stations and mainline valves and location of construction spreads.

52. Are you responsible for the information provided in Exhibit 5 of the application?

Answer: Yes

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53. Will you please summarize the information in that part of the application?

Answer: This exhibit depicts the typical 110' construction right of way.

54. Are you responsible for the information provided in Exhibit A of the application?

Answer: I am responsible for the route maps in Exhibit A.

55. Will you please summarize the information in that part of the application?

Answer: The route maps depict the location of the pipeline through South Dakota.

56. Are you responsible for the information provided in Exhibit B of the application?

Answer: Yes

57. Will you please summarize the information in that part of the application?

Answer: This exhibit includes the Construction Mitigation and Reclamation Plan. This document addresses construction mitigation and reclamation in all types of lands including uplands, wetlands, and water bodies. Uplands include agricultural, grass, pasture, and forested lands, as well as lands for residences and businesses.

58. Could you please briefly describe the Construction Mitigation and Reclamation Plan?

Answer: The CMR Plan was filed as an Exhibit to Keystone's application. The CMR Plan provides a broad range of mitigation and reclamation requirements for all types of land including agriculture lands, but also forested, pasture, grassland, residential, and commercial lands/areas. The plan also addresses many other types of construction impact mitigation, such as noise control, dust control, fire prevention, weed management, etc.

59. Does Keystone seek or have agreements with counties and townships concerning the damage to roads caused by the pipeline construction?

Answer: Keystone will acquire permits authorizing the crossing of county and township roads. These permits may allow bored crossings or, in some cases, open cut crossings. The permits typically require Keystone to restore the roads to their pre-construction condition. Keystone is just now starting the process of permitting the crossings of County and Township roads. In the process of permitting road crossings, many local jurisdictions will request some type of agreement to ensure that any roads damaged during construction are repaired to pre-construction condition. In summary, it is Keystone's policy that if its construction equipment causes damage to county or township roads, Keystone will be responsible for the repair of those roads to pre-construction condition. Keystone understands that the Commission will fix the terms of a bond for such construction and has engaged the Association of Towns and Townships in a discussion about that amount.

60. Do you adopt the portions of Keystone' s application discussed above as your testimony in this proceeding as well as the additional testimony above and the attached exhibits?

Answer: Yes, I do.

61. Do the portions of the application for which you are responsible support the granting of a permit by the Commission for the Keystone Pipeline Project?

Answer: Yes they do.

62. Does this conclude your testimony?

Answer: Yes, it does.

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Dated this 21st day of September, 2007.

L. A. GRAY

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L. A. "BUSTER" GRAY, P.E.

Experience Summary:

Over thirty years of experience in the management and design of oil and gas pipeline projects with capital budgets from less than $1 million to approximately $5 billion. Experienced in all aspects of pipeline project execution including feasibility and flow studies, route selection, surveying, mapping, detailed engineering design, DOT compliance, material procurement, project and construction management, commissioning, and operations. Projects managed have included a variety of pipeline related facilities including production, separation, dehydration, compression, gas treatment and metering equipment. Owned and operated Pipeline Design Enterprises, Inc. which was merged into Universal Ensco, Inc. in 1989. Senior Vice President of Universal Ensco, Inc.

Career highlights include:

- ***Engineering & Construction Manager*** of the 1,280 mile 30" & 36" U.S. portion crude oil pipeline project across North & South Dakota, Nebraska, Kansas, Missouri, Oklahoma, and Illinois. The project involves twelve (12) mainline construction spreads with installation scheduled over a two year period to begin in 2008.

- ***Project Director*** of the conceptual design, constructability assessment, and cost estimate for Exxon's proposed 900 kilometer 36" Sakhalin Island to China natural gas pipeline project. The pipeline route traverses the remoter area of the Khabarovsk Krai in Far Eastern Russia.

- ***Project Director*** for the supervision of construction of an approximate 4,000 kilometers (2,500 miles) of 40" OD gas pipeline and related facilities (China West to East Gas Pipeline Project) for PetroChina Company Limited. The pipeline route traversed rugged, mountainous areas as well as desert terrain.

- ***Project Director*** responsible for the preparation of a cost estimate for construction of the Guangdong LNG Pipeline Project including assessment of the proposed pipeline route for constructability issues and relative complexity to the China West to East Gas Pipeline Project.

- ***Project Director*** of the Conceptual Design and Cost Estimate for construction of an approximate 4,000 kilometers (2,500 miles) of 40" OD gas pipeline (China West to East Gas Pipeline Project) and related facilities for PetroChina Company Limited – Phase I.

- ***Engineering & Construction Manager*** of the 900-mile 36" U.S. portion of the Alliance 36" natural gas pipeline project across North Dakota, Minnesota, Iowa, and Illinois. The project involved seven (7) mainline construction spreads with installation scheduled over a two year period beginning in 1999.

- ***Project Director*** of the 515 mile U.S. portion of the 780-mile 24" crude oil Express Pipeline Project from Wildhorse, Montana to Casper, Wyoming. This project was routed, designed, materials procured and installed in less than one year. The project included management of route selection, survey, engineering design, drafting, procurement, and construction.

- ***Engineering Manager*** of the design of the 223-mile 20" Tuscarora natural gas pipeline project to serve Reno, Nevada and several small northern California communities. The project included survey, design, and drafting of the pipeline, pigging, measurement, and pressure reduction facilities. The pipeline route traverses rugged, mountainous as well as desert terrain.

- ***Project Director*** for the route selection, survey, permitting, right-of-way acquisition, and mapping for Tennessee Gas Pipeline Company's 223-mile, 30-inch natural gas pipeline in Louisiana and Mississippi.

- ***Project Director*** for Seagull Energy Corporation's Multiple Feedstocks Products Pipeline Project. This project, located in the congested Houston Ship Channel area, included the survey, mapping, detailed design, material procurement assistance, and construction inspection for three 8-inch and one 10-inch products pipelines.

- ***Project Manager*** of natural gas pipelines and related facilities to electric generation utilities including a 23-mile 20" line for Florida Power and Light Company in Florida, a 75-mile 20" line for Cincinnati Gas and Electric Company in eastern Kentucky, and an 11-mile 20" line for Kentucky Utilities in central Kentucky. Responsibilities included route selection, survey, permitting, design, right-of-way acquisition, and construction supervision.

- ***Project Manager*** for other large diameter pipeline projects including 67-miles of 30-inch and 51-miles of 24-inch natural gas pipelines in the Houston metropolitan area; 3-miles of dual 30-inch gas pipeline and measurement facilities near Halletsville, Texas, and 11-miles of 24-inch pipeline in the highly congested Houston Ship Channel area.

- ***Expert Witness*** for regulatory hearings and trial on matters including pipeline flow capacities, cost estimates, construction cost claims, and design safety standards.

Education:

Bachelor of Science, Civil Engineering, Mississippi State University, 1976

Registrations and Professional Memberships:

- Professional Engineer, TX, No. 49686; MS, No. 9160; LA, No. 23381; AR, No. 7489; NM, No. 11337; OK, No. 15758; AL, No. 18138; CO, No. 27545; FL, No. 0044425; MT, No. 10706PE; WY, No. 6233; GA, No. 19882; SC, No. 14965; NC, No. 18638; KY, No. 17430; PA, No. PE-043436-R; MO, No. EN-025579; NV, No. 10193; NY, No. 071750, VA, No. 0402025505; MD, No. 20940; NJ, No. 38813; IL, No. 062-050390; MN, No. 24602; IA, No. 13775; KS, No. 14521; MI, No. 43431; WA, No. 34539; WI, 33582-006; OH, No. E-66360; AZ 37034; ND 4714; NE E-11956 and OR 79341PE.
- Professional Land Surveyor, Texas, No. 4257
- American Society of Civil Engineers
- Pipeliners Club of Houston (Former President)

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **DIRECT TESTIMONY OF HEIDI TILLQUIST**

1. Please state your name and address for the record.

Answer: Heidi Tillquist, 1601 Prospect Parkway, Fort Collins, Colorado

2. What is your role with the TransCanada Keystone Pipeline project?

Answer: I am a contractor of TransCanada Keystone. I am employed as an environmental toxicologist and project manager with ENSR in Fort Collins, Colorado. ENSR is providing environmental consulting services to TransCanada Keystone Pipeline, L.P. (Keystone) with respect to the Keystone Pipeline project.

3. Please state your professional qualifications.

Answer: I have 17 years of experience conducting environmental toxicology and risk assessment. I have worked on a number of pipeline projects including crude oil, refined products, natural gas liquid (condensate), and natural gas pipelines. I have conducted risk assessments of pipelines, oil and gas field development, power plants, mining sites, and Superfund sites. I have authored reference texts, including a document discussing the environmental effects of crude oil in freshwater environments.

4. Have you provided a resume?

Answer: Yes, a copy of my resume is attached to my testimony as Exhibit A.

5. Are you responsible for portions of the application which Keystone has filed with the South Dakota Public Utilities Commission seeking a siting permit for the Keystone Pipeline?

Answer: Yes.

6. Are you responsible for the information provided in Section 5.4.2 of the application?

Answer: Yes.

7. Will you please summarize the information in that part of the application?

Answer: The proposed pipeline route crosses near a water supply well in Marshall County and will cross an aquifer protection area in Kingsbury County. The pipeline corridor also passes through areas where shallow and surficial aquifers exist. Shallow and surficial aquifers have the greatest potential generally speaking for sources of water. Since the pipeline will be buried at a shallow depth, it is unlikely that the construction or operation of the pipeline will alter the water yield of any aquifers used for drinking water purposes. Keystone will investigate shallow groundwater when it is encountered during construction to determine if there are any nearby livestock or domestic wells that might be affected by construction activities. Appropriate measures will be implemented to prevent groundwater contamination and steps will be taken to manage the flow of any groundwater encountered. Pipeline construction in the area of any known surficial aquifers or wetlands will be performed according to current industry best management practices to minimize adverse impacts potentially associated with pipeline construction. Keystone's Construction Mitigation and Reclamation Plan (CMR Plan) addresses this topic in further detail.

Reductions in the quality of ground water from spills, leaks, or disposal practices during construction are not anticipated. Most of the aquifers will be at least temporarily isolated from spills which might occur on the land surface. In the unlikely event of an incident, attending personnel will be able to respond before contaminants migrate into groundwater. Impacts to deep aquifers are not expected. In areas with near-surface ground water, or areas adjacent to surface waterbodies, additional procedures and measures will be implemented. See elsewhere in Keystone's application and the CMR plan.

8. Are you responsible for the information provided in Table 4 of the application?

Answer: Yes.

9. Will you please summarize the information in that part of the application?

Answer: Table 4 shows the eight named waterbodies within 10 miles of proposed Keystone pipeline crossings in South Dakota.

10. Are you responsible for the information provided in Table 5 of the application?

Answer: Yes.

11. Will you please summarize the information in that part of the application?

Answer: Table 5 shows the two public water supplies existing within one mile of the centerline of the pipeline.

12. Are you responsible for the information provided in Section 5.8 of the application?

Answer: Yes.

13. Will you please summarize the information in that part of the application?

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Answer: The Clean Water Act (CWA) requires each state to review, establish and revise water quality standards for surface water. Those requirements are found at Section 303(c) of the CWA. South Dakota has developed its own beneficial use classification system. The water quality standards in place in South Dakota are found at Administrative Rules of South Dakota (ARSD) Chapters 74:51:01 through 74:51:03.

A permit for hydrostatic test water discharges is expected to impose limits on discharges which will protect receiving water bodies. Construction methods for stream crossings detailed in Section 7 of the CMR plan (Exhibit B of Keystone's application), protects those streams and waterbodies. Keystone expects that the one-time construction and hydrostatic test water use will result in no short or long-term impacts to water quality along the proposed route.

14. Have you prepared a risk assessment and environmental analysis of the Keystone Pipeline?

Answer: Yes I have.

15. Please describe generally what a risk assessment and environmental analysis is?

Answer: Risk assessments evaluate the probability of an event (such as a pipeline spill), determine if receptors (humans, wildlife, fish) could be exposed in the event of a spill (exposure route), and analyze its potential consequences (exceedence of drinking water criteria).

16. Was a spill analysis conducted for the Keystone pipeline?

Answer: A preliminary spill analysis was conducted for the Keystone Pipeline. A spill frequency and spill volume analysis was conducted by DNV, an independent firm recognized as an industry expert on spill frequency and volume assessments. DNV used information from a number of sources including the national database that is controlled by the Pipeline Hazardous

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Materials Safety Administration (PHMSA) within the U.S. Department of Transportation. Based on the results of DNVs assessment, ENSR subsequently used the spill frequency and volumes to estimate environmental consequences, which was also part of the Risk Assessment.

17. What were the results of the spill analysis?

Answer: The project-specific results provided by DNV were derived from historical data obtained from the USDOT databases. DNV estimated the chance of a leak from the Keystone Pipeline to be no more than once every seven to 11 years over the ENTIRE length of the pipeline in the U.S., depending on product and throughput. Using the most frequent seven year interval, this equates to a spill no more than once every 41 years at any location along the 220 miles of pipeline in South Dakota.

18. Is this spill frequency a conservative figure?

Answer: By design, the frequency/volume statistics are conservative (i.e., they overestimate risk) since the intent was to use the assessment for planning purposes. Specifically, the objective of the risk assessment was threefold: 1) it provided a range of potential effects for the NEPA process; 2) it provided a preliminary evaluation of risk as required for Integrity Management program (49 C.F.R. Part 195); and 3) it is used for Emergency Response planning (49 C.F.R. Part 194).

19. At the PUC public input sessions held in June, a member of the public commented that the Keystone Pipeline will definitely leak. Is that true?

Answer: The statistical frequencies cited in the DNV study should not be interpreted as confirmation that spills will definitely occur. Rather, these statistical estimates are similar to statistics that the auto insurance industry uses. For example, your insurance agent might state that you are likely to have 1.5 crashes in ten years. That does not mean that you will crash

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during that ten year period. In fact, as a good driver, you'll do everything you can to minimize the chance of a crash. Similarly, Keystone will adopt a number of measures to minimize the chance of a pipeline leak or spill.

20. Discuss the probable size of a spill from the Keystone pipeline.

Answer: For the Risk Assessment analysis, DNV utilized data based on a reporting criteria of 50 barrels or more. So the assessment, by design, overemphasizes the probable spill size. This is done to ensure conservatism in emergency response planning and other objectives. Data from actual spills reveals that Keystone's assessment is highly conservative. Since the PHMSA reporting criteria changed in 2002 to require reporting of spills of five barrels or more, the average size of a reported pipeline spill has been 12 barrels, equivalent to approximately 500 gallons. If a spill were to occur on the Keystone Pipeline, these recent data affirm that the spill is very likely to be small.

21. In broad terms, how susceptible are aquifers along the Keystone Pipeline Project route to a crude oil spill?

Answer: Not all aquifers are equally vulnerable to contamination from a pipeline spill. The majority of the pipeline (approximately 80%) is underlain by low permeability soils (including fine-grained glacial deposits and confining materials) that inhibit the infiltration of released crude oil into aquifers. Additionally, most aquifers are more than 50 feet deep, which significantly reduces the chance of contamination reaching the aquifer.

The chance of a spill occurring over a shallow aquifer with highly permeable soils is low. Consequently, the majority of aquifers crossed by the pipeline have low susceptibility to contamination and the chance of a spill from the Keystone pipeline that would affect an aquifer anywhere along the route is very low.

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22. How susceptible are the aquifers in South Dakota?

Answer: Most South Dakota aquifers are located at depths at more than 100 feet and, consequently, are less susceptible to oil contamination. However, the Middle James (also known as the Brampton) and Oakes aquifers in Marshall and Brown counties are shallow lake bed or buried channel aquifers with depth to water generally less than 50 feet. While the Oakes and Middle James aquifers are generally overlain by isolating surficial silts and clays (thereby restricting the penetration of oil to the underlying aquifer), permeable sands and gravels do occur in the extreme northeastern portion of Brown County and in Marshall County. Keystone's proposed Hecla Sandhills reroute, discussed in Mr. Koski's testimony, significantly reduces the amount of shallow groundwater aquifers crossed in Brown and Marshall counties. The original proposed route crossed approximately 20.4 miles of shallow water supply aquifers, of which 12.7 miles were high-yielding aquifers. Sandy soils, which have more permeability, occur along 21.6 miles of the original proposed route. The reroute overlies 5.2 miles of shallow water supply aquifers, all of which have high-yielding aquifers. Sandy soils occur along 11.2 miles of the reroute.

23. How much groundwater would be affected if oil were to reach the aquifer?

Answer: Whenever crude oil accumulates on the groundwater surface, an area of dissolved crude oil constituents will develop, forming a contaminant plume that will migrate in the direction of groundwater flow. Groundwater moves faster than the contaminant compounds (Benzene, Toluene, Ethylbenzene, and Xylene or "BTEX") due to natural attenuation processes, which is the natural degradation of hydrocarbons by microbes. A recent report evaluated over 500 sites with BTEX contamination in groundwater and found that the contaminant plume was within 250 feet of its source in 75% of the cases. In 80% of the cases, the contamination plume

was stable or decreasing in size (MN PCA). Therefore, it is a misconception that a crude oil spill would contaminate an entire aquifer. In reality, if a spill from the Keystone Pipeline were to reach an aquifer, the areal extent of contamination would be quite small.

24. At the PUC public comment sessions held in June, reference was made to a crude oil spill site at Bemidji, Minnesota. Have you investigated the Bemidji oil spill site?

Answer: Yes I have. Because there were comments from the public about the extent of the groundwater contamination and absence of vegetation at the Bemidji site, I went to Minnesota, spoke with the lead USGS researcher, Geoff Delin, and conducted a site visit, in July 2007.

25. What did you learn from your site visit to the Bemidji Oil spill site?

Answer: In 1979, a crude oil spill occurred along Lakehead Pipeline near Bemidji, Minnesota. Approximately 10,600 barrels spilled. While most crude oil was cleaned up, approximately 2,515 barrels remained. The groundwater in the area is susceptible to contamination because the soils in this area are sandy (high hydraulic capacity) and the groundwater is shallow (ranging from zero (surface water) to 35 feet below ground surface).

The USGS has conducted research at the site to determine how crude oil affects groundwater. I learned that the BTEX front moves about five times slower than the groundwater. Over 20 years, the BTEX had moved a total of 170 yards from the crude oil source. The limited movement of the contamination was due to natural attenuation.

26. At the public comment session there was a comment that a crude oil spill will make the ground sterile forever. The Bemidji site was used as an example of this impact. Do you agree with that statement?

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No, it is not accurate, nor is it supported by the Bemidji site. Remediation techniques currently available commonly restore vegetation within a few years. Attached to my testimony are some photographs I took at the Bemidji site this past July, as Exhibit B. The first photograph is of the pipeline ROW, where several pipelines are co-located (Photo 1). The spill was caused by defective pipe that was manufactured in the 1950s. The oil sprayed about 120 meters into what is called the "spray zone." The oil from the spray zone then flowed along the soil surface, following the terrain contours, and drained into a wetland approximately 100 meters away, forming the South Pool. The North Pool was located along the ROW.

As part of the cleanup in 1980, all the topsoil was stripped from the spill area. As shown in the first photograph of the ROW, vegetation has re-established and is indistinguishable from the surrounding area (Photo 1). The next photo (Photo 2) is a view of the North Pool area. Again, vegetation has been successfully re-established throughout this area. Photo 3 is an overview of the spray zone. Most of the area has vegetation growing on it. However, Photo 4 shows an area (20 m x 15 m) within the spray zone where vegetation regrowth is limited. The limited revegetation is due to two things: 1) hydrophobic soils (where the oil forms a water repellent crust at the soils surface); and 2) lack of topsoil (it is difficult for vegetation to grow in subsoils). If this area in Photo 4 were to be actively remediated, the ground would be tilled to disrupt the hydrophobic crust and topsoil would be replaced. Photo 4 is the South Pool area. This is the only area where topsoil was replaced. As you can see, the wetland and surrounding vegetation is very lush.

In summary, vegetation at the Bemidji site has largely re-established despite lack of topsoil and any active remediation to the soil. There is a small area where vegetation has not

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completely re-established and that is attributable to the hydrophobic soils and lack of topsoil. Tillage and topsoil replacement would resolve this issue.

27. Are you responsible for the information provided in Section 6.4.2 of the application?

Answer: Yes, in part.

28. Will you please summarize the information in that part of the application for which you are responsible?

Answer: Pipelines are the safest, most reliable, and most efficient mode of transporting large volumes of crude oil. Pipeline transportation of crude oil enjoys an excellent safety record. Keystone has submitted a preliminary risk assessment and environmental consequence analysis to the Department of State. The preliminary risk assessment evaluates the likelihood of a crude oil release and potential for environmental impacts.

29. Do you adopt the portions of Keystone's application discussed above as your testimony in this proceeding, as well as the additional testimony above and the attached exhibits?

Answer: Yes, I do

30. Do the portions of the application for which you are responsible support the granting of a permit by the Commission for the Keystone Pipeline Project?

Answer: Yes they do.

31. Does this conclude your testimony?

Answer: Yes it does.

Dated this 21 day of September, 2007.

Heidi Tillquist

HEIDI TILLQUIST

009793

Heidi Tillquist, M.S.

Years Experience: 17

Technical Specialties

- Risk Assessment
- Environmental Toxicology
- Fisheries Biology
- Wildlife Biology

Professional History

- ENSR
- U.S. Fish and Wildlife Service
- Lovelace Inhalation Research Institute
- U.S. Forest Service

Education

- MS (Environmental Toxicology) Colorado State University
- BS (Fishery and Wildlife Biology) Colorado State University

Professional Registrations and Affiliations

- Certified Fisheries Professional, American Fisheries Society
- Certified Wildlife Biologist, The Wildlife Society

Representative Project Experience

Pipeline Experience

Keystone Pipeline Project, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Missouri, and Illinois. Keystone is proposing to construct a 1,372 mile pipeline system in the U.S. to transport Canadian crude oil to refinery destinations in the mid-western U.S. Keystone has prepared technical documents that were filed with the Department of State, the lead federal agency for the EIS. Ms. Tillquist is responsible for conducting a risk assessment for accidental releases from the pipeline system, including estimates of the probability of occurrence base on Office of Pipeline Safety data bases and sensitive area maps; estimates of potential toxicological effects on wildlife, fisheries, domestic livestock, and humans from crude oil releases; and estimates of oil spill recovery rates in terrestrial and aquatic systems.

Shell Pipeline Company, New Mexico Products Pipeline EIS, New Mexico and Texas. Shell proposed to convert and reverse the flow of an existing 406-mile crude oil pipeline to transport refined petroleum products (i.e., gasoline, diesel, jet fuel). System conversion also entailed the construction of two new pipeline extensions (about 100 miles total), pump stations, pressure reducing stations, miscellaneous appurtenances, and associated electrical transmission lines. The project would affect portions of New Mexico and Texas, involving many local, state, federal, and tribal jurisdictions. Due to public concern, a probabilistic risk assessment evaluated risk to humans and the environment that could result from the accidental release from the pipeline and its facilities. Pipeline safety was identified as one of the key issues due to the existing pipe's age (45 years old) and its composition (pre-1970 electric resistance welded [ERW] pipe). Historically, pre-1970 ERW pipe has a higher than expected rate of failure. Due to the extreme scrutiny of this project and high probability for litigation, the BLM requested that the pipeline's structural integrity be carefully evaluated. Information from various sources (e.g., previous hydrostatic test; leak history; pipeline repairs; magnetic particle inspection; burst test; close interval survey) were compiled and integrated into a risk assessment where the time-to-failure was calculated, based on Shell's proposed hydrostatic test pressures and proposed operating cycles (frequency and magnitude). The probability of a failure due to pressure reversal and stress-induced cracking was determined to be low. Presuming the pipe passes the pre-operational hydrostatic test and in-line inspection, the elevated hydrostatic test pressures and low frequency, low-magnitude operating cycles proposed by Shell in High Consequence Areas would provide sufficient protection to reasonably ensure the safety of nearby residences and environmental resources.

The EIS also evaluated the potential consequences of a release. Risk statistics were generated from the Office of Pipeline Safety (OPS) database and the potential impacts to sensitive resources were identified. Results indicate that alternatives to the proposed project, including No Action, Pipe Replacement, and Pipe Reroute, would pose greater risks to the public and environment. Moreover, the risk was not distributed equally along the pipeline route. For the pipeline alternatives, risk to environmentally sensitive areas (e.g., groundwater aquifers, residential areas) was disproportionally higher than for other less-sensitive areas along the pipeline. Ms. Tillquist conducted the risk assessment for the EIS, served on the Pipeline Safety Technical Panel, and acted as the Project Manager for this project.

Questar, Williams, Kern River Pipeline Companies, Environmental Impact Statement Preparation for Natural Gas and Crude Oil Pipelines, Utah, Colorado, New Mexico. This EIS incorporated information from three different pipelines, In the first proposal, Williams proposed to convert an existing crude oil pipeline to refined petroleum product service as well as construct new pipeline extensions. The entire project would extend about 500 miles through portions of New Mexico, Colorado, and Utah. In the second and third proposals, Questar and Kern River proposed to simultaneously build natural

gas transmission pipelines within a portion of the same corridor in Utah. ENSR prepared a third-party EIS for the BLM, the lead agency. Primary issues included petroleum spills, natural gas releases, and conflicts with inventoried roadless areas in National Forests. Due to increased public concern regarding the safety of pipelines, national US Department of Transportation incident databases were assessed and used to estimate the probability of future releases. Additionally, adverse effects to sensitive environmental receptors, including residential areas and endangered fish species, were evaluated.

At the BLMs request, ENSR conduct a detailed risk assessment as part of the NEPA process. The structural integrity of the existing pipe and the operational procedures proposed for the entire pipe system were evaluated to ensure the protection of public safety and the environment. The assessment process integrated operational and environmental factors that could affect the safe operation of the pipeline (e.g., cathodic protection measures, internal inspections, ongoing surveillance, leak detection capabilities, operational pressures and cycles, designed safety features, and emergency response capabilities). Geological hazards (e.g., seismicity, landslides) were examined to identify areas along the pipe that might be exposed to additional physical stress. Environmentally sensitive areas (e.g., drinking water recharge area, residential areas, threatened and endangered species habitat) were also incorporated into the analysis. This information was integrated into a comprehensive risk assessment framework that also estimated the probability of an incident (spill, injury, fatality, fire, or explosion) based on the existing pipe's leak history and national statistics. Once the probability of an event was estimated, the potential consequences of a release to sensitive resources were quantified. Based on the assessment, the potential risks to public safety and drinking water sources were considered among the highest priority risks. While no additional safety mitigation was required for the natural gas pipelines, the BLM and Williams met to jointly discuss the analysis, the areas of potential risk from a liquid spill, and discuss potential mitigation. Ultimately, Williams modified their operational plans to further reduce the hazard to these sensitive areas to the satisfaction of BLM technical staff. Ms. Tillquist conducted the risk assessment for the EIS and acted as the Assistant Project Manager for this project.

Entrega Gas Pipeline Inc., Entrega Pipeline Project EIS, Colorado, Wyoming. Entrega Gas Pipeline Inc. (a subsidiary of EnCana Oil and Gas) proposed to construct and operate a 327.5-mile 36- to 42-inch-diameter natural gas transmission pipeline. The pipeline would transport up to 1.5 Bcfd of natural gas from the Piceance Basin in Colorado to interconnections in Wamsutter and near Cheyenne, Wyoming. ENSR was preparing the EIS as a third-party contractor to the FERC and the BLM was a cooperating agency. Major issues included potential impacts to threatened and endangered species (water depletion issues), noxious weed management, and socioeconomic impacts. Because Western Interstate Company (a subsidiary of El Paso Corporation) also proposed to build a large diameter pipeline from the Piceance Basin to

Wamsutter, cumulative impacts were also an issue. Ms. Tillquist served as the Project Manager on this project.

Wyoming Interstate Company, Piceance Basin Expansion Project EIS, Colorado, Wyoming. Wyoming Interstate Company (WIC, a subsidiary of El Paso Corporation) proposes to construct and operate a 141.7-mile 36-inch-diameter natural gas pipeline. The pipeline would transport up to 350 MMcfd of natural gas from the Piceance Basin in Colorado to interconnections near Wamsutter, Wyoming. ENSR is preparing the EIS as a third-party contractor to the FERC and the BLM is a cooperating agency. Major issues include potential impacts to threatened and endangered species (water depletion issues), noxious weed management, and socioeconomic impacts. Because Entrega Pipeline Company Inc.(a subsidiary of EnCana Oil and Gas) also proposes to build a large diameter pipeline from the Piceance Basin to Wamsutter, cumulative impacts are also an issue. Ms. Tillquist serves as the Project Coordinator for this project.

Questar Natural Gas Company, Preparation of the Southern Trails Natural Gas Pipeline Environmental Impact Statement (EIS)/Environmental Impact Report (EIR), California, Arizona, Utah, and New Mexico. Questar proposed to convert a 600-mile crude oil pipeline to the Southern Trail natural gas pipeline. Construction resulting from the proposed extensions, reroutes, realignments, and replacements affected portions of California, Arizona, Utah, and New Mexico and involved many local, state, federal, and tribal jurisdictions. ENSR prepared this third-party EIS/EIR for the Federal Energy Regulatory Commission (FERC). Ms. Tillquist participated in project coordination, wrote several technical sections, and provided technical review of the EIS.

El Paso Energy, Federal Energy Regulatory Commission (FERC) Application to Convert a Crude Oil Pipeline to Natural Gas Pipeline, Texas, New Mexico, Arizona. ENSR coordinated El Paso Energy's Line 2000 application to the FERC for the conversion of an existing approximately 800-mile crude oil pipeline to natural gas service. This conversion project affected lands within Texas, New Mexico, and Arizona. ENSR's duties included the preparation of FERC resource reports, an applicant-prepared biological assessment (BA), applicant-prepared environmental assessment (EA), and 404 permit. Project management activities including project budgeting, coordinating office staff and field survey crews, and creation and maintenance of a database detailing over 300 construction sites and activities.

Newfield Exploration Company, Castle Peak and Eightmile Flat Oil Expansion Project, Utah. ENSR was contracted by the BLM's Vernal Field Office to prepare a third-party EIS for a proposed expansion of oil field development operations in the Unitah Basin area of northeastern Utah. The study area covers approximately 110 sections or 65,500 acres. Inland is proposing to expand its existing waterflood oil recovery operations by drilling up to 900 additional wells in the Castle Peak and Eightmile Flat areas of the greater Monument Butte-Myton Bench oil and gas

production region. Important issues associated with this project included cumulative effects to raptor species in the Unitah Basin, air quality, and effects on sensitive species, such as the mountain plover and hookless cactus. ENSR also prepared a Biological Assessment for the U.S. Fish and Wildlife Service as part of the project permitting requirements. Ms. Tillquist evaluated the effects of habitat fragmentation on wildlife resources.

Risk Assessment – Oil and Gas Emphasis

Inland Resources, Natural Gas Liquid Pipeline Environmental Assessment, Wyoming. Inland Resources plans to develop an area for natural gas liquids extraction. As part of the development, a new pipeline would be constructed which would cross a tributary to the Green River in Utah, which contains several endangered fish species. At the request of the BLM and US Fish and Wildlife Service, the potential hazard posed by the pipeline was evaluated by assessing the likelihood of a spill, attenuation rates, and dilution potential. Additionally, cumulative risk from other natural gas liquid pipelines within the same drainage was also estimated. Based on the pipelines location, volume of natural gas liquids, probability of failure, and likelihood of downstream transport, the assessment showed that no impacts to endangered fish species would be anticipated.

American Petroleum Institute (API), Fate and Environmental Effects of Oil Spills in Freshwater Environments. ENSR prepared a report for API describing the fate and effects of oil spills in freshwater environments. This report summarizes and documents potential environmental effects from inland oil spills into fresh surface waters. It identifies, describes, and compares the behavior, fate, and ecological implications of crude oil and petroleum products in inland waters. The document is intended to provide basic information necessary for the formulation of spill response strategies that are tailored to the specific chemical, physical, and ecological constraints of a given spill situation. The report describes the relevant features of various inland spill habitat types, discusses the chemical characteristics of oils and the fate processes that are dependent thereon, summarizes reported ecological and toxicological effects results both generally and with specific reference to distinct organism groupings, and, finally, in the context of case histories from past spills, highlights some of the considerations, difficulties, and elements of success of presently available spill response techniques.

Bolivian National Government, Evaluation of the Transredes Petroleum Product Spill, Bolivia. Following a pipeline rupture on the Rio Desaguardero, the spatial extent and environmental effects of hydrocarbon contamination was evaluated by chemical analysis of environmental media and laboratory toxicity tests. These data were then used in a risk assessment to evaluate the potential risk to aquatic biota, terrestrial herbivores (cattle, sheep, and endangered vicunas), and human receptors.

Reliant Energy, Pipeline and Facility Decommissioning Evaluation, New Jersey and Pennsylvania. Reliant owned a 10-mile pipeline that had been used to transport fuel oil #6 (historically) and fuel oil #2 (currently). The company also owned a related facility with breakout tanks and aboveground piping. Reliant was considering temporarily (1 to 3 years) suspending the transport of oil through the pipeline and facility and, perhaps, totally abandoning these assets. Alternatively, Reliant could chose to reactivate the pipeline after a temporary suspension. Ms. Tillquist evaluated the federal, state, and local regulations that govern the temporary suspension, reactivation, and abandonment processes. Additionally, she identified technical issues that would be associated with each process. Finally, ENSR provided Reliant with a range of anticipated costs associated with each of these activities.

EXHIBIT B

Photograph 1. Pipeline ROW at Bemidji (7/30/07)

Photograph 2. Spray Zone Overview (7/30/07)

Photograph 3. Hydrophobic soils within Spray Zone showing little revegetation. (07/30/07)

Photograph 4. North Pool and monitoring wells. (07/30/07)

Photograph 5. Wetland and South Pool (07/30/07).

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September 21, 2007

Writer's E-mail: koenecke@magt.com

Dear Intervenors:

Enclosed please find the direct testimony filed by TransCanada Keystone LP in support of its application for a siting permit as indicated. You should have seven testimonials with attachments:

Direct Testimony of Robert Jones
Direct Testimony of Scott Ellis
Direct Testimony of Brian Thomas
Direct Testimony of Michael Koski
Direct Testimony of Meera Kothari
Direct Testimony of L. A. Gray
Direct Testimony of Heidi Tillquist

If you have questions you may wish to consult with your own counsel, Kara Semmler, PUC staff attorney, or myself.

Sincerely,

MAY, ADAM, GERDES & THOMPSON LLP

BRETT KOENECKE

BK:lar
Enclosures

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001
	)	**CERTIFICATE OF SERVICE**

I hereby certify that the following documents were served upon all of the parties listed on the attached Service List on the 24th day of September, 2007, by mailing a true and correct copy thereof to them by first class mail, postage prepaid, at their last known mailing addresses.

Direct Testimony of Robert Jones
Direct Testimony of Scott Ellis
Direct Testimony of Brian Thomas
Direct Testimony of Michael Koski
Direct Testimony of Meera Kothari
Direct Testimony of L. A. Gray
Direct Testimony of Heidi Tillquist

MAY, ADAM, GERDES & THOMPSON LLP

BY:_____
BRETT KOENECKE
Attorneys for TransCanada Keystone Pipeline
503 South Pierre Street
P. O. Box 160
Pierre, SD 57501
(605) 224-8803

Robert Papendick
540 SE Crestview Street
Pullman, WA 99163

Lillian Anderson
12189 - 415th Ave
Langford, SD 57454

Hanson County Auditor
Randy Doyle
Po Box 500
Alexandria 57311-0500

Marshall County Auditor
Julie Hagen
Po Box 130
Britton 57430-0130

Maureen Friesen
27307 - 435th Ave
Freeman, SD 57029

Josh Kraft
PO Box 123
Britton, SD 57430

Lawrence Roster
24874 SD Hwy 25
Spencer, SD 57374

Norman Hofer
43439 - 279th Street
Freeman, SD 57029

Raymond Wormke Trust Dan Tople, Trustee
3204 S. Lupine
Sioux Falls, SD 57110

David C. Wade on behalf of BDM Rural Water System, Inc.
705 - 7th Street
Britton, SD 57430

Earla and Richard Strid
PO Box 213
DeSmet, SD 57231

Dixie Conner
1100 E. 15th Street
Yankton, SD 57078

Janice Hofer
43405 - 258th Street
Bridgewater, SD 57319

Rhonda Hardina
PO Box 94
Britton, SD 57430

SD Association of Towns and Townships
PO Box 28
Madison, SD 57042

Andrea Kilker
41650 SD Hwy 10
Britton, SD 57430

Duane Hacecky
29840 - 439th Ave
Irene, SD 57037

Jerry Burger
10644 - 417th Ave
Britton, SD 57430

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **CERTIFICATE OF SERVICE**

I hereby certify that the following documents were served upon all of the parties listed below on the 28th day of September, 2007, either electronically via email or by mailing true and correct copies thereof to them by first class mail, postage prepaid, at their last known mailing addresses.

Letter to Intervenors
Direct Testimony of Robert Jones
Direct Testimony of Scott Ellis
Direct Testimony of Brian Thomas
Direct Testimony of Michael Koski
Direct Testimony of Meera Kothari
Direct Testimony of L. A. Gray
Direct Testimony of Heidi Tillquist

Jeffrey W. Weldon
On behalf of the City of Yankton
P.O. Box 176
Yankton, SD 57078

Lois Ablin
P.O. Box 701046
Tulsa, OK 74170

Rory King representing MMP, Inc.,
Merl Moeckly Co. and
Kent Moeckly
P.O. Box 970
Aberdeen, SD 57401

Donnell Hanson
41354 120th Street
Claremont, SD 57432

Paula Jones, Yankton County Auditor
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Delorres & Raymond Lowe
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Golden, CO 80401

Paul Fishbach, Chairman of
WEB Water Development Assn.
office@webwater.orgn

Dale Strasser for the City of Freeman
dale@strasserlawoffice.com

Susan and Michael Sibson
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Robert Klimisch on behalf of
Yankton County
rob@co.yankton.sd.us

MAY, ADAM, GERDES & THOMPSON LLP

BY:_____
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MAX MAIN*
DWIGHT A. GUBBRUD*
*LICENSED IN SOUTH DAKOTA AND WYOMING

EST. 1908

RETIRED
DONN BENNETT

RECEIVED
OCT 26 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

October 24, 2007

Kara Semmler
Staff Attorney
South Dakota PUC
500 East Capitol
Pierre, SD 57501-5070

RE: TransCanada Keystone Pipeline Project; HP07-001.

Dear Kara:

Enclosed is a copy of the discovery responses of Ed and DeEtte Goss. Please consider these sworn discovery responses to be Ed and DeEtte's pre-filed testimony. Should you have questions, please advise. As before, you should continue to communicate directly with Mr. and Mrs. Goss, as I have not filed a Notice of Appearance in this matter.

Sincerely,

BENNETT, MAIN & GUBBRUD, P.C.

Max Main

Max Main

MM/njo
Enc.
cc: Clients

RECEIVED
OCT 26 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	**HP07-001**

RESPONSES OF EDWARD GOSS AND DE ETTE GOSS TO SOUTH DAKOTA PUBLIC UTILITY COMMISSION STAFF'S FIRST SET OF INTERROGATORIES AND REQUEST FOR DOCUMENTS TO ALL PARTIES WITH INTERVENER STATUS

STATE OF SOUTH DAKOTA)
) **ss.**
County of Butte)

COMES NOW, EDWARD GOSS and DE ETTE GOSS, two of the above-referenced Intervenors, and hereby make the following responses to South Dakota Public Utility Commission Staff's First Set Of Interrogatories And Request For Documents To All Parties With Intervener Status.

INFORMATION REQUESTS:

INFORMATION REQUEST 1:

Please list the following personal information:

a) Your full name
b) Your full address
c) Your telephone number
d) Your e-mail address, if any
e) Whether you have personally received any specific crude oil pipeline training. If so, from where and when?

ANSWER:

a) EDWARD GOSS and DE ETTE GOSS.
b) 10997 Minnesela Road, Belle Fourche, SD 57717.
c) 605.892.6454.
d) eddeeg@msn.com .
e) No.

INFORMATION REQUEST 2:

Are you or will you be represented by an attorney? If an attorney will represent you, please state your attorney's name and contact information.

ANSWER: We will not be represented by an attorney during this matter; however, prior to preparing these responses, we did consult with Attorney Max Main, Belle Fourche, South Dakota.

INFORMATION REQUEST 3:

Do you own land in the direct path of the pipeline? If so, please provide the legal description of such land.

ANSWER: Yes. The legal description of said land is:

T109N, R58W, Kingsbury County, SD:
Section 22: SW¼.
Section 34: SE¼.

INFORMATION REQUEST 4:

Will a pumping station be located on your property according to the most recent TransCanada location maps?

ANSWER: No.

INFORMATION REQUEST 5:

The applicable applicant burden of proof statute reads as follows:

49-41B-22. Applicant's burden of proof. The applicant has the burden of proof to establish that:

(1) The proposed facility will comply with all applicable laws and rules;

(2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;

(3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and

(4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

a) Please specify particular aspect/s of the applicant's burden of proof you intend to personally testify to.

b) Please specify particular aspect/s of the applicant's burden of proof you intend to call a witness to testify on.

ANSWER:

(a) We intend to personally testify as to the facility's threat of serious injury to the environment, to inhabitants, and to the welfare of the inhabitants. We will also testify as to the facility's undue interference with our property. Particularly, the facility will destroy native grasslands, a 1964 waterfowl production area granted to the United States, the natural topography of the lands, and the natural drainage of the lands.

(b) We have not yet determined if we will be calling other witnesses.

INFORMATION REQUEST 6:

Do you intend to offer evidence regarding "terms, conditions or modifications of the construction, operation, or maintenance?" See SDCL 49-41B-24 and 49-41B-36. If so, please specify the same.

ANSWER: Yes. Any facility easement should be limited to one pipeline only, with no additional uses. Any facility easement should not be perpetual; it should automatically terminate upon non-use.

INFORMATION REQUEST 7:

Do you intend to offer evidence regarding the bond the Commission requires pursuant to SDCL 49-41B-38?

ANSWER: We do not know.

INFORMATION REQUEST 8:

Please list with specificity the witnesses (including yourself) you intend to call. Please include, name, address, phone number, credentials and area of expertise.

ANSWER:

EDWARD GOSS and DE ETTE GOSS, landowners.
10997 Minnesela Road, Belle Fourche, SD 57717.
Phone 605.892.6454.

INFORMATION REQUEST 9:

Do you intend to take depositions? If so, of whom?

ANSWER: No.

INFORMATION REQUEST 10:

Do you intend to file written testimony? If so, whose testimony will you submit?

ANSWER: Yes. Edward Goss and DeEtte Goss.

DOCUMENT REQUEST 1:

Do you intend to offer any documents as evidence in the case other than your own written testimony? If so, please specify and provide a copy.

RESPONSE: 1964 waterfowl production area easement. Copy attached.

May also have pictures of the property.

DOCUMENT REQUEST 2:

Please, as an ongoing request, provide Commission Staff with a copy of all data, documentary or interrogatory requests you send any party or Intervener to this docket along with its complete answer to such request.

RESPONSE: We will do so.

DATED this 15th day of October, 2007.

Edward Goss
EDWARD GOSS

DeEtte Goss
DE ETTE GOSS

SUBSCRIBED AND SWORN to before me this 15th day of October, 2007.

MAX MAIN NOTARY SEAL PUBLIC STATE OF SOUTH DAKOTA

Max Main
Notary Public
My Commission Expires: May 15, 2008

CERTIFICATE OF SERVICE

I, Edward Goss, do hereby certify that on the 15th day of October 2007, I caused a true and correct copy of the foregoing to be served upon:

Kara Semmler, Staff Attorney
South Dakota Public Utilities Commission
500 East Capitol
Pierre, SD 57501

by depositing the same in the United States Mail, with first-class postage thereon fully prepaid, in envelope addressed as above.

Edward Goss

EDWARD GOSS

No. 7535

UNITED STATES DEPARTMENT OF THE INTERIOR

U. S. FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

CONVEYANCE OF EASEMENT FOR WATERFOWL MANAGEMENT RIGHTS

THIS INDENTURE, by and between Edward E. Goss and De Etta M. Goss, his wife, of Esmond, South Dakota and Roy Pooley, Jr. and Mary A. Pooley, his wife of Carthage, South Dakota, parties of the first part, and the UNITED STATES OF AMERICA, acting by and through the Secretary of the Interior or his authorized representative, party of the second part.

WITNESSETH:

WHEREAS, section 4 of the Migratory Bird Hunting Stamp Act of March 16, 1934, as amended by section 3 of the Act of August 1, 1958 (72 Stat. 486, 16 U. S. C., sec. 718d (c), authorizes the Secretary of the Interior to acquire small wetland or pothole areas suitable for use as waterfowl production areas:

WHEREAS, the lands described below contain or include small wetland or pothole areas suitable for use as waterfowl production areas:

NOW, THEREFORE, for and in consideration of the sum of two hundred Dollars ($ 200.00), the parties of the first part hereby convey to the United States, commencing with the acceptance of this indenture by the Secretary of the Interior or his authorized representative which acceptance must be made within six months of the execution of this indenture by the parties of the first part, or any subsequent date as may be mutually agreed upon during the term of this option, an easement or right of use for the maintenance of the land described below as a waterfowl production area in perpetuity, including the right of access thereto by authorized representatives of the United States:

T. 109 N., R. 58 W., 5th P.M. Kingsbury County, South Dakota.
section 34, SE¼

Subject, however, to all existing rights-of-way, for highways roads, railroads, pipelines, canals, laterals, electrical transmission lines, telegraph and telephone lines, and all outstanding mineral rights.

The parties of the first part, for themselves and for their heirs, successors and assigns, covenant and agree that they will cooperate in the maintenance of the aforesaid lands as a waterfowl production area by not draining or permitting the draining, through the transfer of appurtenant water rights or otherwise, of any surface water including lakes, ponds, marshes, sloughs, swales, swamps, or potholes, now existing or reoccurring due to natural causes on the above-described tract, by ditching or any other means; by not filling in with earth or any other material or leveling, any part or portion of the above-described tract on which surface water or marsh vegetation is now existing or hereafter reoccurs due to natural causes; and by not burning any areas covered with marsh vegetation. It is understood and agreed that this indenture imposes no other obligations or restrictions upon the parties of the first part and that neither they nor their successors, assigns, lessees, or any other person or party claiming under them shall in any way be restricted from carrying on farming practices such as grazing, hay cutting, plowing, working and cropping wetlands when the same are dry of natural causes, and that they may utilize all of the subject lands in the customary manner except for the draining, filling, leveling, and burning provisions mentioned above.

SPECIAL PROVISIONS

1. This indenture shall not be binding upon the UNITED STATES OF AMERICA until accepted on behalf of the United States by the Secretary of the Interior or his authorized representatives, although this indenture is acknowledged by the parties of the first part to be presently binding upon the parties of the first part and to remain so until the expiration of said period for acceptance, as hereinabove described, by virtue of the payment to parties of the first part, by the UNITED STATES OF AMERICA, of the sum of One Dollar, the receipt of which is hereby expressly acknowledged by parties of the first part.

2. Notice of acceptance of this agreement shall be given the parties of the first part by certified mail addressed to Edward E. Goss at Esmond, South Dakota and such notice shall be binding upon all the parties of the first part without sending a separate notice to each.

3. The parties of the first part warrant that no person or selling agency has been employed or retained to solicit or secure this contract upon agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the vendors for the purpose of securing business. For breach or violation of this warranty the United States shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration the full amount of such commission, percentage, brokerage, or contingent fee. 3a. Vendors agree that payment for this indenture will be made to Edward E. Goss at Esmond, South Dakota.

4. It is further mutually agreed that no Member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this contract, or to any benefit to arise thereupon. Nothing, however, herein contained shall be construed to extend to any incorporated company, where such contract is made for the general benefit of such incorporation or company.

5. Payment of the consideration will be made by Disbursing Officers check after acceptance of this indenture by the Secretary of the Interior or his authorized representative, and after the Attorney General or in appropriate cases, the Field Solicitor of the Department of the Interior shall have approved the easement interest thus invested in the United States.

IN WITNESS WHEREOF the parties of the first part have hereunto set their hands and seals this 15th day of May, 19 64.

EDWARD E. GOSS (L. S.)
Edward E. Goss

De ETTA M. GOSS (L. S.)
De Etta M. Goss

ROY POOLEY JR. (L. S.)
Roy Pooley Jr.

MARY A. POOLEY (L. S.)
Mary A. Pooley

Contract No. 14-16-0003-7747

_____ (L. S.)
(Witness)

_____ (L. S.)

ACKNOWLEDGMENT

STATE OF SOUTH DAKOTA,
County of Kingsbury } ss.

On this 15th day of May, in the year 1964, before me personally appeared Edward E. Goss and Roy Pooley, Jr. and DeEtta M. Goss Mary A. Pooley, his wife, known to me to be the persons described in and who executed the foregoing instrument and acknowledged to me that they (HE) executed the same as their ~~THEIR~~ free act and deed.

ALAN C. BONSACK
Alan C. Bonsack
Notary Public
(Official Title)

(SEAL)

My commission expires August 27, 1971

ACCEPTANCE

This indenture is accepted on behalf of the United States this 16 day of Jul, 19 64 under the authority contained in section 4 of the Migratory Bird Hunting Stamp Act, as amended, and pursuant to authority delegated by 210 DM 1.3, Commissioner of Fish and Wildlife Order No. 4, and 4 AM 4.5D (1).

THE UNITED STATES OF AMERICA

By W. P. SCHAEFER
(Title) Acting Regional Director /s/W.P. Schaefer

009818

INFORMATION REQUEST 10:

Yes I do intend to file written testimony and following is that Testimony:

My name is John M. Sieh and I presently live at 11 E 4th Ave, Groton, SD 57445. I was born November 26, 1925 on NE1/4 Section 20 Twp 124 Brown County South Dakota on the Sieh family Tree Claim farm. As a youth I was active in 4-H Club work representing South Dakota Crop Judging team at the National 4-H Club Congress in Chicago. As a member of FFA (Future Farmers of America) authored an essay on the value of tree shelterbelts on the Great Plains and was honored to present that subject and represent South Dakota in a National FFA Public Speaking Contest.

During my 20's I served and was honorably discharge d from the US Army and worked for the SD Farmers Union as Director of Youth Activities and traveled for the National Farmers Union as an organizer in Iowa, Kansas and Texas. Returned to the farm in 1955 and have been involved with grain and livestock production up to the present.

Because of the impossibility of maintaining shallow wells, quick sand would filter into sand points and tubular wells and obstruct water flow, the water quality was very poor, very saline and very hard. My father, as did many of his neighbors, put down an artesian well at about 1200 feet, a soft but saline water was found, we used this well until the 1950's until corrosion stopped the flow. We dug many test holes all over our property to determine if good potable water could be found in shallow or tubular wells to no avail. Because there was no other water source I was forced to put down the second artesian to the same level about 1200 feet–this lasted until two years ago and it also failed. The cost of an artesian well in the 1950 was $2500. to $3500. Now the cost would exceed $10,000. Let me list the problems we had with this water quality. Yes it was soft for washing clothes etc, but was so saline that on a hot day if you drank too much it would cause diarrhea. If you could keep the water real cold, it would taste better. We had to be cautious when partime help would come to the farm to assist in harvesting or haying in hot weather and if you gave them ice cold water, those strapping healthy young men could become helpless with cramps and the worst kind of diarrhea. The water was very corrosive on pipes,

fixtures and sinks and tubs. Minerals would collect and color your wash and toilet bowls red. Our children's teeth would be discolored chalky and brown. In our livestock and poultry water dispensers, the iron deposits would support bacteria that if not cleaned and disinfected often. Enteritis problems particularly with our swine and poultry were serious concerns. I personally suffered with kidney stones. If you think you have suffered some severe pain in your life, wait until you pass a kidney stone! Mayo Clinic Doctors could not tell me exactly what causes kidney stones to develop, however they did tell me that North and South Dakota and Minnesota have a high incidence of stones as compared to other areas.

As evidence mounted that artesian water in our area was unhealthy–we purchased and used an electric distiller for our drinking water until BDM Rural Water arrived with good clean potable water.

In 1974 I was elected to represent Brown County rural areas on the Oahe Conservancy Sub-District Board. The second year I was on the board I was elected chairman and served six years as chairman. This governmental entity was authorized by the SD Legislature and petitioned and voted into existence by citizens in a 15 ½ County area. The District had some taxing authority over real estate and contracting authority. In general the districts' mission was to deal with water resource and conservation issues. The District held the contract with the US Bureau of Reclamation as the local governing body to plan and operate a vast irrigation scheme known as the Oahe Irrigation Project.

Because of a host of issues raised by many, concerning, cost, drainage problems, environmental hazards our board conducted a comprehensive series of public hearings at which all government agencies, both Federal and State were called on to testify along with citizens as to the feasibility of the Oahe Irrigation Project. After the hearing process was completed it was apparent the Irrigation Project as planned would be a disaster. It was determined that the highest priority of need was for potable, clean drinking water for the cities and towns, and farmers and ranchers through out the 15 ½ county area. Al of whom wereplagued with saline, inferior and limited water supplies for domestic use.

One of our first priorities was to contract with the Federal and State Geological Survey Agencies and we partially funded comprehensive underground water Surveys in the District area. Brown, Day, Marshal. Spink and Clark counties all of which contains property which TransCanado has commenced property condemnation. These surveys will show the aquifers and underground drainage systems.

We hired a domestic water coordinator who was charged with assisting, the Web Water proposal of piping Missouri River Water east to Webster, a group of Marshal, Brown and Day people that located an aquifer in Marshal County large enough to service the area, and another group of farmers in Clark, Day and Beadle counties that found a suitable aquifer of good water to serve their area. The priorities for the Federal and Local government had changed from promoting vast Federal Irrigation to supporting rural water systems that piped the good water to the consumers.

With good water available our communities have developed. Projects like the Granary Rural Cultural Center would not be feasible without BDM. rural water–with the old Artesian wells soils in your garden would salt up and you couldn't successfully irrigate a flower bed or a tomato plant.

People have worked for years to build these rural water systems, it has cost the Federal and Local Governments and citizens vast sums of money to create this important infrastructure.

That is why we are asking the Public Utilities Commission to protect our drinking water from TransCanada's Crude Oil Pipelines, and require that Adequate Funds be set aside from TransCanada into independent accounts that will pay for damages to our water systems from the inevitable spills and leaks–or simply deny the permit to build.

This is my testimony dated October 25, 2007. Mailed to Kara Semmler, Staff Attorney
SD Public Utilities Commission
500 East Capitol
Pierre, SD 57501

Signed _____
John M. Sieh

STATE OF SOUTH DAKOTA)
: S.S.
COUNTY OF Brown)

On this 26th day of October, 2007, before me, the undersigned, a Notary Public within and for said County and State, personally appeared John M Sieh Schumacher known to me to be the persons whose names are subscribed to the within instrument and who executed the above and foregoing instrument and acknowledged to me that they executed the same for the purposes therein contained.

_____
Notary Public, South Dakota

My Commission Expires: June 29, 2012
(SEAL)

ADDENDUM -

I AM MAILING A MAP IN THE NEXT WEEK.

Tchi Sieh..

Testimony for Formal hearing

From:

Richard Hastings
41415 101 ST
Britton SD 57430

RECEIVED
OCT 30 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Richard Hastings

To the PUC Members

My name is Richard Hastings my address is 41415 101 ST Britton South Dakota. I am not [redacted] for this project. The land that this pipeline crosses is the east half of section 10-128-59. The other farm land that I rent is within one half mile of the proposed pipeline. My biggest concern is the event of a leak or spill. If a large area is contaminated from a spill in my area it will have an enormous affect on the crop growing part of my farm. It will also have an affect on the cattle part also because this is where a good part of where my winter feed comes from.

The land that the pipeline crosses is considered highly erodable by the soil conservation and Farm service agency. It is a light sandy soil which allows liquids and other things to easily run through it. It also has high water table in many areas. If this soil is contaminated to the point that not much will grow in this highly erodable soil how will I stay in compliance with the soil Conservation and Farm service agency.

If I lose compliance I may Lose any of a number of programs offered.

They say the land will get back to full productivity after 3 year. I don't believe that. I think you will see it for a very long time especialy when it is dry.

If the average yeild goes down because of the pipline area then my Crop Insurance premium will go up because it show I'm more of a risk. A lot of Farm service Agency programs are based on production and a loss in production means less in benifits and less grain sales.

If there are damages due to leaks from what I have been able to find out is that monetary damages will be awarded. Hopfully enough to pipe water in if the aquifer is not contaminated. As far as soil contamination I would hope the monetary damages would not be for what the land is worth because we do not wish to sell. If the payment was for the value of the land it would be like having a forced sale.

Another concern is abandoning in place. From what I have found out is that sometimes when an easement is abandoned the land goes back to the ajoining land owner. Does that mean the land owner now owns the pipe

and is reposible for any left over product? When it rusts away we are responsible for filling in the void?

As far as the easement contract I tried to have some changes made. I have never asked for more compensation just wording changes and additions. A couple changes were made but a far as what would happen or what I wanted to happen in case of a leak or spill could not or would not be written into the contract. I wanted it added incase of a leak or spill that I had at my hand a written document to refer to. They say they will take out of the easement the part that says more than one pipeline. That is very easy to say. If they want to put in another one along side someday all they have to do is go through the same process again or eminant domain. With a 50 foot easement that leaves a lot of room for more pipelines.

The people's rights need to be protected and the easement should read however the individual wants it to read being wording or amount of payment. Remember TransCanada came to us we didn't go to them.

attachments

Wording I wanted in easement and didn't get

FSA maps showing highly erodable land and high water table

Attachment

Changes requested by

Richard Stanley

for easement

It has been brought to my attention that this Easement Contract is negotiable.

These changes and additions are requested.

1. I wish the Easement Contract to read as that only one pipeline will be placed in the easement area TransCanada Keystone Pipeline LP or any future owners.

2. I wish the Easement contract to read that the pipeline can not be abandoned in place by TransCanada Keystone Pipeline LP or any future owners.

3. I wish the Easement Contract to read that nothing will be constructed or placed above ground at any time by TransCanada Keystone Pipeline LP or any future owners.

4. I wish the Easement Contract to read that the ground elevation will be maintained by TransCanada Keystone Pipeline LP or any future owners and that the pipeline will be four feet below the surface of the ground. Any crop damage will be paid for reentry of any type of work by TransCanada Keystone Pipeline LP or any future owners

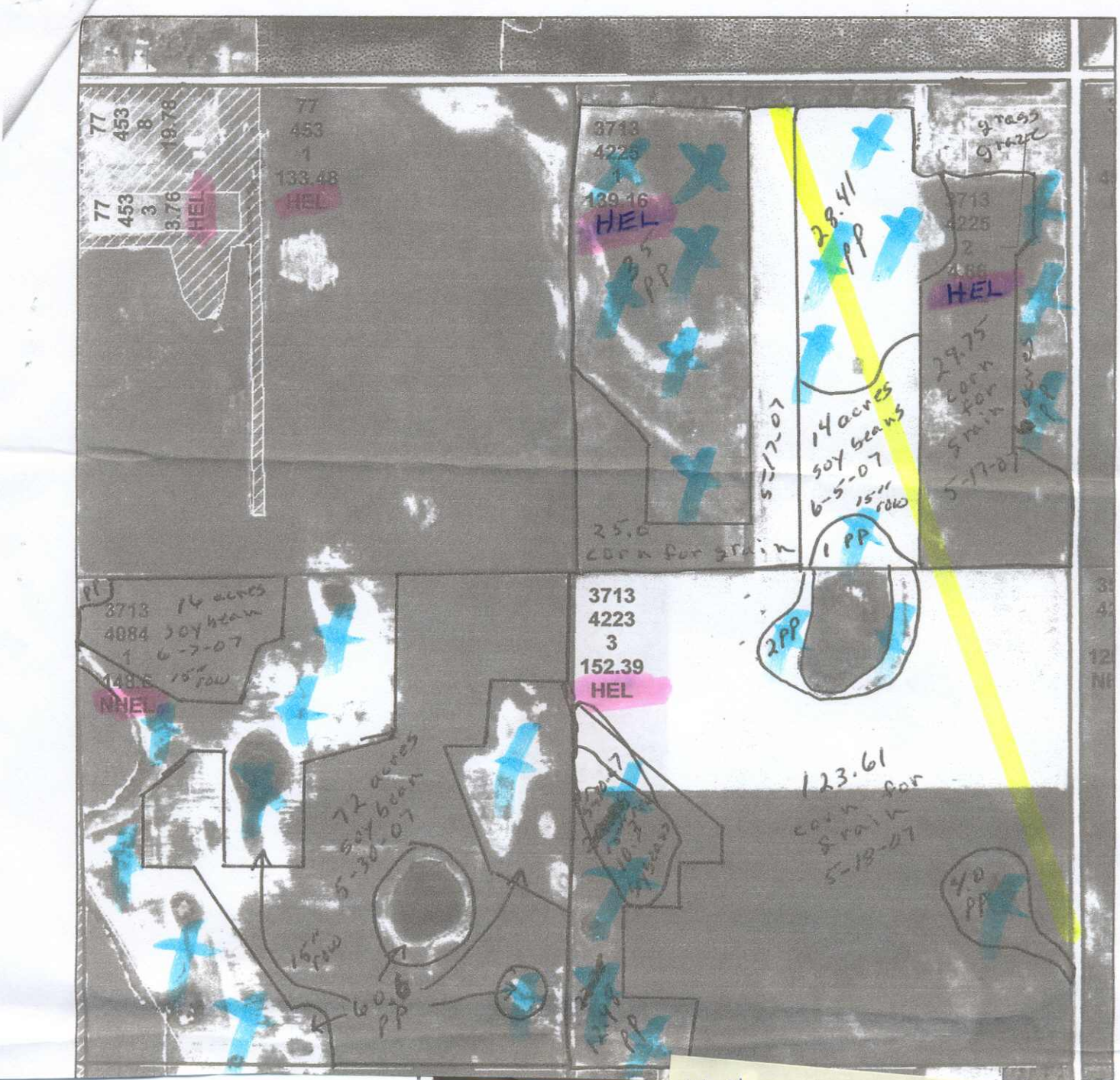
5. I wish the Easement Contract to read that if the easement area is changed as to paragraph 11 of orisinal contract the change would have to be OKed by me and additional compensation paid if land area has changed.

6. I wish the Easement Contract to read that the pipeline's owners Transcanada Keystone Pipeline LP or any future owners are liable for every aspect of the pipeline present and future including but not limited to the following:

7. I wish the Easement Contract to read that in case of a Leak, spill or other malfunction whether on my property or on other's that has an adverse effect on my water supply for human or livestock use. That a rural water system will be put into place where ever need for human and livestock use. At Transcanada Keystone Pipeline LP's or future owner's expense. Plus miwium water bill expenses.

8. I wish the Easement Contract to read that in case of a Leak, spill or other malfunction whether on my property or on other's that has an adverse effect on my land to grow crops or raise livestock. Transcanada Keystone Pipeline LP or any future owners will compensate me for lost Income from each acre until production again.

Attachment A



Yellow is approximate route

Blue is high water Table

Pink signifies Farm Service Agency Highly Erodable land

009831

RECEIVED
OCT 30 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

TO: South Dakota Public Utilities Commission

FROM: Delwin Hofer
40916 – 192 Street, Carpenter, SD 57322

RE: Testimony in the Matter of Application by TransCanada Keystone Crude Oil Pipeline – HP07-001

A TransCanada land agent called me in the middle of May and asked if he could come out and have me sign an easement for the pipeline to cross my land. He said all my neighbors had signed. I asked if TransCanada had all the permits for the pipeline, he said they had all the permits and everything was ready to go. I knew he was not telling the truth since they had not got the South Dakota PUC permit to construct. We had a few words and I hung up on him. This is not negotiating for a right-of-way easement, this is trying to push it on us. This contact indicated to me that TransCanada had very poor landowner relationship.

Later I received the easement in the mail. I took it along to the PUC hearing in Clark on June 26th , and gave it back to TransCanada and told them I could not sign an easement like this. I told them when they get all the permits to construct the pipeline to contact me and we would go meet in my lawyer's office and draw up an easement I could sign and live with. They agreed.

Since then we have had 2 calls from Paul Klust wanting us to sign the easement again. He said he would mail it to us. About 3 weeks later we received it in the mail and we have turned it over to our lawyer.

At the place we were to sign on the signature page of the easement, TransCanada has Delwin Hofer, husband, and Pamela Hofer, husband. If TransCanada can't see a mistake like this how are they going to take care of a large high pressure oil pipeline?

The route of the proposed pipeline runs at an angle across my property and could make it impossible to farm. This quarter of land is the most productive land I own. There is only one way to get to access the land to farm it. During the time of construction will I have

access to the west side of my field? The land will never be as productive in the area of the pipeline as the temperature would be 80 degrees.

At the PUC hearing at Clark, Buster Grey said that the pipe will be bent hydraulically to fit the land. I am a farmer, I work with iron. When you bend pipe it has to stretch. That weakens the pipe no matter how heavy the pipe is. At the meeting Buster Grey said 'the pipe would have a protective coating during bending'. This protective coating will also be damaged, and shorten the life time of the pipe and cause leaks. The soil in the area of the pipeline is heavy and stays wet. It is very corrosive. Being close to pumping station 21 it is very likely there would be greater possibility of leaks and contamination of the land as a result of operation failures at the pump and changes in pressure.

My land drains toward the creek that serves as the water supply for our cattle. This creek flows into Shue Creek and on to the James River. Oil leaks at the location of our land would contaminate the water supply for our cattle, and pollute the creek and river.

I am a conservationist. I have served on the County Conservation Board for years, and have encouraged no till farming, planting trees and preserving wetlands. As a farmer I cannot destroy or drain wetlands, nor take trees out of wetlands. TransCanada's plan for the pipeline seems to go against these conservation practices and rules that we have worked for many years. According to the plans for the pipeline, TransCanada will go through wetlands and over aquifers, take out trees and destroy native grasses. Don't trees, aquifers, and wetlands have any value at all?

On the map filed with TransCanada's application to the PUC entitled "Land Use Type – Map 29-46", our land is marked as 'pastureland or rangeland, which includes lands that were plowed or sometime in the past and replanted to pasture grass and wetlands'. This is not true. Their description of kinds of land is not even correct as in their 3 miles of graph. By their description are they trying to tell us there will be a strip of grass planted through our tilled field when they are finished?

What standards are TransCanada going to follow in building and operating a high pressure oil pipeline? They have already been granted a waiver to use thinner pipe that lowers the safety standards of the pipeline. If the PUC approves this pipeline will the PUC take responsibility to protect the public and the land from leaks and pipe failures? Is the PUC going to inspect the pipeline during construction to make sure the contractors follow all legal requirements and all material and construction specifications for a high pressure oil line? At the meeting in Carpenter I asked what liabilities does TransCanada have? Jeff Rauh said he didn't know but would get back to me – he never did.

I have attended 7 meetings concerning the TransCanada pipeline. I have taken time off my work, and I don't get paid. The pressure of the whole thing dealing with the easement and the possibility of eminent domain, and with the concerns for the land and my farming operation and family, and dealing with the pressure of untruths and misleading information from TransCanada causes me a lot of anxiety. The fact that I have had heart problems in the past and a four bypass surgery this stress does not help me any.

I do not think it is legal for a private company of a foreign country to use eminent domain on us. TransCanada shows no respect for property owners and people, and no respect for land, water, and wildlife. My property is in the hands of the Public Utilities commission. I ask you to deny TransCanada from pushing this project on us. Take care of the farmers in South Dakota and not a big company from a foreign country who will destroy and ruin land.

Signed: Delwin Hofer

Date: 10-29-07

Before me Fawn Glanzer the above named person signed this document on 10-29-07.

My commission expires 4-27-2009 Fawn Glanzer
Notary Public

RECEIVED
OCT 30 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

TO: South Dakota Public Utilities Commission

FROM: Pam Hofer
40916 – 192 Street, Carpenter, SD 57322

RE: Testimony in the Matter of Application by TransCanada Keystone Crude Oil Pipeline – HP07-001

I have many concerns about the TransCanada Keystone pipeline. Safety is a big one! At one of the meetings Dusty Johnson said, "this company has thousands of pipelines and they are no strangers to this line". But Dusty, this is not true. TransCanada does NOT have a crude oil pipeline like this. This is the 1st . At our meeting in Aberdeen in May this year, Nicole Altken said they do not have one at the present. So how do they know so much about the outcome of the Keystone crude oil pipeline?

There are many examples of oil spills and it's not near as safe they think it is, especially for a company with no previous experience with a crude oil pipeline like TransCanada. I have read information about oil pipeline projects and all their spills. On July 2, 2007 crude oil from a large spill in Coffeyville, Kansas was taken up with flood waters during a high rain and contaminated many homes and a river. And on July 24, 2007 a break in a high pressure oil pipeline in Burnaby, British Columbia shot oil 30 meters into the air like a geyser.

I am very concerned about a break in the oil pipe on our land. A short distance away form the site of the proposed pipeline on our land is a drainage that supplies water for our cattle. This drainage flows into Shue Creek, a fast moving creek that empties down stream into the James River. If this water way gets contaminated from an oil spill where will we get water for our cattle?

TransCanada admits there will be spills from the pipeline. Their report says a spill of 1,000 barrels (42,000 gallons of oil) may occur anywhere along the Keystone Pipeline once in 12 years. A spill of 10,000 barrels (420,000 gallons of oil) may occur in 39 years, and a spill of more than 10,000 barrels might occur in 50 years. The United States

Geological Survey estimated that an average of 83 crude oil spill occurred in the U.S. during the 3 year period of 1994 – 1996 with each spill about 50,000 barrels or 2,100,000 gallons of crude oil. Spills of this size certainly will ruin a lot of land and streams and rivers. A crude oil leak near Bemidji, Minnesota in 1979 was never fully cleaned up, and the soil remains sterile 28 years later.

What if there is a pipeline accident when the pipe is too shallow? ThansCanada says they only have to be 2 feet deep, but they will go 1½ feet deeper, that is 3½ feet. In the application to the PUC, other information says 4 feet deep. So what is it 3½ or 4 feet? There is a lot of difference among all these figures. How do we know they will comply with any of these specifications? Can we check on them to see if the pipe is 4 feet deep? The pipelines are too shallow and they are not thick enough to meet acceptable safety standards. TransCanada should have a fund to compensate those affected by pipeline accidents.

I want to see a right-of-way easement for 20 years, not a perpetual easement of more than 100 years. Then if TransCanada does not keep their obligation, the easement is terminated.

The easement says one or more pipelines. TransCanada is talking about only one pipeline. It looks like if we sign the easement they can do whatever they want with our land. We've worked too hard to pay for the land and make a living for our family. I will not sign something that gives someone the right to do what they want to with my land.

TransCanada says they will have 20 employees in the U.S. to operate the 1,077 miles of pipeline, 23 pumping stations and 45 mainline valves with operation staff located in Omaha, Nebraska. If there would be 3 work shifts that would be 6 or 7 employees on duty at one time. If each employee worked alone that would be on the average 1 person to take care of approximately 155 miles of the system including pipeline, pumps and valves. If 2 employees worked together that would be a team of two persons to take care of approximately 310 miles of the system. A team of 3 persons would look after 465

miles of the system on the average. That's not enough. They need to be stationed by each pumping station so if there is a problem they can shut down immediately. TransCanada says computers will be working to do some of the jobs. We know computers. They fail and often and require sophisticated technicians to maintain.

Our property is a mile from a pumping station with 1,400 to 1,700 pounds pressure and 311 miles from Omaha. A pipeline break and major oil spill at the location would pretty much devastate that land before any repairs were made. This is dangerous to us.

The Enviromantal Impact Statement is incorrect regarding the pumping station at Carpenter.

When TransCanada was asked to look at the route along I-29 which provided much better access for pipeline operation and maintenance, and would not have to cross nearly as much private property and productive farm land, TransCanada responded that route would not be safe for the higher populated area. Why then is it any more safe for us. Even through our rural area, TransCanada got a waiver from the oil friendly Bush administration to reduce the thickness of the pipe which makes it even less safe. Why are we not as important as the more populated areas?

These are my feelings on the Keystone oil pipeline project. I do ask you to please deny TransCanada from shoving this project on us.

County of Beadle
State of South Dakota

Signed: Pam Hafer

Date: Oct 29th 2007

Before me Pam Hafer the above named person signed this document on October 29, 2007

My commission expires _____ Notary Public

My Commission Expires 10-13-2010

EAST RIVER
ELECTRIC POWER COOPERATIVE
121 Southeast First St. P.O. Box 227
Madison, SD 57042 Telephone (605) 256-4536

October 31, 2007

To Whom It May Concern:

I am the General Counsel for East River Electric Power Cooperative, Inc.

Enclosed/attached please find the Direct Testimony of James O. Edwards, Jr., on behalf of East River.

Please contact me if you have any questions.

Sincerely,

Robert K. Sahr
General Counsel

RKS/sl

Enc.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	HP07-001 **DIRECT TESTIMONY OF JAMES O. EDWARDS, JR.**

Q: Please state your name, title, and business address.

A: My name is James O. Edwards, Jr. I am the Assistant General Manager of Operations of East River Power Cooperative, Inc. ("East River"). My business address is 121 SE First Street, P.O. Box 227, Madison, South Dakota 57042.

Q: What is your educational background and professional experience?

A: I received a Bachelor of Science degree in Electrical Engineering, with emphasis in Power Systems, from South Dakota State University, Brookings, South Dakota, in 1982. I received a Masters of Engineering degree from the University of Colorado, Boulder, Colorado, in 1989. From 1983 to 1985, I was employed by the Southwestern Public Service Company ("SPSC") as a District Distribution Engineer. My responsibilities included designing, specifying, and overseeing the installation of overhead and underground electrical distribution systems and equipment. From 1985 to 1988, I was an Industrial Power Engineer for SPSC and my responsibilities included assisting large utility industrial and commercial customers with the design, specification, and installation of electrical systems, metering, and energy management systems. From 1988 to 1989, I was a Supervisory Controls Engineer for a subsidiary of SPSC and my responsibilities included designing control systems for electrical generating plants. From 1989 to 1994, I was a Principal Engineer employed by General Physics Corporation. My responsibilities included providing technical consulting services to electrical utilities on power system operations and maintenance. From 1994 to 1998, I was the District Superintendent employed by the Oregon Trail Electric Consumers Cooperative. My responsibilities included supervising the operation, construction, and maintenance of the distribution

systems, transmission systems, and substations for two of the cooperative's four districts. From 1998 to the present, I have been employed by East River as the Assistant General Manager of Operations. I am a registered Professional Electrical Engineer in South Dakota, Maryland, New Mexico, Oregon, and Texas. I have provided testimony before the South Dakota Public Utilities Commission and before the United States Federal Energy Regulatory Commission.

Q. Please describe your present responsibilities.

A. As Assistant General Manager of Operations, I am responsible for managing the Operations Division which is comprised of Engineering, Transmission, Substation, Dispatch, and Telecommunications Departments. I am responsible for overseeing the safe and reliable operation of East River's transmission, telecommunications, and control systems.

Q: Please tell us about East River.

A: East River is a wholesale electric power supply cooperative serving 20 rural electric cooperatives and one municipally-owned electric system, which in turn serve more than 86,000 homes and businesses and about 250,000 consumers. Our 36,000 square mile service area covers the rural areas of 41 counties in eastern South Dakota and nine counties in western Minnesota. To serve our member systems, East River owns and operates an extensive transmission system which includes over 2,600 miles of transmission lines and 215 substations.

Q: What role will East River and its member play in the Keystone Pipeline?

A: East River will provide the needed facilities and wholesale electric power supply to enable four of its member cooperatives--Lake Region Electric Association, Inc.; Dakota Energy Cooperative, Inc.; Central Electric Cooperative, Inc.; and Southeastern Electric Cooperative, Inc.--to serve the electricity needs of the four Keystone Pipeline pump stations to be located in South Dakota.

Lake Region is based in Webster, South Dakota, and serves 2,450 members. Dakota Energy is based in Huron, South Dakota, and serves 2,239 members. Central Electric is based in Mitchell, South Dakota, and serves 4,764 members. Southeastern Electric is based in Marion, South Dakota, and serves 11,300 members.

Q: What are your general thoughts regarding the proposed Keystone Pipeline?

A: The Keystone Pipeline will bring benefits to the State of South Dakota and to the school districts, counties, and communities through which it will pass. The project will also be an important piece of our nation's energy infrastructure and lead to greater energy security and independence as the crude oil pipeline is estimated to provide a sizable portion of our nation's petroleum needs. The Keystone Pipeline is a rare opportunity to mitigate the tremendous cost of our reliance on oversea oil supplies. As such, East River and its member systems believe this is precisely the type of project that our state and nation should support.

Q: Please discuss the following standard:

49-41B-22. Applicant's burden of proof. The applicant has the burden of proof to establish that:

(1) The proposed facility will comply with all applicable laws and rules;

(2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;

(3) The facility will not substantially impair the health, safety, or welfare of the inhabitants; and

(4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

A: As stated in my previous response, we see significant benefits from the Keystone Pipeline. SDCL 49-41B-22 sets forth important criteria for the Commission to consider. We believe, when one applies these statutory standards, the pipeline not only meets the standards but furthermore supplies a positive impact to each of the categories.

The project will produce significant economic value during construction, and, in the long term, communities along the route will derive substantial financial benefits from the increased tax revenues. This will positively affect the criteria listed in 49-41B-22 (2), (3) and (4).

The pipeline will be located underground, and this should mitigate many safety concerns. An underground facility also should have little, if any, impact on the inhabitants, local communities, and the development of the region. Our research indicates TransCanada has an excellent environmental and safety track record.

TransCanada will pay landowners for easements and crop loss and return the land as closely as possible to its previous form. The project will have almost no impact on future agricultural use of the land. We expect that on much of the route, after a very short period of time, it will be difficult to ascertain where the pipe lies.

TransCanada's filing calls for four pumping stations in South Dakota. From our review of the plans, it appears these sites and other above ground facilities will have minimal impact on the local areas.

It should be noted that other pipelines currently exist and operate safely in our state on a daily basis. These pipelines help us meet the needs of society, contribute to the tax rolls of our governments, and peacefully coexist with farmers, ranchers, communities, businesses, and even other pipelines. All indications are that the Keystone Pipeline will harmoniously exist in a similar manner.

While we urge TransCanada to negotiate fairly with landowners and to treat landowners respectfully, it would be impossible to build any piece of infrastructure spanning the state without encountering some level of landowner discontent. Society constructs roads, airports, water pipelines, and a myriad of other projects for the public good. And, understandably, some affected people may not support a particular project, others may oppose the project's proposed design, and others may believe they should receive greater compensation from the project.

It is our understanding that the Keystone Pipeline's route was carefully chosen. Alternative locations were considered. Modifications were made to the current route.

TransCanada ultimately selected a pathway that would have a minimal impact on South Dakota, its communities and people, and the environment.

East River will construct facilities to provide electrical service to the four oil pump stations. Like the rest of our infrastructure, these facilities will be designed to meet or exceed any safety standards and to minimize the impact on the affected areas. We will, of course, comply with all federal, state, and local laws, including siting, zoning, and environmental regulations, throughout the construction and operation of our facilities.

Finally, it is impossible to evaluate the Keystone Pipeline without considering the critical role the project will play in developing a more stable energy future for our country. Our nation is grappling with energy delivery from unstable international sources, desperately looking for new and innovative energy solutions, and focusing on growing North America's energy infrastructure. This project addresses all three issues, and, if successful, could lead to additional development of these energy resources. In light of this, it is not an overstatement to say the Keystone Pipeline will greatly increase the energy security of the United States of America and the State of South Dakota.

Q: How will the Keystone Pipeline impact East River and its members?

A: As I am sure the Commission is well aware, the last few decades have been a dynamic and challenging time in the electric utility industry. One of the ways East River and its members have met these challenges has been through the growth of large customers such as ethanol plants, other agri-business ventures, rural water systems, and a variety of businesses locating and expanding in the communities we serve. These large loads have sparked an economic revitalization in rural and small towns in South Dakota and Minnesota and have directly and indirectly benefited our electric cooperatives and their member consumers.

TransCanada and its Keystone Pipeline is one of the latest large customers to choose South Dakota as a possible location. After soliciting bids and an evaluation process, TransCanada selected Lake Region, Dakota Energy, Central Electric, and Southeastern Electric as its retail electric service providers.

The Keystone Pipeline will be an important customer for these four electric cooperatives. The project will diversify and enhance their overall customer mix. Because of its size, it

will have a similar effect on East River, and, in turn, the other members of East River. Because electric cooperatives are member-owned entities, the benefits of serving the Keystone Pipeline will ultimately flow to and be shared by South Dakotans and Minnesotans who are the member-owners of our region's rural electric cooperatives.

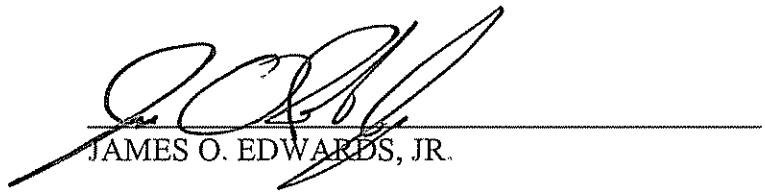
In conclusion, our nation needs more energy independence and stability. To ensure their future viability, our small towns and rural communities need to expand their economic bases and tax rolls. The Keystone Pipeline is a carefully planned project that will meet these goals and benefit our nation, state, and consumers.

We respectfully encourage the Commission to approve the application of TransCanada Keystone Pipeline, LP, to build the Keystone Pipeline.

Q: Does this conclude your testimony?

A: Yes.

Dated this 31st day of October, 2007.



JAMES O. EDWARDS, JR.

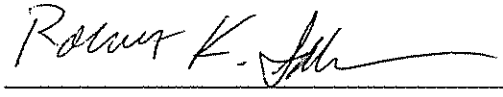
BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP07-001 **CERTIFICATE OF SERVICE**

I hereby certify that the following documents were served upon all of the parties listed on the attached Service List on the 31st day of October, 2007, either electronically or by mailing a true and correct copy thereof to them by first class mail, postage prepared, at their last known mailing to email addresses.

Direct Testimony of James O. Edwards, Jr.

EAST RIVER ELECTRIC POWER COOPERATIVE, INC.

By: 

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Testimony by:
Mike Sibson
Address: 23782 426th Ave Howard SD 57349

I live in Miner County, Roswell Township. The legal description S1/2SW1/4 28-106-57, and NW1/4SW1/4 33-106-57 is where TransCanada wants to put the pipeline thru our land. We are lifetime South Dakota residents. I have wanted to farm since I was 5 years old. My parents purchased this farm in 1972. I moved there in 1977 and since then purchased the farm plus surrounding land. I raise grain and background feeder cattle. This is my HOME SECTION. I also allow a lot of wildlife to live on my land.
I'm clearly stating that I am against the TransCanada Pipeline in this location.
It's ironic, that 20 years ago almost to the day and month. I was protecting and fighting for my land. The Super Conducting Super Collider was to be located near my farm. But, thanks to Texas –the project went there. Eminent domain was going to be implemented. Fair market for land was $175.00 at that time.

Now, 20 years later we are facing the same nightmare. We are being offered fair market value on this land at $2500. Or more. This is an example of what happened to land prices in 20 years. Where will the land price be in another 20 years? My land is not for Sale.

This pipeline affects more than just my wife and me. We have children and grandchildren. I work closely with my brother-in law and his family. My parents help when they can. We all work together. We work hard.

As the proposed pipeline would enter my land it crosses native grass, farm ground, a wetland, native grass and ends up going thru a wetland and a waterway. The pipeline is within a ¼ mile of our farm. We plan to expand our cattle lots. Our children plan to return

to the area. With their return we will need to diversify. Possible plans include new farmsteads with confinement cattle lots. The proposed pipeline could jeopardize future expansion plans.

My primary and secondary water sources could greatly be affected with the pipeline so close to our farm. With a feeder cattle operation water is very important. It's essential.

For summer grazing my cattle use dugouts as their only water source. In the event of an oil spill I could have 5 dugouts affected. I feel Transcanada needs to address this issue. Could I lose hundreds of cattle from drinking contaminated water?

The affected cropland is vital as we produce all the feed for our cattle. Deceased crop production is a big concern.

My local fuel dealer has many regulations to follow. Does Transcanada have to have a secondary containment on their pipeline in the event of a leak? My local dealer does.

We hear a lot about the tax money that will go to our local counties from the pipeline. But, is it enough? Is 6.4 million for the State of South Dakota enough? We will need plenty of money for updating roads and fire departments. Our local fire departments at this time do not have the adequate equipment to fight an oil spill or fire. Who is going to pick up the tab when our county runs out of money, the State or Federal government?

June 23, 2007 we received easement and right-of-way agreement papers from Tran Canada. How can the company get easements from landowners when the project is not approved yet? The land

agent told us the answer it's a done deal and all land easements will be done by October /November. So, why are we all here to Testify-**when it's a done deal**? Does the PUC know what the land agent knows?

The easement agreement is very one sided. We feel the company could do a lot better. We do not want a perpetual easement. The company plans to make 26 -29 million a day off our property. We feel, we are entitled to more than a one time payment. We have been told that other companies do offer yearly royalties to landowners. Why isn't TransCanada?

We have big concerns about the company's liability and compensation plans.

I have a statement to all other affected landowners. I feel this company is not treating us fair. Especially, their lop-sided easement agreements. My plans are not to sign. We have to have an easement that is fair and balanced. We all need to stand together.

The testimony I have given comes from a lifetime tax paying South Dakota resident. I am God fearing, honest, hard working, family oriented, I care about others and their well-being.
I love this land and plan to continue to protect and fight for it.
Economic development for TransCanada is certain economic disaster for me and all other **South Dakota** affected landowners.

Thank you.

Respectfully submitted,
Michael Sibson
Mike Sibson

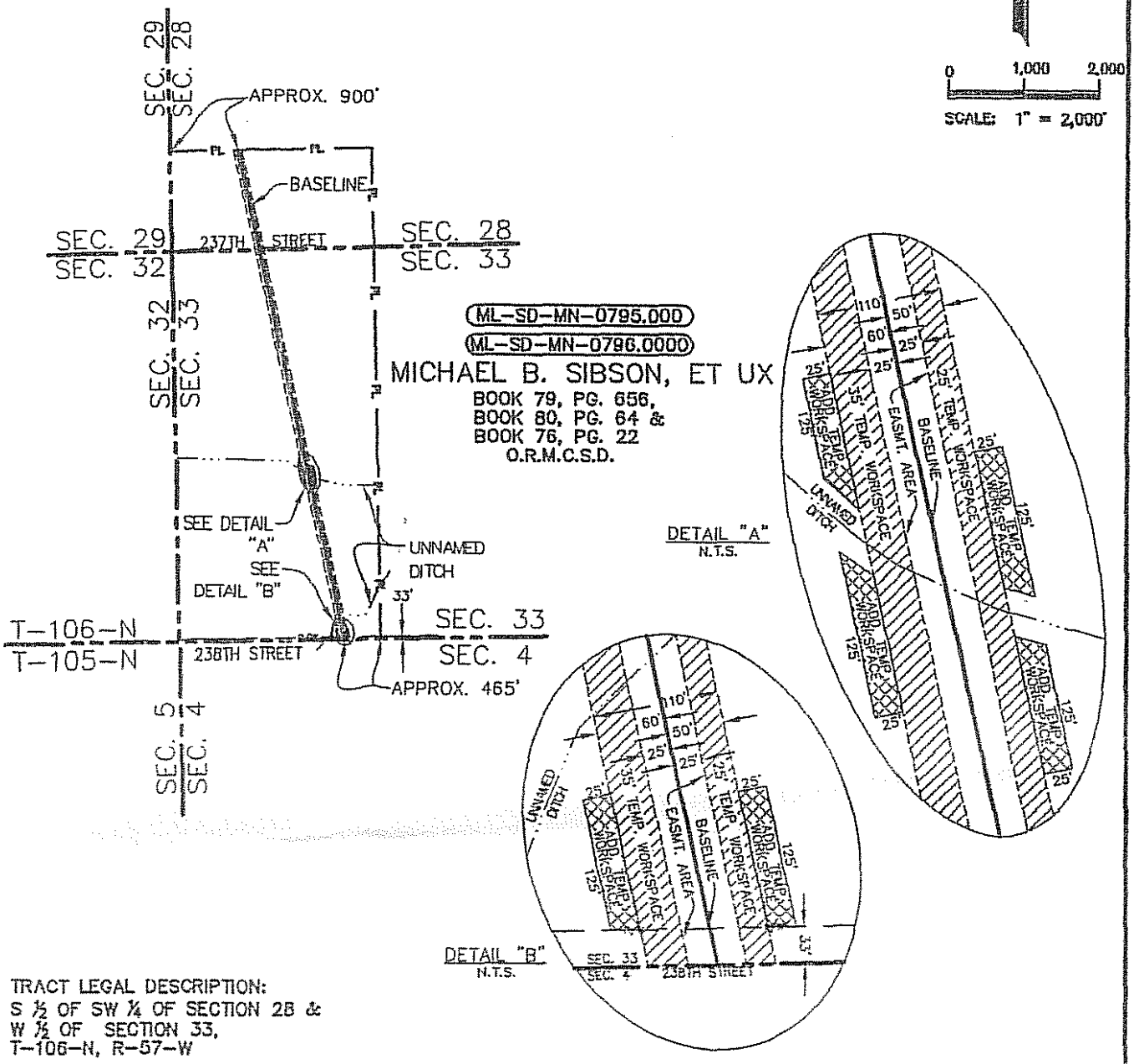
MINER COUNTY, SOUTH DAKOTA

T-106-N, R-57-W, SECTIONS 28 & 33

LEGEND:

P/L	PIPELINE
PG.	PAGE
PL	PROPERTY LINE
ADD.	ADDITIONAL
EASMT.	EASEMENT
APPROX.	APPROXIMATELY
EXIST.	EXISTING
TEMP.	TEMPORARY
SEC.	SECTION

O.R.M.C.S.D. OFFICE OF THE RECORDER OF MINER COUNTY, SOUTH DAKOTA



TRACT LEGAL DESCRIPTION:
S ½ OF SW ¼ OF SECTION 28 &
W ½ OF SECTION 33,
T-106-N, R-57-W

TOTAL LENGTH: APPROX. 6,700 FT.
EASEMENT AREA: APPROX. 7.7 ACRES
TEMPORARY WORKSPACE: APPROX. 9.3 ACRES
ADDITIONAL TEMP. WORKSPACE: APPROX. 0.5 ACRES

NOTE:

THIS SKETCH DOES NOT MEET THE MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS. IT WAS NOT DERIVED FROM AN ON THE GROUND SURVEY BUT IS INTENDED FOR RIGHT OF WAY PURPOSES ONLY.

UNIVERSAL ENGG. INC.

NO.	REVISION	DATE
0	ISSUED FOR REVIEW HOUSTON	02/06/07
1	BASED ON SURVEY & TITLE	05/16/07
2	CHANGED TRACT NO.	05/15/07
3	APPROVED IN KC	05/04/07
4	ISSUED FOR ACQUISITION	06/04/07

SCALE	DATE	DRAWN BY	CHECKED BY
1"=2,000'	01/10/07	DN	GTC

TransCanada

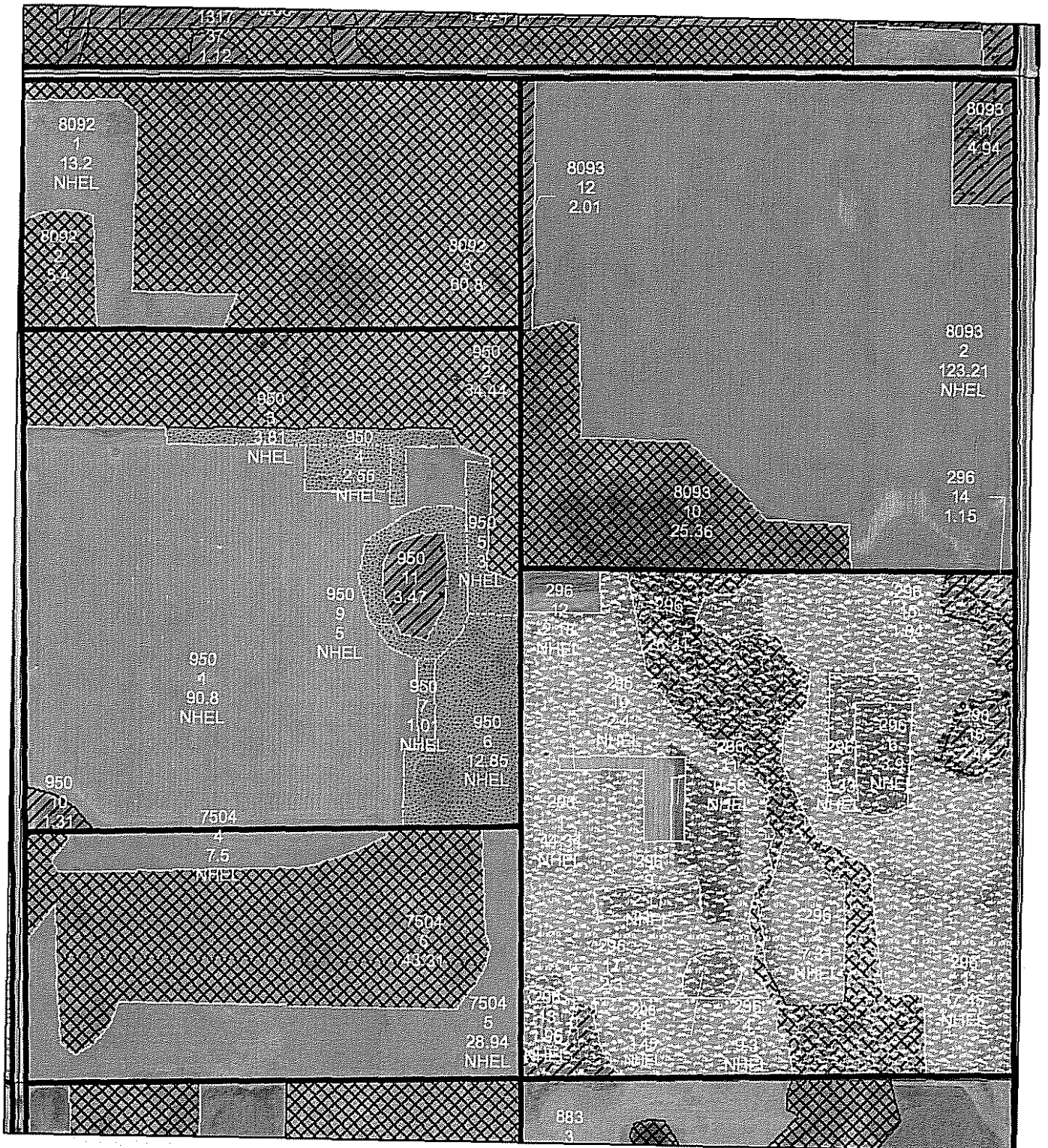
KEYSTONE PIPELINE PROJECT

EASEMENT AREA
ACROSS THE PROPERTY OF
MICHAEL B. SIBSON, ET UX
ML-SD-MN-(0795.0000, 0796.0000)

PROJECT:	EXHIBIT A
9347.000	

APPROVED BY	DRAWING NUMBER
ML	K-46-P-7500-1191

009854



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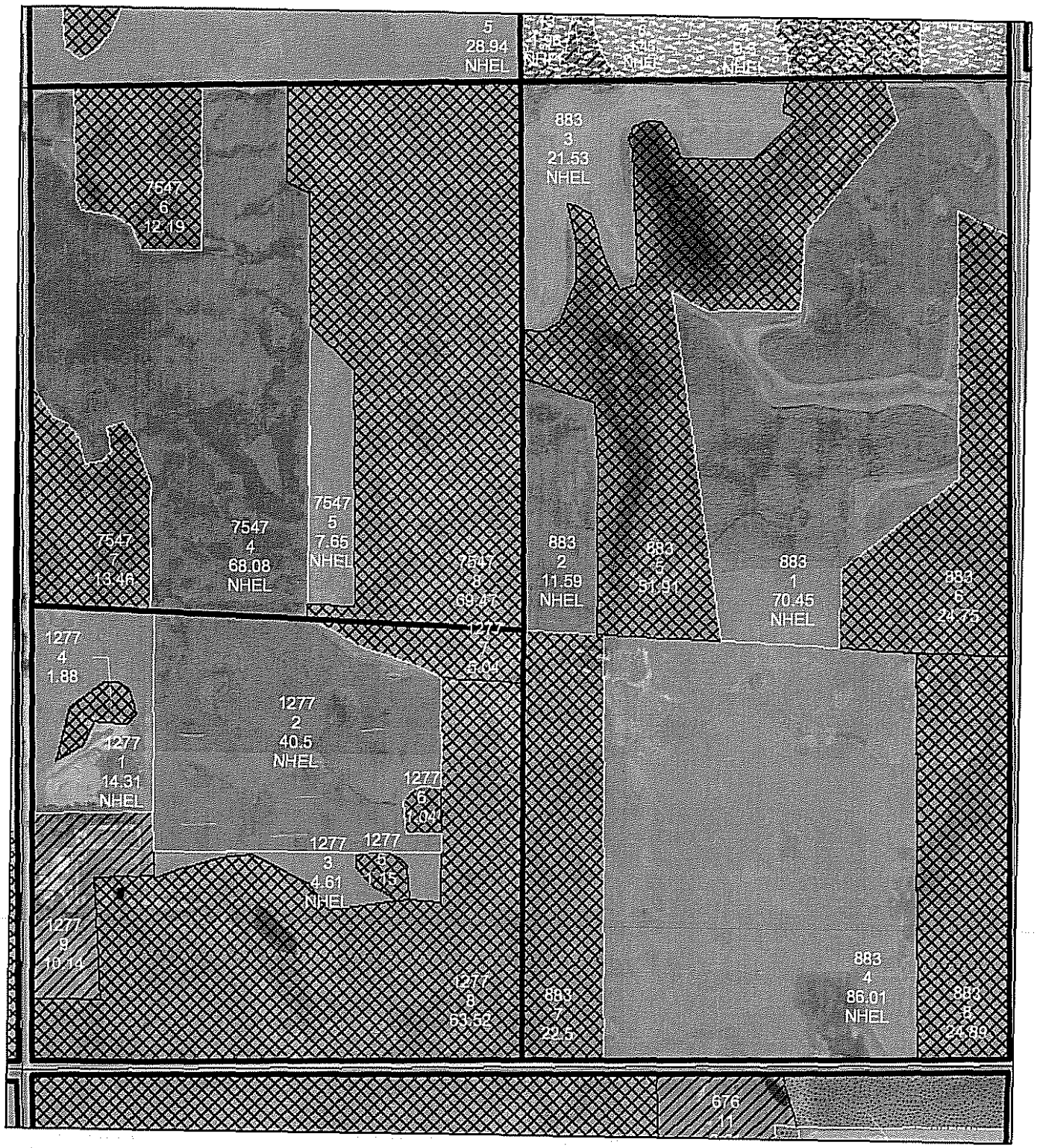

USDA United States Department of Agriculture
Farm Service Agency

Miner County

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RECEIVED
OCT 3 1 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Before the Public Utilities Commission
of the State of South Dakota

IN THE MATTER OF THE APPLICATION	)	HP 07-001
BY TRANSCANADA KEYSTONE PIPELINE,	)	
LP FOR A PERMIT UNDER THE SOUTH	)	**DIRECT TESTIMONY OF**
DAKOTA ENERGY CONVERSION AND	)	**Tim Hofer**
TRANSMISSION FACILITIES AC T TO	)	605-352-7175
CONSTRUCT THE KEYSTONE PIPELINE	)	
PROJECT	)	

My name is Tim Hofer and my address is 40918 192nd Street, Carpenter, South Dakota 57322. I farm with my parents Del and Pam Hofer near Carpenter, SD. We have farm land that would be crossed by the oil pipeline proposed by Trans-Canada.

I have attended several meetings sponsored by TransCanada and SD Public Utilities Commission in the past several months. The last meeting I attended was at in Clark, SD. It was a hearing put on by the U.S. State Department from Washington, DC. I don't know why they made the trip out to South Dakota at taxpayer expense, because it was obvious from the meeting that the people attending on behalf of the federal government had already made up their minds before the meeting even started. One lady from an environmental consulting firm hired by the State Department to prepare the EIS nearly fell asleep during the meeting which went from 7:00 pm to 9:00 pm.

I also attended an informational meeting in the same room in Clark, SD in June which the PUC and TransCanada attended. We were disappointed thatTransCanada was allowed to talk first and dominate most of the meeting time. The room was packed but there was very little time set aside for landowners and concerned citizens. I'm sure that the PUC and TransCanada set it up that way to "educate" us. But the fact is, we had already read about the other hearings in the paper and wanted to tell our side of things rather than have to listen to the Canadians all night.

Since the meetings and hearings many things have changed about the plan. One important thing that changed is the thickness of the pipeline that will be installed in the rural area where we live. It's supposed to be just as safe and as good as other crude oil pipelines around the USA but I question if this thinner pipe is so safe, why are they going to use thicker pipe in the more populated areas, like Yankton, SD? Are the lives of farmers and rural people less important to the PUC and the Governor than city

residents?

It seems to me that if that pipeline is supposed to be in operation for 50 years it would make sense to use the thicker pipe. The cost that TransCanada will save will be small in comparison to what they will get for the 591,000 barrels of oil they pump through South Dakota every day.

I believe the reason they want to use the thinner pipe just to save money. That's another example of how much they care about the people living out here in the country trying to make a living off the land. The land that we thought we owned until this private oil company from a foreign country came along and said it was theirs to use however they wanted and no elected official in South Dakota lifted a finger to help us. We are mad and sad about that. What did we ever do to offend you. What did we do to deserve being ignored and neglected by our government in Pierre?

The TransCanada Keystone pipeline is set to run kity-corner through our best piece of farmland. I can only get to that piece of land from one direction. During construction how am I going to plant, spray, and harvest with a ditch running on an angle? The payment TransCanada offered is even equal to what the land would rent for over a 50 year period. We asked them what happens if they have sink holes over the pipeline and we get stuck with farm machinery? I heard Buster Grey, the engineer for TransCanada from Kansas say that they pack the ground, but I don't believe they can put it back to natural conditions. He also said that if we damage the pipe with farm machinery, whether it's an accident or not, they will hold us liable. When I get stuck it costs me money, especially if I break something. Once the pipeline is approved by the PUC and our land is taken by eminent domain no matter what happens if I farm my land and get stuck over the pipeline it's at our expense. How can they say we have full use of our land? Trans-Canada will have millions of dollars a day flowing through their pipes and the landowners are the ones who pay for it. We will find out soon how important the farmers and land owners are to the PUC. I'm afraid we don't count for much.

They plan to building a pumping station a mile to the north of our land. This spring it was very wet and the summer was very dry. There were cracks in the ground several inches wide in places. Using thinner pipe does not make me feel any better with the way the ground shifts around here. With the temperature of the pipeline the ground will freeze later and thaw sooner, if it even freezes at all. When I plant winter wheat, which is an important cash crop for us, it will never be any good over that pipeline because TransCanada will heat the oil to 80 degrees so it will flow. Whatever crop I plant on there no one can tell me it won't dry out over that pipeline quicker in the summer and all I'll have to harvest is weeds. Here again, TransCanada gets the millions of dollars of oil money and I get to pay for spraying weeds. TransCanada may deny it but I have seen pictures from farmers in Canada who have oil pipes like this on their land and the land ends up not being good for much of anything.

I'm also concerned about the added risk of fire. TransCanada claims we have nothing to worry about. But do a search on the internet and you will find news stories and proof

that these kinds of pipelines leak and blow up all the time. I have read where during the first years of operation that two pump stations blew up and burned on the oil pipeline in Alaska. TransCanada's documents say that if there is a leak and it starts on the fire the best thing to do is let it burn out. You know what the summer and fall winds are like in South Dakota. If they do that it will start grass fire like we have never seen before in South Dakota. They will be gone and the three PUC commissioners and their staff will be left to pick up the pieces and handle the fall out.

Once they get their permit from you it won't matter to TransCanada what happens to the farmers like me and the rural communities they cross. It does matter very much to us and our families. I've heard the PUC say they have no control over the eminent domain part of this project but I beg to differ. I believe if you wanted to, the PUC could deny the project a permit until TransCanada agrees to play fair with the landowners. No one's property should be taken from them by force by the government let alone by an oil company. How would you feel if was your home or your property or your family business.

I wonder if any one of the three of you ever lived on a farm or tried to make a living off the land. You can work as hard as possible, from sun-up to sun-down, and be wiped out by a hail storm, a frost, prices, costs or the lack of rain. Now we have another thing to worry about, TransCanada.

I'm afraid I won't be able to attend the hearings you will be holding in Pierre on December 3 through 14, 2007. If was held in Huron or Clark we could make it. We feed cattle in the winter and we just can't leave them alone that long.

Please look into your hearts and study all the laws and the information and see if you can place conditions on any permit you decided to grant TransCanada that at least provides more protection for public safety, ground water, the farmer, the landowner and the environment. We have a great place to live here and we should be so eager for a few tax dollars that we bring in something like crude oil that could damage the great place where we live.

Tim Hofer

Date: October 28, 2007

RECEIVED
OCT 31 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Before the Public Utilities Commission
Of the State of South Dakota

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE	))))))	HP 07-001 **DIRECT TESTIMONY OF SCOTT ANDERSON** **October 31, 2007**

My name is Scott Anderson. My home address is 41384 – 122nd Street, Langford, SD 57454. I live 5.25 miles west and 1 mile north of Langford. I operate a grain and livestock farm with my father, Raymond Anderson.

Burden of Proof
According to the letter that the PUC sent us on September 19, 2007, TransCanada has the burden to prove that their permit application and project plan complies with state law.

> **SDCL 49-41B-22 Applicant's burden of proof.** The applicant has the burden of proof to establish that:
>
> (1) The proposed facility will comply with all **applicable laws and rules;**
>
> (2) The facility will **not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants** or expected inhabitants in the siting area;
>
> (3) The facility will **not substantially impair the health, safety or welfare of the inhabitants;** and
>
> (4) The facility will **not unduly interfere with the orderly development** of the region with due consideration having been given the views of governing bodies of affected local units of government.

Keystone Will Pose a Serious Threat To The Environment and Economic Condition
I rent land that will be crossed and farm other land in the area that would be compromised when this pipeline leaks. This crude oil would ruin the water supplies that we have. The cattle would become sick from eating from any ground that came into contact with oil spills. The land that I rent would not produce on the acres that have the pipeline corridor because of the heat from the pipe. There would be no subsoil moisture over a line that was running 75-80 degrees at all times. It also could create a problem with insects and weed seeds that do not die because of the warm ground. That would bring more costs in for more chemicals.

We have been following studies for specialty crops. Soybeans were unheard of several years back. Who knows what crops will be our future. With the depth of the slough on our farm, we could even dam it up, dig it deeper and use it for local fishing. It is a source of many dollars for Game, Fish and Parks right now. There are always hunters coming to hunt our area for game birds and deer. That will be gone with the crude oil spill also.

TransCanada keeps stating that this pipeline is not going to Elk Point and Hyperion. That may well be BUT we would be stupid not to realize that they are establishing a corridor. By ConocoPhillips own words, they will need another five pipelines if they continue with their plans. They stated that they would be shipping 3.5 million barrels by the 2020's. At 590,000 per line, that is another five lines that will be dug into our ground. That is another five times that the soil will be disturbed. That is six times that the ground will be dug up and lines put in. How many times can you move top soil and it is still top soil? I doubt that anything much will grow over these lines. This pipeline takes quite a stretch of ground with pipes running 75-80 degrees. That would be a great breeding ground for spores from soybean rust. There would be so many different things that could survive in that big an area that it could change our whole way of farming. One thing for sure, it would cost more and more money each year.

Keystone Will Substantially Impair Health, Safety and Welfare of Inhabitants
When there is a leak in the pipeline, it has the potential of spreading from section 14 to the west to a major slough. When that slough becomes contaminated with chemicals that cause liver and kidney disease and birth defects, no one is going to want to live close to the area. My house is west of the slough and my parents' home is east. Both farmsteads would be worthless. The value would be gone like our water supply. I am now on BDM water and have to have a supply tank because of low water pressure. What would happen if several more farmers needed to hook up? All new lines would have to be dug in at a huge cost. Why would other people to the east who might not be affected want to pay so that I can have water? Why should they have to?

TransCanada Keystone filed for waivers. All the while they were at meetings and talking to landowners they knew that they were not telling the truth. It did not seem to bother them. I would have been a great time to tell everyone what was really happening. They said that landowners could simply draw a line through the number of pipes. Of course, that was because they knew there was a waiver that said they could have the number of pipes that they wanted. It did not matter what the landowner thought they were signing. How many more waivers are there? Why were they not made known sooner? How can TransCanada be trusted when we can see how easy it is for them to lie about these things? Lying by omission is lying.

Thinner walled pipes with more pressure from a company that has never run a crude oil pipeline doesn't make much sense. Of course they have a good record about spills since this will be their first. I would think that since this is their first, they should be held to a higher standard than a company that had built several lines and had some experience.

I find it most interesting that the state of South Dakota has more concern about livestock feeding operations---CFO's---than it has for the dangers from this pipeline. The concern for

runoff from fertilizers and chemicals that are used on the farms is scrutinized far more than any thought as to how our state would recover from the pipeline break that will happen at some time.

Landowner Relations

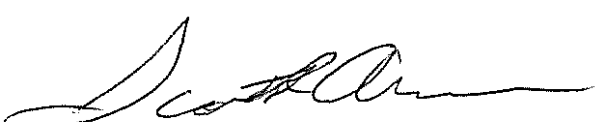
TransCanada Keystone has promised since their first visit in early May that they would stop their land agents' actions that were not proper. They have promised at several meetings. Yet nothing has come of it. They even have a county commissioner from Day County buying easements. I would think there would be conflict of interest in that case. He is after tax dollars for his county and who knows what influence he would have because of his position. Our state, county and federal officials seem to think that TransCanada Keystone is a better citizen than those that have paid taxes for many years. We know what taxes they get from us. They promised the little towns and counties a lot more than they will receive. That is another form of their deceit. After some of the schools looked into the matter, they felt that they would receive less in the long run than they are getting now.

Eminent Domain

TransCanada Keystone has filed eminent domain on 18 landowners that we know of at this time. Where is the negotiation in that? When you start threatening at your first meeting with the landowner, when does the negotiating come into the picture? Of course the people that signed right away had no problems with TransCanada. They did nothing except believe that TransCanada could take their land for nothing. Some of the letters to the PUC state that the landowners wished that they could have their easements back. I think that anyone that feels they were conned into signing should be given a second chance. And possibly, TransCanada should have to renegotiate and pay the landowner again. That might be a lesson to them that they might understand. It seems that money is the driving force behind them.

Cultural Resources

The amount of survey work that has been done is not enough. There are too many important relics and cultural resources to be protected. The Native Americans and SHPO need more time in which to do the survey the right way. The Native Americans in the USA and Canada have rights that are not being met. The Department of State needs to take more time and see that everything is done right at the beginning. Not after they have found and ruined their heritage. This pipeline is being rammed through the states like Sherman through Georgia. It is not protecting the rights of landowners, the Native Americans or anyone else involved. It seems that the only rights that are being considered are those of TransCanada Keystone.



Scott Anderson
10/31/07

Pre-filed Testimony in the Matter of Application by TransCanada Keystone Pipeline, LP for a Permit Under South Dakota Energy Conversion and Transmission Facilities – HP07-001

Submitted by George Piper for the Board of Director South Dakota Resources Coalition

October 31, 2007

Soil and water contamination of crude oil products – There are many examples of crude oil spills. TransCanada's *Spill Frequency Volume Study* predicts spills of crude oil of various amounts can occur from time to time at any place along the pipeline.

The Keystone pipeline crosses the eastern slope of the James River watershed throughout the state. The region contains highly productive farm land, and some of the richest wetlands of the state. Also the pipeline will lie over and near several groundwater aquifers. Drainage of surface waters throughout this region is to the James River.

Crude oil contains several highly toxic small weight chemicals including benzene, toluene, ethylbenzene, and xylene that rapidly disperse in water and wet soils. These chemicals are regulated contaminants in both surface and ground water by South Dakota water quality standards.

Again Pipe lines leak! Crude oil spills in or around any of these surface waters could pollute the water in violation of the water quality standards.

Wildlife Resources – Threatened and Endangered Species – The proposed route of the Keystone pipeline crosses through habitat of several protected species including the Bald Eagle, Dakota Skipper, Western Prairie Fringed Orchid, Pallid Sturgeon, Topeka Shiner, and others.

The operation of the pipeline must consider the needs and maintenance of habitat for the continuation of these species.

Energy Policy

We are enticed by the possibility that TransCanada will pay $6.5 Million to the state in taxes each year. I don't know what the market for crude is, but for example if it is $45 per barrel the sale of 144,444 barrels would pay the taxes. At the rate of delivery of 435,000 barrels per day, the taxes could be paid in 8 hours

We are also told that we need this crude oil pipeline that will contribute to meet energy needs, bring about energy independence, and solve the energy problems. Conservation and efficient use of energy must be a part of the solution.

The development of the Keystone crude oil pipeline flies in the face of an emerging national energy policy that advocates the reduction of green house gasses. The state of

South Dakota and the PUC should be leaders in championing initiatives that reduce carbon emissions and rewards the conservation and efficient use of energy.
Build a new energy system and energy economy around the many innovative processes of energy production and use that are environmentally friendly.

Recommendations

1. Require TransCanada to provide a remedial plan that they and their contractors will follow to clean-up soil, surface waters, and ground waters contaminated by an operational crude oil spill **both inside and outside** of their easement right-of-way. The plan should also include reimbursement to landowners, adjacent property owners, water utilities and public lands and resources that are impacted by an oil spill or pipeline accidents.

2. Require TransCanada and its partners to post a bond or cash payment with the State of South Dakota to cover the cost of clean-up of any crude oil spill during the lifetime of the project.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	HP07-001 **DIRECT TESTIMONY OF EDWARD D MILLER**

1. Please state your name and address for the record.

Answer: My name is Edward D. Miller. My address is 300 West Vermont, Salem, SD 57058. My mailing address is PO Box 557, Salem, SD 57058.

2. How are you involved with the Keystone pipeline project?

Answer: I am a landowner in Miner County, South Dakota affected by the proposed Keystone pipeline.

3. What is your professional background?

Answer: I hold a Bachelors degree in Computer Science from the University of Minnesota (1984). My work experience includes several years with Exxon Company USA in Houston, TX (1984-1992.) During my time with Exxon, I worked as a systems analyst, project leader, data analyst, database administrator and as a consultant to other internal projects and business functions.

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4. What is the purpose of your testimony?

Answer: I am concerned that the proposed Keystone pipeline poses a threat of serious injury to the environment and may impair the health, safety or welfare of South Dakotans. Specifically, the oil spill estimates included in the application are significantly lower than the actual historical track record of hazardous liquid pipelines in North America. Since the pipeline environmental assessment is based on these low oil spill estimates, I'm concerned that the risk associated with this pipeline is significantly under-stated by the applicant.

5. What is the track record of pipelines in the United States?

Answer: Basically there are three major types of energy pipelines in the United States. Pipelines are regulated by the US Department of Transportation, through the Office of Pipeline Safety (OPS). The OPS classifies pipelines into the following categories: 1) gas distribution pipelines, 2) gas transmission pipelines and 3) hazardous liquid pipelines.

In terms of reported accidents per mile of pipeline, hazardous liquid pipelines involve the most risk. Accident rates per mile for hazardous liquid pipelines are about 3 times higher than accident rates for gas transmission pipelines. Furthermore, hazardous liquid pipeline accident rates are about 8 times higher than those for gas distribution pipelines.

The chart at the top of EXHIBIT A is based on historical accident and mileage data from the OPS. The diagram in the lower part of EXHIBIT A is from

a May 2000 Government Accounting Office (GAO) report on pipeline safety. As shown in both parts of this exhibit, hazardous liquid pipelines have higher overall accident rates and higher major accident rates than other types of energy pipelines. The GAO report is submitted with this testimony as supporting documentation (GAO/RCED-00-128). The OPS accident and mileage reports for each of the three types of pipeline are also included as supporting documentation.

6. What type of pipeline is the proposed Keystone pipeline?

Answer: The proposed Keystone pipeline is a crude oil pipeline. Since crude oil is classified as a hazardous liquid (Title 49 CFR), the proposed Keystone pipeline is a hazardous liquid pipeline. The two key factors here are 1) the project, which is a hazardous liquid pipeline, and 2) the location, which is North America. References to all other subjects, including other types of pipelines, and all other locations outside North America, are irrelevant while evaluating the merits of this application.

7. What sources of information regarding hazardous liquid pipelines in North America are available to the public?

Answer: The Office of Pipeline Safety maintains databases containing detailed information regarding hazardous liquid pipeline accidents in the United States. The Environmental Protection Agency (EPA) also maintains databases of pipeline accident information. The information from both sources is available

to the public through the freedom of information act.

Independent research studies including one conducted by the California State Fire Marshall are also available. The study, published in 1993, is available from the CSFM web site. Information from that report is included later in this testimony; the report is submitted here as supporting documentation.

Some pipeline industry leaders provide their operational data including oil spill statistics to the public. For instance, the Canadian pipeline company Enbridge publishes its Corporate Social Responsibility Report annually, and makes that information available to the public. The company also maintains information available to the public from their web pages, including www.enbridgecasslake.com which details remediation efforts regarding a major crude oil ground water contamination site near Cass Lake, MN. Statistics from those reports and the web pages are included later in this testimony; they are submitted here as supporting documentation.

The National Transportation Safety Board investigates major pipeline accidents in the US and publishes reports available to the public. Likewise the Transportation Safety Board in Canada investigates pipeline accidents there as well. That information is often available to the public. Statistics from the US NTSB and the Canadian TSB are included in this testimony; several of their reports are submitted here as supporting documentation.

Since the proposed Keystone pipeline is a crude oil pipeline, only information regarding hazardous liquid pipelines should be considered. Other subjects (i.e. gas transmission pipelines) are largely irrelevant and must be

excluded. Likewise, information from locations outside of North America (i.e. Europe, Asia) is largely irrelevant and must also be excluded.

8. Please provide a summary of the historical track record of hazardous liquid pipelines in the US.

Answer: The Office of Pipeline Safety (OPS) maintains databases regarding significant pipeline incidents in the United States. The OPS also provides reports to the public summarizing annual accident statistics involving hazardous liquid pipelines (Google "OPS Statistics"; follow the links.) A recent copy of a summary report is provided as EXHIBIT B. The report lists the total number of accidents, fatalities, injuries, property damage, amount of oil spilled (gross loss) and amount of oil never recovered (net loss) each year since 1986. This report only includes oil spills that are reported to OPS as 50 barrels or more. More detailed reporting has been in place since 2002, although this summary report hasn't changed so that historical comparisons are possible.

Overall totals are also provided. As the report shows, there have been thousands of accidents in the US involving hazardous liquid pipelines. These accidents have resulted in more than $1.22 trillion dollars in property damage caused by oil pipelines. More than 3.4 million barrels of oil have been spilled, and the majority of that amount, more than 2 million barrels, has never been recovered. In terms of gallons, hazardous liquid pipelines have spilled more than 143 million gallons of oil in the US since 1986; more than 84 million gallons were never recovered.

It is fairly straightforward to calculate average spill size per year and other statistics to gain insight into the industry. For instance, in 2006 there were 110 accidents that spilled a combined total of 136,263 barrels of hazardous liquids. The average spill for those accidents amounts to about 1,238 barrels of oil, which is more than 52,000 gallons.

The report also notes that the totals are subject to change as new information is submitted to OPS. Some pipeline spills, especially those involving detailed investigations, may not be finalized for several months or even a couple years after the incident takes place. Spill data for the most recent years is updated monthly.

9. How do those spill totals compare to the Exxon Valdez oil spill in Alaska?

Answer: The Exxon Valdez spilled about 10.6 million gallons of oil in the waters off Alaska. Since 1986, hazardous liquid pipelines in the US have spilled more than 13 times as much oil as the Exxon Valdez did in Alaska in 1989. Furthermore, for the years 2005 and 2006 combined, hazardous liquid pipelines spilled 273,280 barrels of oil. This recent two year total is more than that spilled by the Exxon Valdez.

10. Does the OPS incident database contain all oil pipeline spills in the US?

Answer: No. The US-DOT acknowledges "known problems with under-

reporting property damage and spill quantities…" involving hazardous liquid pipeline incidents in its DOT Performance Plan – FY 2004. That report is included here as supporting documentation. Also, the GAO report listed earlier notes that the EPA had records of 16,000 pipeline spills from 1989-1998 that were never reported to OPS. Some reasons and examples are as follows:

(1) Some hazardous liquid pipelines are exempt from OPS reporting. A recent example is the 2006 BP pipeline spill in Alaska. Even though more than 250,000 gallons of crude oil were spilled, that event is not included in the Office of Pipeline Safety incident database because that pipeline is exempt; it is considered a low stress pipeline in a rural area (49 CFR 195.2)

(2) Spills smaller than 50 barrels or 2100 gallons were excluded from OPS reporting prior to 2002. The OPS reporting threshold has changed to include all spills 5 barrels or larger to be reported, and some spills as small as 5 gallons to be reported.

(3) Some spills are under-reported in one way or another. An example of under-reporting could include the 1992 spill near Renner, SD. In that incident, about 300,000 gallons of hazardous liquid were spilled into productive farmland threatening a nearby aquifer. Even though over 220,000 gallons were lost, the OPS database record shows that the property damage was $0.

(4) Some spills are not reported at all. An example would be the Enbridge spill near Cass Lake MN discovered on the Leach Lake Indian Reservation in 2002. Even though an extensive cleanup has taken place, an estimated 48,000 gallons of crude oil remain floating on contaminated ground

water. This spill is not recorded in the OPS incident database. The company involved with the spill and cleanup maintains a website regarding those efforts at www.enbridgecasslake.com. That web based information is submitted here as supporting documentation.

11. Please provide a summary report of recent pipeline spills involving crude oil.

Answer: There are two summary reports shown in EXHIBIT C. The first report is calculated using the actual pipeline oil spill records available from the Office of Pipeline Safety for all hazardous liquid spills of 5 barrels or more since 2002. The second report includes crude oil spills only; it consists of reported spills of 5 barrels or more. All other incidents were excluded from both reports, including small spills reported in gallons and all incidents that did not involve spills at all (fires, injuries, fatalities, etc.)

The summaries only include those spills reported to the OPS since the new reporting format was adopted in response to the Pipeline Safety Improvement Act (2002).

As the first report shows, there have been 915 reported hazardous liquid spills of 5 barrels or more in the US since the beginning of 2002. Of those 915 oil spills, 168 spills contaminated water and 287 spills involved High Consequence Areas (HCAs). The spills resulted in more than 382 million dollars in property damage. Over 603,000 barrels, which is more than 25 million gallons, of hazardous liquids were spilled. The average hazardous liquid pipeline spill listed

on this report was 660 barrels, or 27,707 gallons.

As the second report in EXHIBIT C shows, there have been 446 reported crude oil spills of 5 barrels or more in the US since the beginning of 2002. Of those 446 crude oil spills, 71 spills contaminated water and 79 spills involved High Consequence Areas (HCAs). The spills resulted in more than 217 million dollars in property damage. Almost 280,000 barrels of crude oil were spilled, amounting to more oil spilled than that by the Exxon Valdez. The average crude oil pipeline spill listed on that report was 627 barrels, or 26,345 gallons.

The OPS Hazardous Liquid Incident database records from 1986 through September 2007 are submitted as part of my testimony in this case. The Microsoft Excel spreadsheet containing the post 2002 records used to calculate the reports in EXHIBIT C is also included.

12. Please provide a list of recent significant crude oil pipeline spills affecting the Northern Plains in the US.

Answer: A sampling of regional crude oil pipeline spills involving the Northern Plains is included as EXHIBIT D. As shown in the exhibit, there are several recent significant crude oil spills from pipelines that have affected surface water, ground water, and high consequence areas (HCAs.) There have been several multi-million dollar cleanups and some multi-million gallon oil spills. The source for this information is the Hazardous Liquid Incident database available from the Office of Pipeline Safety. The list of spills shown in EXHIBIT D is a partial list of the more significant incidents; it is not a complete list.

13. Based on historical information from sources in North America, how often do oil pipelines leak?

Answer: In order to answer that question, a standard measure must be defined. The Spill Frequency Rate (SFR) can be defined as the number of pipeline oil spills per year for a given length of pipeline, usually 1000 miles. Since the proposed Keystone pipeline is listed at 1845 miles long in the Frequency and Volume Analysis, and since TransCanada listed its spill projections for the entire pipeline, the Spill Frequency Rate will be defined here as the number of spills per year per 1845 miles of pipeline or right-of-way.

The actual hazardous liquid pipeline Spill Frequency Rates derived from sources in North America are as follows:

(1) The California State Fire Marshall study (1993) reported an incident rate of 7.1 leaks per 1000 miles of pipeline per year. That is equivalent to 13 leaks per 1845 miles of pipe per year. The study includes all oil spills regardless of the amount spilled. Page 170 of that report lists the overall incident rates under the heading “8.1 Significant Findings”. Page 170 of that report is included here as EXHIBIT E. The CSFM study is included with this testimony as supporting documentation.

(2) An industry leader, Canadian pipeline company Enbridge Inc, has publicly reported its actual oil spill statistics annually for the last several years. For the 10 year period from 1996-2005, the actual Enbridge Spill Frequency Rates range from a low of 8 reported spills per 1845 miles of right-of-

way in 2001, to a high of 21 reported spills per 1845 miles of right-of-way in 1996. Enbridge includes all actual oil spills that have been reported to regulatory jurisdictions. A summary of Enbridge spill statistics from 1996-2005 is included as EXHIBIT F. Note: Enbridge reports mileage totals in terms of miles of right-of-way instead of miles of pipeline. The Enbridge Corporate Social Responsibility reports for 2004, 2005 and 2006 are included with this testimony as supporting documents. The Enbridge Environment Health and Safety reports for years 2001, 2002 and 2003 are also included as supporting documents.

(3) The US industry average pipeline spill information is derived from the Hazardous Liquid Pipelines Incident Database maintained by the US-DOT Office of Pipeline Safety. Reporting guidelines were changed in 2002 to require reporting of all spills of 5 barrels or more and some spills as small as 5 gallons. The actual US industry average Spill Frequency Rate for the years 2002 - 2005 ranges from a high of about 5 spills per 1845 miles of pipe in 2003, to a low of about 4 spills per 1845 miles of pipe in 2005. This includes all spills of 5 gallons or more. A summary of OPS spill statistics from 1996-2005 is included as EXHIBIT G.

14. What is the projected Spill Frequency Rate for the Keystone pipeline?

Answer: TransCanada's forecast for the Keystone pipeline is one spill of 50 barrels or more over the next seven years. That calculates to a Spill Frequency Rate of approximately 0.15 spills per 1845 miles of pipeline per year.

The forecast is listed in the Frequency and Volume Analysis submitted with the application.

15. How do the actual historical Spill Frequency Rates from the sources listed above compare to the forecast Spill Frequency Rate for the Keystone pipeline?

Answer: The actual historical Spill Frequency Rates are significantly higher than TransCanada's forecast for the Keystone pipeline. The actual historical spill rates from the sources listed above are plotted on a chart included as EXHIBIT H. The TransCanada forecast rate is also plotted on that chart in EXHIBIT H. As shown in the chart, the actual historical Spill Frequency Rates are as much as 100 times as high as the forecast Spill Frequency Rate for the Keystone pipeline. The reporting thresholds for each of the sources are listed on the chart.

16. Based on historical information from the sources mentioned above, how much oil do pipelines spill in North America?

Answer: In order to answer that question, another standard measure must be defined. The Spill Volume Rate (SVR) can be defined as the amount of oil spilled per million barrel-miles of product transport. As defined by the Association of Oil Pipelines (AOPL), one barrel-mile equals one barrel of oil transported a distance of one mile. The AOPL states that the average spill volume rate for oil pipelines in the US is about 1 gallon of oil spilled per million

barrel-miles of throughput. That industry average can be confirmed by using information from the Hazardous Liquid Incident database available from the Office of Pipeline Safety.

The actual Spill Volume Rates derived from sources mentioned above are as follows:

(1) The industry leader, Enbridge, publicly reports its actual oil spill statistics annually. For the 10 year period from 1996-2005, the actual Enbridge Spill Volume Rates range from a low of 0.2 gallons spilled per million barrel-miles in 2004, to a high of 1.7 gallons spilled per million barrel-miles in 1999. The actual Enbridge spill volume rate averaged about 0.82 gallons spilled per million barrel-miles for the ten year period from 1996-2005.

(2) The US industry average information is derived from the Hazardous Liquid Pipelines Incident Database maintained by the OPS and statistics provided by the Association of Oil Pipelines. For the 10 year period from 1996-2005, the actual US industry average Spill Volume Rates ranged from a low of 0.9 gallons spilled per million barrel-miles in 2003, to a high of 2.2 gallons spilled per million barrel-miles in 1997. The recent US industry average spill volume rate is approximately 1 gallon spilled per million barrel-miles of product transport.

17. What is the projected Spill Volume Rate for the Keystone pipeline?

Answer: The Keystone spill volume rate forecast by TransCanada is about 0.072 gallons spilled per million barrel-miles of product transport. That number is

calculated based on information supplied in the Frequency and Volume Analysis submitted with the application (average of 0.37 barrels spilled per mile per year.)

18. How do the two actual historical Spill Volumes Rates compare to TransCanada's Spill Volume Rate forecast for the Keystone pipeline?

Answer: The actual historical Spill Volume Rates are more than an order of magnitude higher than TransCanada's forecast for the Keystone pipeline. The three separate spill volume rates are plotted on the chart included as EXHIBIT I. As shown in the chart, the industry leader's actual Spill Volume Rate for 1996-2005 is about 11 times higher than Keystone's projection. The actual US industry average spill volume rate for the years 1996-2005 is about 14 times higher than Keystone's forecast Spill Volume Rate.

19. What do you conclude from the spill frequency and the spill volume forecasts for the Keystone pipeline?

Answer: The Keystone spill frequency rate and spill volume rate forecasts are clearly much lower than the actual historical rates calculated from the sources listed. I'm concerned about that because these Keystone estimates are used to assess the environmental consequences associated with the pipeline. The potential adverse impact of oil spills may be significantly underestimated.

20. What are the shortcomings of the Frequency and Volume Analysis regarding the oil spill estimates?

Answer: There appear to be several considerable flaws with the Frequency and Volume Analysis submitted with the application. These shortcomings can be classified as flaws regarding data selection, data omission, data interpretation and general assumptions. When combined, these items can effectively lower the projected Keystone spill frequency and spill volume rates.

21. Please provide an example of data selection flaw.

Answer: Regarding the Frequency and Volume Analysis, there are two obvious flaws regarding data selection. The first is that the study focused extensively on projects and locations outside of North America. The second flaw is that the study focused a great deal on the wrong types of pipelines, namely natural gas pipelines.

22. Explain why the selection of projects and locations outside of North America constitutes a data selection flaw.

Answer: The consulting firm DNV (Norway) conducted the study. The majority of references listed at the end of the report are outside North America. They include Norway, the United Kingdom, Brussels, the Netherlands, Australia, Hong Kong, the country of Brunei, and even the USSR. These references are simply not relevant to hazardous liquid pipelines in North America, especially references regarding Brunei, Hong Kong and the USSR.

Furthermore, reported pipeline incident rates in Europe are lower than they are in North America. The CONservation of Clean Air and Water for Europe

group, CONCAWE, tracks the performance of hazardous liquid pipelines in Europe. Europeans maintain tight reporting thresholds and they do frequent inspections, including intelligent pig inspections. Even though their reporting threshold for spills is 1 cubic meter, their incident database has only 436 records going all the way back to 1971. The annual number of spills from 2001 – 2005 is as follows: 15, 14, 12, 5 and 11. Compare that with the OPS summary report in EXHIBIT B, which shows hundreds of spills per year in the US, and thousands of spills recorded over the last 20 years. The spill frequency rates are significantly lower in Europe than they are in North America. The CONCAWE report is titled "Performance of European cross-country oil pipelines" (report no 4/07) and is included with this testimony as supporting documentation.

23. Explain why the focus on natural gas pipelines constitutes a data selection flaw.

Answer: Another data selection flaw is evident by the study's significant focus on the wrong type of pipeline. The study referred extensively to natural gas pipelines, especially the European Gas pipeline Incident data Group or EGIG, which involves gas transmission pipelines in Europe. Since the proposed Keystone pipeline is a hazardous liquid pipeline, gas transmission pipelines are largely irrelevant. It is well known and well documented that incident rates regarding gas transmission pipelines are significantly lower than incident rates on hazardous liquid pipelines. The actual incident rate comparisons for different types of pipelines are shown in EXHIBIT A.

24. Does DNV include any references to North America?

Answer: Yes, there are references to the US; however, there are no references to Canada at all. References relevant to the United States include the DOT Office of Pipeline Safety and the California State Fire Marshall, among a few others. However, other North American sources including the US EPA and the entire country of Canada are never mentioned at all in the Frequency and Volume Analysis. North American industry leaders such as Enbridge, which has extensive crude oil pipelines across the US and Canada, and is a direct competitor to the Keystone pipeline, is not mentioned at all. Even though the California State Fire Marshall study is referenced, DNV's forecast is significantly different than the actual historical results reported by the California State Fire Marshall. Refer again to EXHIBIT H.

By including the wrong continents like Europe, Asia, etc., and the wrong types of pipeline in the study, each of which involve lower incident rates, a forecaster could estimate lower overall incident rates than those found exclusively on hazardous liquid pipelines in North America. Effectively, that could lower the spill frequency rate estimate for the Keystone pipeline.

25. Please provide an example of a data omission flaw regarding the Frequency and Volume Analysis.

Answer: A specific instance of data omission is obvious in Section 5.1 of the study. Section 5.1 refers to the amount of time that elapses between the

occurrence of a leak in the pipeline and the point in time where the pipeline is isolated or completely shut down. However, table 5.1 reveals an obvious data omission in that the amount of time required to shut down the pumps has been omitted. That omission has a significant impact on the estimate of the amount of time required to isolate the pipeline and on the amount of oil released from the pipeline. EXHIBIT J shows that the data omission can impact the estimated times and potential spills by a factor of 27% to 75% depending on the size of the hole in the pipe. Please refer to EXHIBIT J for the actual calculations.

26. Please provide an example of a data interpretation flaw regarding the Frequency and Volume Analysis.

Answer: The final conclusion of the Frequency and Volume Analysis reveals a data interpretation problem. The study claims that from 1992-2003, the OPS statistics show that the average hazardous liquid pipeline spill in the US was 0.49 barrels per mile per year. However, that calculation is not based on the amount of oil spilled from the pipeline, it is based on the amount of oil spilled and never recovered. Essentially, any oil that is recovered during cleanup is subtracted from the original volume of the actual spill. The correct answer is actually 0.84 barrels spilled per mile per year, an increase of 71% over the incorrect figure listed in the study. Please refer to EXHIBIT K for the actual calculations.

27. Please provide an example of an unrealistic assumption

included in the Frequency and Volume Analysis.

Answer: Another way to reduce the average spill volume is to make unrealistic assumptions regarding the drain down of oil after a pipeline leak is isolated by valve closure. For instance, the Frequency and Volume Analysis assumes that all small and medium pipeline leaks anywhere along the entire pipeline will be completely stopped by clamping or by gel block within 4 hours after the control center operator is notified (section 5.5). This is a very aggressive assumption which is contradicted by actual experience.

Other assumptions involve operational aspects of the pipeline such as the SCADA system, which is assumed to work correctly all the time. For instance, in 2005 the National Transportation Safety Board (NTSB) published a report regarding SCADA systems and Liquid Pipelines. The NTSB reviewed the performance of SCADA systems involved in 13 hazardous liquid pipeline accidents that the NTSB had investigated previously. The NTSB concluded that in ten of those accidents, the SCADA system actually contributed to the severity of the accident. The report, NTSB/SS-05/02 is included with this testimony as supporting documentation.

28. What are your conclusions regarding the results of the Frequency and Volume Analysis?

Answer: The net combined effect of data selection, data omission, data interpretation and general assumptions can effectively reduce the number of estimated spills and reduce the estimated volume of oil spilled. Thus, the

estimates from this study may be much lower than what could reasonably be expected under real world conditions.

Whereas historical information regarding oil spills is objective and verifiable, a forecast is largely a subjective, judgmental process often influenced by assumptions and the bias of the forecaster. For instance, the Frequency and Volume Analysis uses the words assume or assumption 24 times, the phrase modifying factor is used 20 times and the word judgment is listed 9 times. That gives forecasters a lot of flexibility.

29. What about Canada? Are there any sources of pipeline spill information available from Canada?

Answer: Yes. The Canadian province of Alberta has an extensive installed base of oil pipelines and experience with oil pipeline spills. A comprehensive summary of pipeline spills is available in a report provided by the Alberta Energy and Utilities Board (EUB). The report is called Pipeline Performance in Alberta 1990-2005. Page 47 of that report contains a summary of pipeline releases; it is included as EXHIBIT L. As listed in the report, the province of Alberta alone recorded 16,004 pipeline spills in the 16 year period from 1990-2005. Of that total, there were 4,769 hydrocarbon liquid spills, which amount to an average of about 300 spills per year. The Alberta EUB Pipeline Performance report is submitted here along with my testimony.

30. Are the majority of those spills in Alberta smaller spills?

Answer: That depends on what is considered a small spill. The report lists four separate categories regarding spill size. The smallest spill category listed in the report is <100 m3 or cubic meters. That means the category of small spills includes all spills that are less than about 26,417 gallons. By contrast, the reporting threshold in the US is 5 barrels or 210 gallons. The smallest spill category in Alberta is about 125 times as large as the OPS reporting threshold. Even though the majority of spills in Alberta are included in the first category, they may involve tens of thousands of gallons of oil. That's not what I would consider a small spill. At the other end of the spectrum, the largest spill category is >10,000 cubic meters or 2,641,700 gallons. Fortunately, there were zero reported liquid hydrocarbon spills in the largest category. The point to remember is that when TransCanada claims that spills are small, they may be referring to 26,400 gallons.

31. Have there been any significant crude oil pipeline spills affecting Canada?

Answer: Yes. A list of significant Canadian pipeline ruptures is included in Exhibit M. All of the incidents listed there were investigated by the Transportation Safety Board of Canada. The TSB report numbers are shown next to each incident. The list of ruptures is grouped by 1) Enbridge, 2) TransCanada and 3) all others. The list is then sorted by date within each group. Enbridge has had several ruptures over the years resulting in some multi-million gallon spills. An example is shown in EXHIBIT N.

There are some very interesting details regarding the Hardisty spill in 2001. The cause of the spill was a material failure; the pipe ruptured. The pipeline SCADA system detected the rupture within a reasonable amount of time and the control center operator shutdown and isolated the pipeline within a reasonable time. However, the release still amounted to more than a million gallons, demonstrating that SCADA systems and isolation plans cannot prevent some major or even catastrophic spills. Furthermore, even though it was a very large spill, pipeline crews were unable to find the rupture point and the spill for almost 14 hours, disproving the Frequency and Volume Analysis assumption that all spills can be contained or clamped off within four hours. TSB report P01H0004 is included as supporting documentation.

32. How old were the pipes involved in the ruptures investigated by the TSB in Canada?

Answer: There are 26 pipeline ruptures listed in EXHIBIT M that involved Transportation Safety Board investigations. Of those 26 ruptures, none of them occurred within the first 10 years of installation of the pipe. Four ruptures occurred during the period between the 11th and the 20th year after installation. Nine occurred between the 21st and 30th years, and ten occurred between the 31st and 40th years. Three ruptures occurred between 41 years and 50 years.

The summary indicates that the pipelines work better when they are new or fairly new. As shown at the bottom of EXHIBIT M, failure rates generally increased as the age of the pipeline increased. The California State Fire

Marshall study also indicated that failure rates increased as the pipelines aged. It is critically important to consider the long term risks associated with pipelines, since the risk of failure increases over the long term.

33. What about the spills involving TransCanada?

Answer: Like Enbridge and others, TransCanada has had several pipeline ruptures over the years as well, many of them involving fires. An example is shown in EXHIBIT O. A natural gas pipeline ruptured near a small town resulting in an explosion, fire, evacuation and considerable product loss. TSB report P02H0017 is included as supporting documentation. TransCanada also reported two pipeline breaks in the same area in Western Alberta within a 24 hour period in 2003. Emergency response plans were implemented there as well.

34. What restrictions or conditions should be attached to any crude oil pipeline permit should one ever be issued in South Dakota?

Answer: Any pipeline permit approved by the PUC must allow only one pipeline within the right of way. Each additional pipeline in the right-of-way benefits the owner of the pipeline; however, each additional pipeline in the right-of-way results in incremental damage to the landowner's property. Additional pipelines cannot be allowed without additional compensation to the landowner to offset the incremental damage to the property.

35. Should TransCanada be allowed to design the Keystone

pipeline using a 0.8 design factor?

Answer: No. The current pipeline code design factor is 0.72; no deviations from that standard should be allowed. TransCanada does not currently operate any hazardous liquid pipelines, much less those with design factors of 0.8. Pipelines that have been granted such permits are natural gas pipelines. Again, please review EXHIBIT A which highlights the significantly higher risk associated with hazardous liquid pipelines versus natural gas pipelines.

36. What other concerns do you have regarding this application?

Answer: A company called Welspun Gujarat Stahl Rohren, Ltd in Mumbai, India has announced that they had received a major pipeline order from TransCanada to be delivered over the next 12 to 18 months. The order amounts to a significant amount of money. I am concerned that the manufacturing and materials standards in India may not be as rigorous as those we have in North America. I am also concerned that this company may not be ISO certified and that TransCanada will not be able to effectively monitor the manufacturing and testing processes. Furthermore, the pipe will be subject to damage during such a long shipment. This increases the risk associated with the project.

37. Is there anything else you would like to add?

Answer: Yes, I plan to develop a PowerPoint presentation to highlight the main points of my direct testimony during the formal hearing in December. Based on written communication with the PUC, I understand that will be

acceptable as long I notify other participants and make a copy of the presentation available to them by Nov 28, 2007. The presentation will be used to highlight my written testimony and information contained in the exhibits.

The PowerPoint presentation will also contain information regarding two actual pipeline spills (including photographs.) The first happened in Alaska in Oct 2001. The 0.46" thick pipeline was pierced by a gunshot and leaked at an average rate of 132 gallons per minute for about 36 hours. During that time, approximately 285,000 gallons of crude oil leaked; 121,000 gallons were never recovered. The second spill happened in July 2007 in Burnaby, BC. An excavator punctured a pipeline while updating the city sewer system. According to press reports, crude oil spewed up to 40 feet into the air for about 20 to 30 minutes. An estimated 60,000 gallons of crude oil was spilled. The TSB is conducting an investigation. Press reports and photographs are included as supporting documentation.

38. Is there anything else included with your testimony?

Answer: Yes. The number and size of documents and files submitted as part of my testimony make it infeasible to include all of them here. Several documents and files including the PowerPoint presentation will be recorded onto a CD. It will be delivered by Nov 28, 2007 in accordance with SDAR 20:10:01:02.05. A list of those documents is included in EXHIBIT P.

39. Should the PUC approve the permit for the Keystone pipeline?

Answer: No**.** South Dakota landowners deserve the truth.

The oil spill statistics provided by TransCanada are clearly a significant departure from reality. The actual historical track record of hazardous liquid pipelines in the US and Canada (Enbridge) is summarized in EXHIBITS H and I. The actual historical track record of pipelines in Alberta is listed in EXHIBIT L. The environmental assessment associated with this facility must be based on the facts. It must be based on the actual historical track record of hazardous liquid pipelines (only) in North America (only). Europe is irrelevant; natural gas is irrelevant. Data omissions and unreasonable assumptions are inappropriate.

TransCanada continues to demonstrate a significant lack of credibility by their unwillingness to present the truth regarding pipeline oil spills in this application**.** Landowners will be forced to bear the brunt of these spills.

You must temper the enthusiasm of those who have everything to gain from this project and nothing to lose. Bear in mind that there are those of us who have everything to lose and nothing to gain. As commissioners of the South Dakota PUC, you must use your authority to protect the people and resources of South Dakota. That is your responsibility. Demand the truth.

40. Does that conclude you testimony?

Answer: Yes it does.

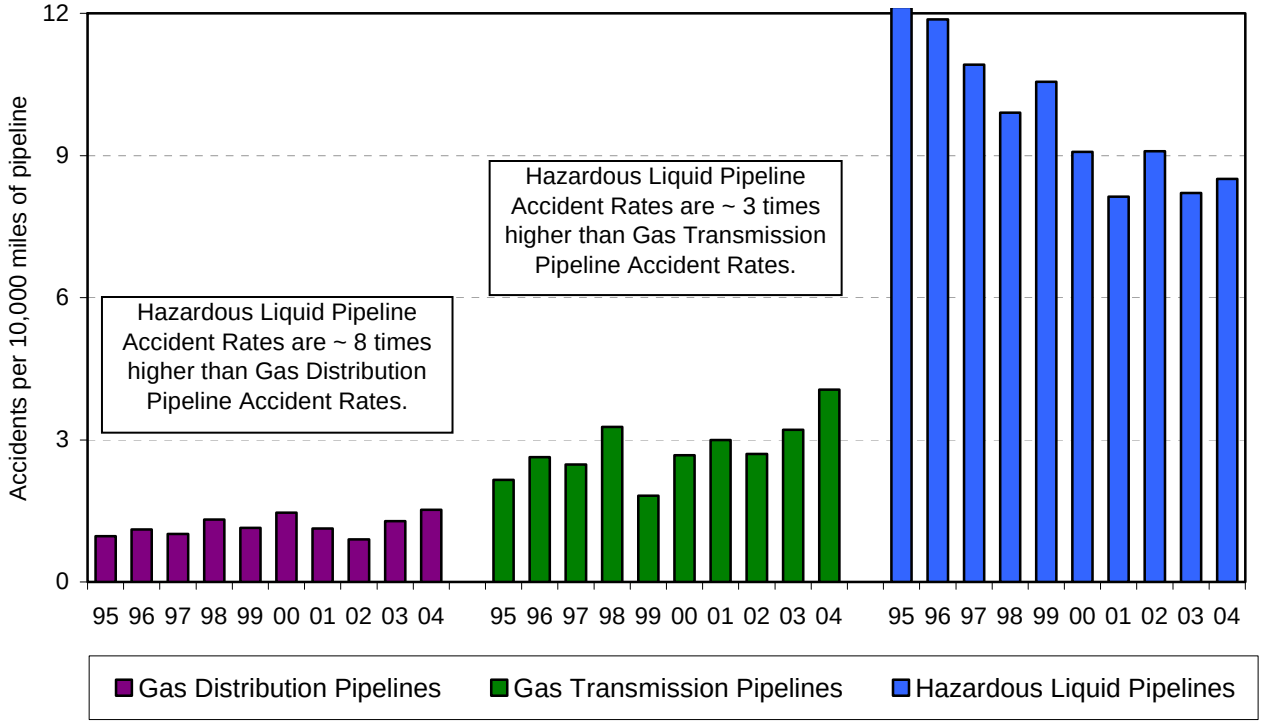
Dated this 30th day of October, 2007. . / signed / .

EDWARD D MILLER

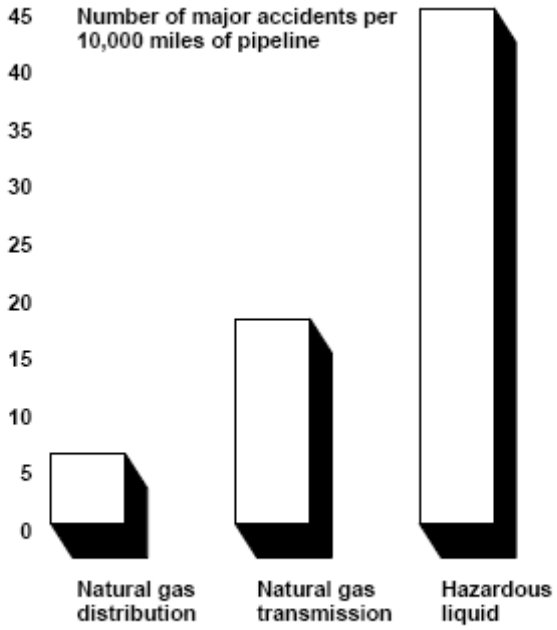
LIST of EXHIBITS

009891

Energy Pipelines in the US
Accident Rate Comparison Chart
Accidents per 10,000 Miles of Pipeline
Source: Office of Pipeline Safety



United States General Accounting Office – Pipeline Safety Report – May 2000 (1989-1998 data)



Source: GAO's analysis of OPS' data.

GAO/RCED-00-128 Oversight of Pipeline Safety

EXHIBIT A

Generated 10/19/2007

PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986	210	4	32	$16,077,846	282,791	220,317
1987	237	3	20	$13,140,434	395,854	312,794
1988	193	2	19	$32,414,912	198,397	114,251
1989	163	3	38	$8,813,604	201,758	121,179
1990	180	3	7	$15,720,422	124,277	54,663
1991	216	0	9	$37,788,944	200,567	55,774
1992	212	5	38	$39,146,062	137,065	68,810
1993	229	0	10	$28,873,651	116,802	57,559
1994	245	1	7[1]	$62,166,058	164,387	114,002
1995	188	3	11	$32,518,689	110,237	53,113
1996	194	5	13	$85,136,315	160,316	100,949
1997	171	0	5	$55,186,642	195,549	103,129
1998	153	2	6	$63,308,923	149,500	60,791
1999	167	4	20	$86,355,560	167,230	104,487
2000	146	1	4	$150,555,745	108,652	56,953
2001	130	0	10	$25,346,751	98,348	77,456
2002	147	1	0	$47,410,656	95,642	77,269
2003	131	0	5	$49,981,280	80,112	50,523
2004	144	5	16	$146,314,940	88,237	68,558
2005	139	2	2	$149,690,733	137,017	45,814
2006	110	0	2	$53,713,137	136,263	53,806
2007	83	0	2	$26,013,791	66,327	48,442
Totals [2]	**3788**	**44**	**276[1]**	**$1,225,675,095**	**3,415,329**	**2,020,638**

Historical totals may change as PHMSA receives supplemental information on incidents.

[1] Does not include 1,851 injuries that required medical treatment reported for the October, 1994 accidents that were caused by severe flooding near Houston, Texas.

[2] The reporting criteria changed in 2002 adding small spills down to 5 gallons. The change was instituted on 2/7/2002. For continuity with past trending, the data from post-2/7/2002 accidents used in our statistical summary includes only accidents meeting the reporting criteria: Accidents with gross loss greater than or equal to 50 barrels; those involving any fatality or injury; fire/explosion not intentionally set; Highly Volatile Liquid releases with gross loss of 5 or more barrels; or those involving total costs greater than or equal to $50,000.

Return to the Pipeline Statistics page

EXHIBIT B

PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Hazardous Liquid Spills - 5 barrels or more

Year	Number of Accidents	Water involved	HCAs involved	Property Damage	Gross Loss barrels	Net Loss barrels	Ave Spill barrels	Ave Spill gallons
2002	182	35	48	$ 42,913,873	92,461	73,654	508	21,337
2003	184	35	54	$ 48,857,018	81,011	50,793	440	18,492
2004	166	35	48	$ 99,886,974	88,498	68,818	533	22,391
2005	159	26	55	$ 130,550,384	137,785	46,106	867	36,396
2006	131	18	46	$ 35,927,161	137,204	54,119	1,047	43,989
2007	93	19	36	$ 24,378,875	66,659	48,414	717	30,104
Totals	**915**	**168**	**287**	**$382,514,285**	**603,618**	**341,904**	**660**	**27,707**
		18%	**31%**	**$418,048**				

PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Crude Oil Spills - 5 barrels or more

Year	Number of Accidents	Water involved	HCAs involved	Property Damage	Gross Loss barrels	Net Loss barrels	Ave Spill barrels	Ave Spill gallons
2002	78	13	10	$ 26,738,641	20,238	8,844	259	10,897
2003	86	11	10	$ 18,529,314	28,850	14,106	335	14,090
2004	82	19	11	$ 61,660,836	31,279	19,755	381	16,021
2005	85	11	18	$ 86,013,150	102,901	19,253	1,211	50,845
2006	73	8	17	$ 14,775,328	84,294	5,929	1,155	48,498
2007	42	9	13	$ 9,299,370	12,201	1,455	291	12,201
Totals	**446**	**71**	**79**	**$217,016,639**	**279,763**	**69,342**	**627**	**26,345**
		16%	**18%**	**$486,584**				

Database Generated on 10/19/2007

"Historical totals may change as PHMSA receives supplemental information on incidents."

EXHIBIT C

US DOT - Office of Pipeline Safety - Regional Oil Spills

Note: This is a partial list of significant regional pipeline oil spills; it is not a complete list.

Date	OPS Report ID	Operator	Location	State	Spill (gal)	Damages ($) or Comment
1/1/2007	20070029	Enbridge	Atwood	WI	63,000	$702,500
9/27/2005	20050310	Enbridge	not listed	ND	14,700	$350,000
10/21/2005	20050336	Enbridge	El Dorado	KS	98,700	$24,976
4/14/2003	20030187	Enbridge	Trail	MN	5,250	$1,000,000
Regional Crude Oil Pipeline Spills (surface water contamination)						
6/27/2006	20060218	Koch	Little Falls	MN	134,400	$4,158,716
6/8/2004	20040241	Tesoro	Center	ND	16,800	$805,000
5/13/2004	20040139	Enbridge	Superior	WI	1,680	$81,764
1/24/2003	20030083	Enbridge	Superior	WI	189,000	$2,853,000
7/4/2002	20020238	Enbridge	Cohasset	MN	252,000	$5,597,300
Regional Crude Oil Pipeline Spills (ground water contamination)						
2/5/2007	20070050	Enbridge	Clearbrook	MN	294	$49,341
2/2/2007	20070048	Enbridge	Exeland	WI	126,000	$1,633,660
10/20/2006	20060320	Enbridge	Pinewood	MN	210	$50,000
2/9/2004	20040063	Enbridge	Grand Rapids	MN	42,126	$1,089,790
July 2002	no OPS report	Enbridge	Cass Lake	MN	48,000+	?
Regional Crude Oil Pipeline Spills (HCAs affected)						
1/25/2007	20070043	Enbridge	Stanley	ND	9,030	HCA
5/3/2006	20060154	Koch	Cottage Grove	MN	1,260	HCA
12/14/2005	20050374	Enbridge	Stanley	ND	504	HCA
11/2/2005	20050320	Enbridge	Stanley	ND	252	HCA
5/13/2004	20040139	Enbridge	Superior	WI	1,680	HCA
12/2/2003	20030464	Enbridge	Clearbrook	MN	1,974	HCA
1/24/2003	20030083	Enbridge	Superior	WI	189,000	HCA
Regional Crude Oil Pipeline Spills - 50,000+ gal - (pre-2002 OPS format)						
7/27/2000	20000095	Lakehead *	Douglas Co	WI	50,400	$200,000
9/16/1998	19980147	Lakehead *	not listed	MN	239,400	$100,000
7/2/1997	19970102	Marathon	Garden Co	NE	295,092	$420,000
12/26/1996	19970010	Marathon	Nucholls Co	NE	205,800	$1,300,000
8/24/1996	19960142	Lakehead *	Donaldson Co	MN	210,000	$500,000
5/1/1993	19930093	Amoco	Patoka	IL	210,672	$300,000
3/3/1991	19910057	Lakehead *	Itasca Co	MN	1,701,000	$14,400,000
7/13/1989	19890091	Lakehead *	Pembina Co	ND	1,314,600	$1,500,000
6/16/1988	19880120	Lakehead *	Macomb Co	MI	369,600	$3,200,000
4/9/1988	19880115	Amoco	Peoria Co	IL	210,000	$1,500,000
5/27/1987	19870136	Lakehead *	Columbia Co	WI	132,300	$345,000
4/24/1986	19860087	Lakehead *	Elgin	IL	525,000	$815,000
11/7/1985	19850155	Minn Pipeline	Anoka Co	MN	251,160	?

* Note: Lakehead = Enbridge

EXHIBIT D

8.0 Conclusions

Based on the results presented for the period from January 1, 1981 through December 31, 1990, the following conclusions have been drawn regarding California's regulated hazardous liquid pipelines. These conclusions have been organized into two subsections. The first includes items which we consider to be major findings, as well as the issues specifically required to be addressed in the study by state statute. The second subsection includes what we consider to be less significant findings.

8.1 Significant Findings

a. Overall Incident Rates

The various criteria used to report hazardous liquid pipeline incidents had a direct effect on the resulting incident rates. The data collected regarding California's incidents was the only completely audited sample available. It resulted in incident rates somewhat higher than those presented in other studies. Using all of the available data, we have estimated the overall incident rates for various pipeline events as follows:

Event	Incident Rate
any size leak	7.1 incidents per 1,000 mile years
damage greater than $5,000	1.3 to 6.2 incidents per 1,000 mile years
damage greater than $50,000	up to 4.4 incidents per 1,000 mile years
any injury, regardless of severity	0.70 injuries per 1,000 mile years
injury requiring hospitalization	0.10 injuries per 1,000 mile years
fatality	0.02 to 0.04 fatalities per 1,000 mile years

b. External Corrosion

External corrosion was by far the largest cause of incidents, representing 59% of the total. Significant differences in external corrosion leak incident rates were found among the following factors:

- Older pipelines had a significantly higher external corrosion incident rate than newer lines.

EXHIBIT E

009896

Enbridge Liquid Pipelines
Hazardous Liquid Pipeline Spills in North America

Actual Pipeline Spills Reported to Regulatory Jurisdictions

Year	Reported Spills (1)	Miles of ROW	(2) Spill Frequency Rate - SFR 1845	Gallons Spilled	Millions of Barrel-Miles	(3) Spill Volume Rate - SVR	Information Source
1996	49	4398	21	575,316	768,000	0.7	01-EHS-P16
1997	49	5560	16	915,600	771,000	1.2	02-EHS-P22
1998	39	5740	13	412,860	759,000	0.5	03-EHS-P30
1999	54	6368	16	1,207,920	687,000	1.8	04-CSR-P55
2000	43	6362	12	314,160	735,000	0.4	05-CSR-P91
2001	27	6370	8	1,078,140	695,000	1.6	06-CSR-P71
2002	46	6406	13	616,560	705,000	0.9	06-CSR-P71
2003	58	6363	17	267,834	710,000	0.4	06-CSR-P71
2004	64	6881	17	130,788	757,000	0.2	06-CSR-P71
2005	70	6886	19	412,650	695,000	0.6	06-CSR-P71
Totals	**499**	**Ten Year Period**		**5,931,828**	**7,282,000**		
Average	**49.9**	**(Annually)**	**15.1**	**593,183**	**728,200**	**0.8**	
Average	**4.2**	**(Monthly)**		**49,432**			

(1) Actual number of oil spills reported to regulatory jurisdictions.
(2) SFR - Spill Frequency Rate = Number of spills per year per 1845 miles of Right Of Way (ROW)
(3) SVR - Spill Volume Rate = Gallons spilled per million barrel-miles of throughput.

Enbridge Summary - 10 year period (1996 - 2005)

Total number of reported spills (10 years)	**499**	
Total gallons of oil spilled (10 years)	**5,931,828**	
Overall average spill size (number of gallons)	**11,887**	
Average number of spills per year	**50**	
Average number of gallons spilled per year	**593,183**	
Average Spill Frequency Rate	**15.1**	spills per 1845 miles of ROW per year
Average Spill Volume Rate	**0.8**	gallons per million barrel-miles

EXHIBIT F

US DOT - Office of Pipeline Safety
Hazardous Liquid Pipeline Spills in the US

Actual Hazardous Liquids Pipeline Spills Reported to OPS

Year	Reported Spills (1)	Miles of Pipline	(2) Spill Frequency Rate - SFR 1845	Total Gallons Spilled	Millions of Barrel-Miles	(3) Spill Volume Rate - SVR	Information Source
1996	194	163,422	2.2	6,733,272	3,822,941	1.761	OPS (86-01)
1997	171	156,638	2.0	8,213,058	3,806,271	2.158	OPS (86-01)
1998	153	154,528	1.8	6,279,000	3,826,645	1.641	OPS (86-01)
1999	167	158,248	1.9	7,023,660	3,813,680	1.842	OPS (86-01)
2000	146	160,900	1.7	4,563,384	3,564,250	1.280	OPS (86-01)
2001	130	159,889	1.5	4,130,616	3,556,841	1.161	OPS (86-01)
	Implementation of the Pipeline Safety Improvement Act - New Reporting Requirement						
2002	436	161,670	4.98	4,084,592	3,619,199	1.129	OPS(2002+)
2003	417	159,512	4.82	3,415,010	3,643,895	0.937	OPS(2002+)
2004	351	169,346	3.82	3,747,559	3,701,930	1.012	OPS(2002+)
2005	346	166,175	3.84	5,798,585	3,704,400	1.565	OPS(2002+)
Totals	**1,550**	**Four Year Period**		**17,045,746**	**14,669,424**		
Average	**387.5**	**(Annually)**	**4.4**	**4,261,437**	**3,667,356**	**1.2**	
Average	**32.3**	**(Monthly)**		**355,120**			

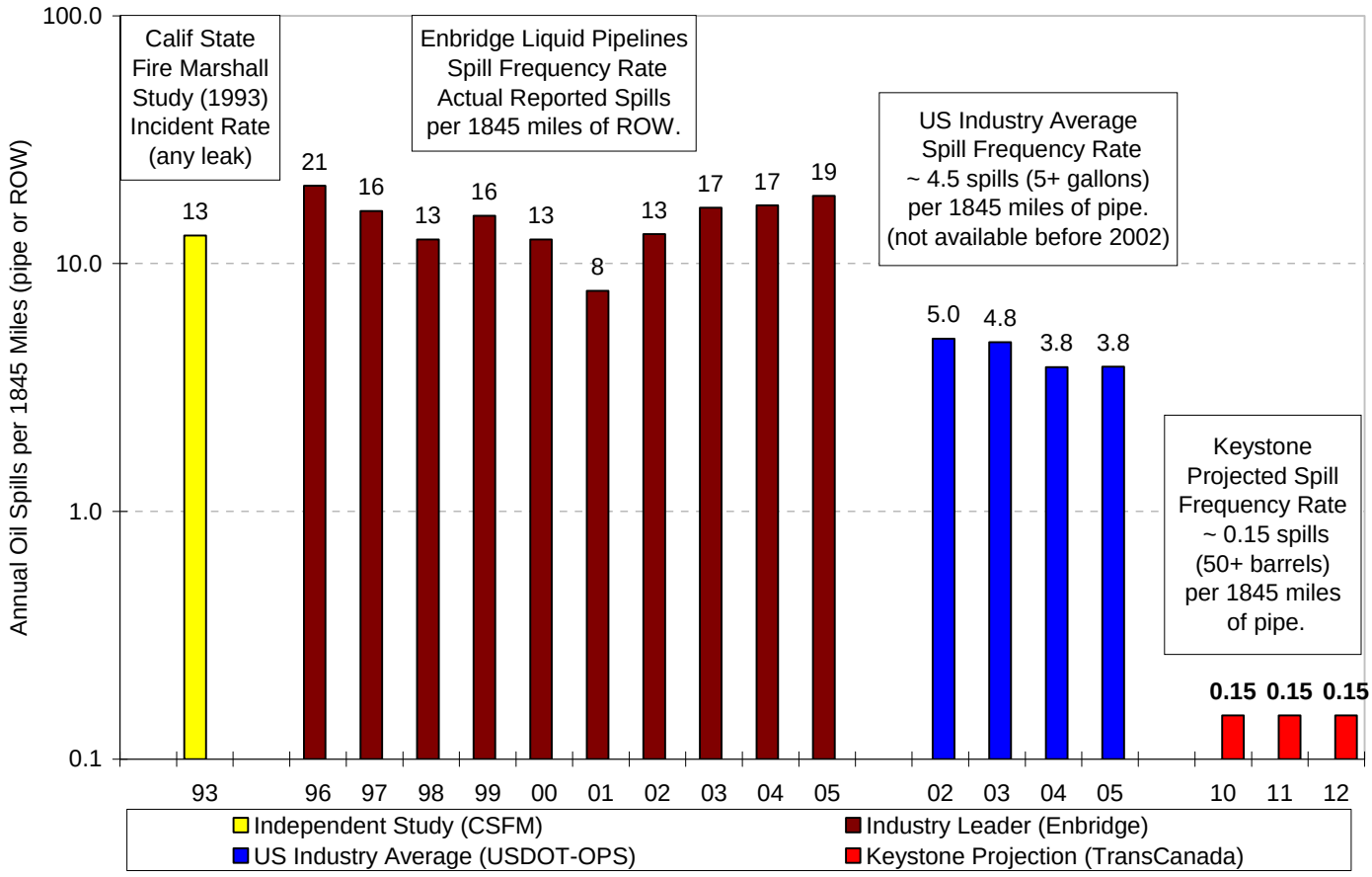
(1) Actual oil spills reported to the Office of Pipeline Safety (1+ barrel or 5+ gallons.)
(2) SFR - Spill Frequency Rate = Number of spills per year per 1845 miles of pipeline.
(3) SVR - Spill Volume Rate = Gallons spilled per million barrel-miles of throughput.

OPS Summary - 4 year period (2002 - 2005)

Total number of reported spills (4 years)	**1550**	
Total gallons of oil spilled (10 years)	**17,045,746**	
Overall average spill size (number of gallons)	**10,997**	
Average number of spills per year	**388**	
Average number of gallons spilled per year	**4,261,437**	
Average Spill Frequency Rate	**4.4**	spills per 1845 miles of pipe per year
Average Spill Volume Rate	**1.2**	gallons per million barrel-miles

EXHIBIT G

Hazardous Liquid Pipelines in North America
Spill Frequency Rate (SFR) Comparisons
Annual Number of Spills per 1845 Miles
Source: CSFM, Enbridge, USDOT-OPS, TransCanada



The Independent Study results are from the California State Fire Marshall (CSFM) study published in 1993. The "Significant Findings" are listed on page 170 of that report.

An Industry Leader in North America is the Canadian pipeline company Enbridge. The numbers presented are available from the Enbridge Corporate Social Responsibility Reports.

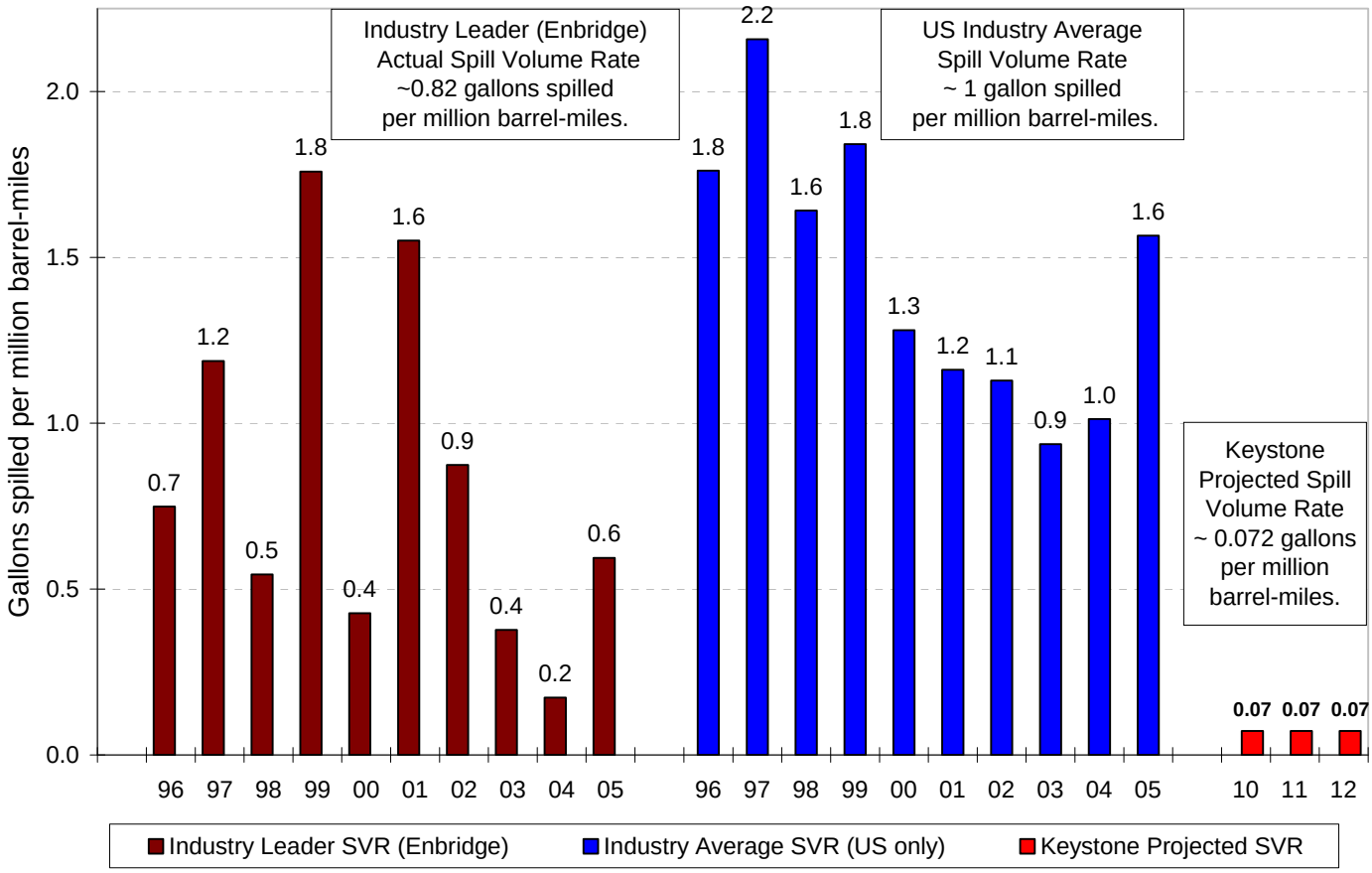
The US Industry Average information is available from the US DOT Office of Pipeline Safety. The numbers presented are calculated from the Hazardous Liquids Incident Database.

The Keystone Pipeline (projection) information is provided by TransCanada in the Frequency and Volume Analysis submitted with the permit application. In that study, the Keystone pipeline is listed at 1845 miles long. All spill frequency rates are listed relative to 1845 miles of pipeline or Right Or Way (ROW)

Note: All information is specific to hazardous liquid pipelines (only) in North America (only).

EXHIBIT H

Hazardous Liquid Pipelines in North America
Spill Volume Rate (SVR) Comparisons
Gallons of Oil Spilled per Million Barrel-Miles
Source: Enbridge, USDOT-OPS, TransCanada



The Enbridge average SVR is 11 times higher than Keystone's; the industry average is 14 times higher.

The Association of Oil Pipelines (AOPL) in Washington, DC states that the industry average spill volume rate in the US is about 1 gallon of oil spilled per million barrel miles of product transport. One barrel-mile is defined as one barrel of oil transported a distance of one mile.

An Industry Leader in North America is the Canadian pipeline company Enbridge. The numbers presented are available from the Enbridge Corporate Social Responsibility Reports.

The US Industry Average information is available from the US DOT Office of Pipeline Safety. The numbers presented are calculated from the Hazardous Liquids Incident Database and information available from the Association of Oil Pipelines.

The Keystone Pipeline (projection) information is provided by TransCanada in the Frequency and Volume Analysis submitted with the permit application. In that study, the Keystone pipeline is projected to spill about 0.37 barrels per mile per year. Based on the nominal capacity of 591,000 barrels per day, the spill volume rate is calculated at 0.072 gallons spilled per million barrel-miles.

N**ote:** All information is specific to hazardous liquid pipelines (only) in North America (only).

EXHIBIT I

Data Omission Example from the Frequency Volume Study

CONFIDENTIAL

5.1 Detection, Verification, Response and Isolation

Table 5-1 Time from Leak Start to Closure of RGVs for Reported Causes

Hole size	Response Time	Valve Closure
Small	30 minutes	3 minutes
Medium	15 minutes	3 minutes
Large	9 minutes	3 minutes

Table 5-2 Time from Leak Start to Closure of RGVs for Non-Reported Causes

Leak Rate (as percentage of throughput)	Detection and Verification	Isolation
	Belowground Pipe	Time for RBV to Close
Less than 1.5%	90 days	3 minutes
5%	90 minutes	3 minutes
53%	5 minutes	3 minutes

Data Omission: The time needed to shut down the pumps is omitted.

Correct Version

Table 5.1 Time from Leak Start to Closure of RGVs for Reported Causes

Hole Size	Response Time	Pump Shutdown	Valve Closure	Total Time	Time/Spill Increase
Small	**30**	**omitted**	**3**	**33**	
Actual	**30**	**9**	**3**	**42**	**27%**
Medium	**15**	**omitted**	**3**	**18**	
Actual	**15**	**9**	**3**	**27**	**50%**
Large	**9**	**omitted**	**3**	**12**	
Actual	**9**	**9**	**3**	**21**	**75%**

Impact: The pipeline isolation times and potential spill sizes increase up to 75%.

EXHIBIT J

Frequency Volume Study
Data Interpretation Example

Hazardous Liquids Pipelines Incident Database (Source: OPS)

Year	Total Pipeline Mileage (miles)	Gross Loss Total Oil Spilled (barrels)	Net Loss Oil Never Recovered (barrels)
1992	155,113	137,065	68,810
1993	153,444	116,802	57,559
1994	154,731	164,387	114,002
1995	154,933	110,237	53,113
1996	163,422	160,316	100,949
1997	156,638	195,549	103,129
1998	154,528	149,500	60,791
1999	158,248	167,230	104,487
2000	160,900	108,652	56,953
2001	159,889	98,348	77,456
2002	161,670	95,642	77,269
2003	159,512	80,112	50,523
Totals	1,893,028 (Total Miles)	1,583,840 (Total Spill)	925,041 (Net Loss)

Real World Calculation
Average leak volume per mile ==== > **0.84** barrels
(TOTAL SPILL divided by TOTAL MILES)

Frequency Volume Study
Average leak volume per mile ========== > **0.49** barrels
(NET LOSS divided by TOTAL MILES)

The Real World
Average leak volume per mile is **71%** higher than their interpretation.

The Frequency Volume study doesn't use the TOTAL Spill in the calculation.
They subtract the amount of oil recovered from the original spill total.
The net result is that the average spill size is reduced because of data interpretation.

EXHIBIT K

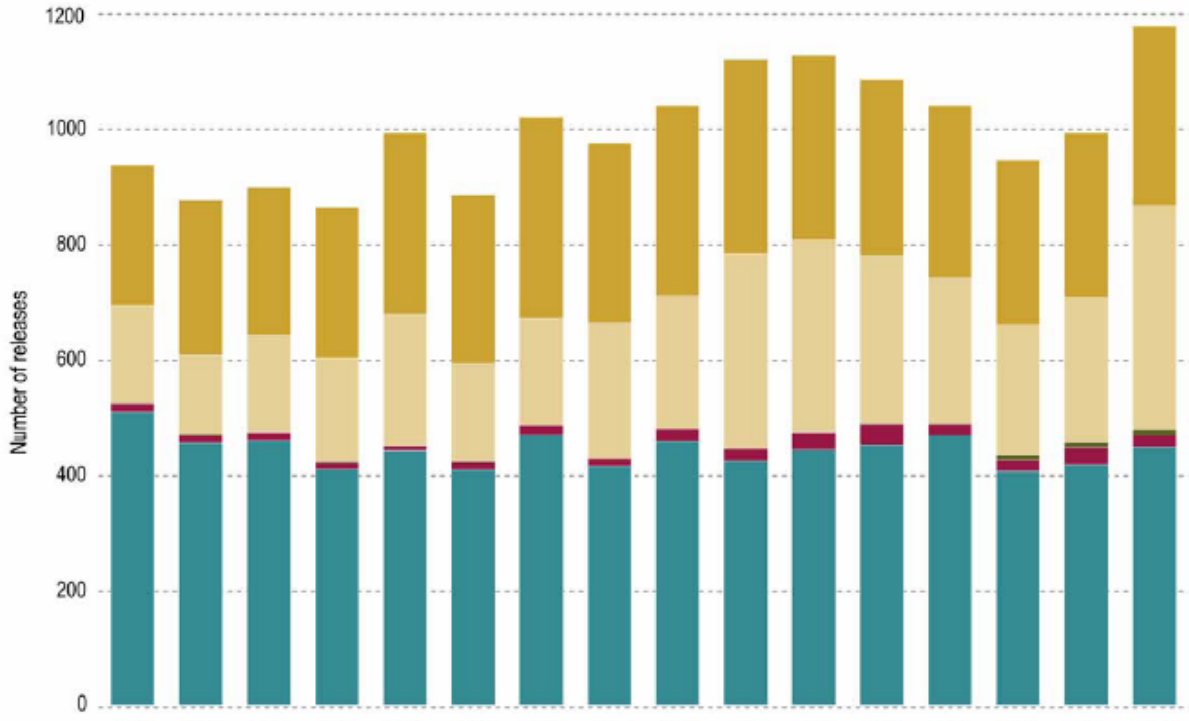
Report **2007-A**

Pipeline Performance in Alberta, 1990-2005

April 2007

Alberta Energy and Utilities Board

Figure 19. Pipeline releases by substance released per year
All pipeline releases from January 1, 1990, to December 31, 2005 (test failures are excluded)



PRODUCT	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total number	% of total
Hydrocarbon liquid	244	268	256	261	315	291	349	311	330	337	320	305	299	286	286	311	4769	29.8
Hydrocarbon gas	168	138	168	179	228	169	185	234	231	338	333	291	252	225	251	388	3778	23.6
Other	2	4	1	2		2		1			1	1	1	9	9	12	45	0.3
Sour gas	14	11	14	12	8	14	18	13	21	21	30	36	21	19	29	18	299	1.9
Water	511	457	461	411	444	410	470	417	460	426	445	454	469	408	420	450	7113	44.4
Total number releases	**939**	**878**	**900**	**865**	**995**	**886**	**1022**	**976**	**1042**	**1122**	**1129**	**1087**	**1042**	**947**	**995**	**1179**	**16 004**	
% of total	**5.9**	**5.5**	**5.6**	**5.4**	**6.2**	**5.5**	**6.4**	**6.1**	**6.5**	**7.0**	**7.1**	**6.8**	**6.5**	**5.9**	**6.2**	**7.4**		**100.0**

Sixteen Year Summary: (1990-2005): 16,004 total pipeline releases – 1000 per year on average.
There were 4,769 hydrocarbon liquid releases reported – about 300 per year or about 6 per week.

EXHIBIT L

National Energy Board of Canada
List of Pipeline Ruptures (1992 – 2007)
Transportation Safety Board Investigations

(Grouped by Enbridge, TransCanada, Others; Sorted by date)

TSB #	Company	Date	Age	City	Product	Comment
P07H0014	Enbridge	04/15/07	39	Glenavon, SK	Crude	261,000 gal spill.
P01H0049	Enbridge	09/29/01	29	Binbrook, ON	Crude	13,200 gal spill
P01H0004	Enbridge	01/17/01	33	Hardisty, AB	Crude	1+ million gal spill
P99H0021	Enbridge	05/20/99	31	Regina, SK	Crude	825,000 gal spill
P96H0008	Enbridge	02/27/96	28	Glenavon, SK	Crude	211,000 gal spill.
P95H0047	Enbridge	11/13/95	30	Langbank, SK	Crude	203,000 gal spill.
P95H0023	Enbridge	06/16/95	27	Windthorst, SK	Condensate	
P94H0048	Enbridge	10/03/94	31	St. Leon, MB	SynCrude	1.1 million gal spill
P02H0017	TransCanada	04/14/02	33	Brookdale, MB	Gas	Immediate ignition
P97H0063	TransCanada	12/02/97	28	Cabri, SK	Gas	Resulted in ignition.
P96H0049	TransCanada	12/11/96	39	Stewart Lake, ON	Gas	Delayed ignition.
P96H0012	TransCanada	04/15/96	34	St. Norbert, MB	Gas	Delayed ignition.
P95H0036	TransCanada	07/29/95	22	Rapid City, SK	Gas	Immediate ignition.
P95H0003	TransCanada	02/04/95	22	Vermillion Bay, ON	Gas	Immediate ignition.
P94H0049	TransCanada	10/06/94	37	Williamstown, ON	Gas	
P94H0036	TransCanada	07/23/94	22	Latchford, ON	Gas	Resulted in ignition.
P92T0005	TransCanada	07/15/92	19	Potter, ON	Gas	Resulted in ignition.
P02H0052	TNPL	12/07/02	50	St-Clet, QU	Diesel	
P02H0024	Westcoast	05/15/02	45	Fort St. John, BC	Sour gas	
P00H0037	Westcoast	08/07/00	43	Hope, BC	Gas	
P98H0044	Westcoast	12/08/98	40	Kobes Creek, BC	Sour gas	Resulted in ignition.
P97H0024	Westcoast	04/30/97	19	Ft. St. John, BC	Sour gas	Resulted in ignition.
P94H0018	BP Canada	05/10/94	17	Regina, SK	Ethane	Fire from pump.
	Westcoast	04/25/94	32	Rigel, BC	Sour gas	
P94H0003	Foothills	02/15/94	12	Maple Creek, SK	Gas	Resulted in ignition.
P93H0007	Westcoast	05/13/93	24	Fort St. John, BC	Sour gas	Delayed rupture.

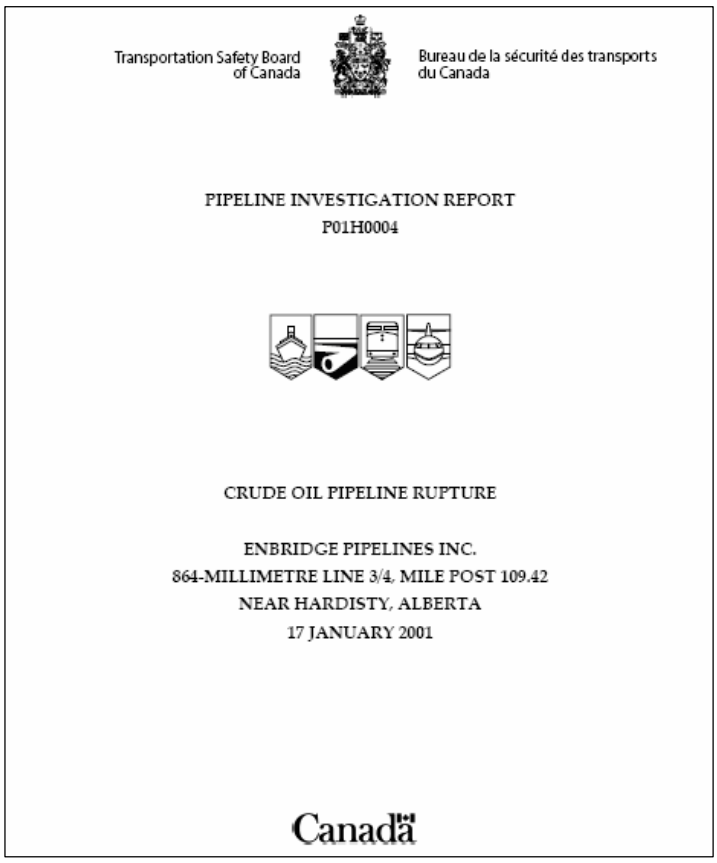
Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

Ruptures – Age of Pipe Distribution

Number of years from installation to failure (above listed ruptures)						**Totals**
Age of Pipe	0-10 yrs	11-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	12-50 yrs
Ruptures	0	4	9	10	3	26

Average ages of the pipe at time of rupture ~ 30 years; the range is 12 – 50 years.

EXHIBIT M



Summary

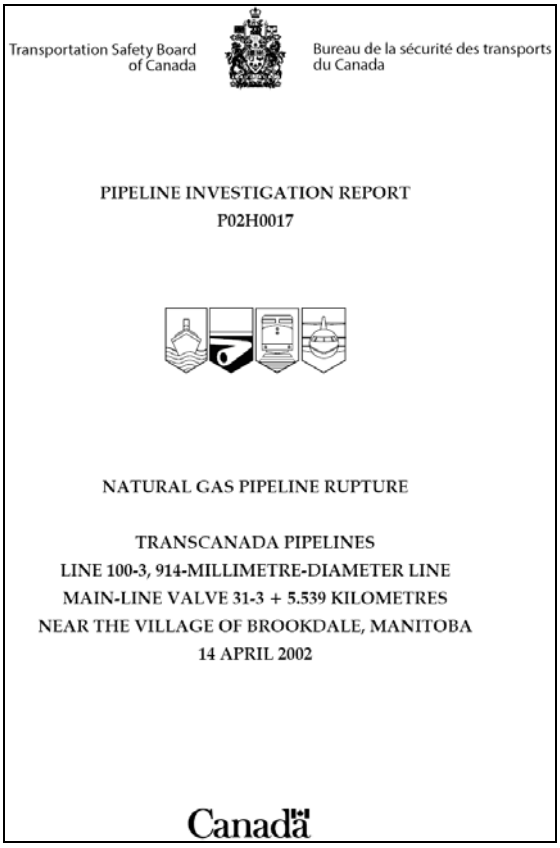
At 0045 mountain standard time on 17 January 2001, a rupture occurred on the Enbridge Pipelines Inc. 864-millimetre outside diameter Line 3/4 at Mile Post 109.42, 0.8 kilometres downstream of the Hardisty pump station near Hardisty, Alberta. The rupture occurred in a permanent slough that was fed by an underground spring. Although the line was shut down at the control centre in Edmonton, Alberta, within minutes of the rupture, the exact location of the rupture was not found until 1415 mountain standard time. Approximately 3800 cubic metres of crude oil was released and contained within a 2.7-hectare section. As of 01 May 2001, 3760 cubic metres of crude oil had been recovered.

Other Factual Information

At 0045 mountain standard time (MST),[1] the control centre operator in Edmonton, Alberta, controlling Line 3/4 noticed a pressure drop at the Hardisty pump station and immediately began to shut down the mainline units at that pump station. As the line was being shut down, the emergency notification procedure was begun.

During the morning of 17 January 2001, the pipeline route downstream of the Hardisty pump station was both walked and flown along numerous times in an effort to identify the possible leak location. At approximately 1415, company personnel walking the line noticed that crude oil had surfaced through a crack in the ice near the edge of a slough about 300 metres (m) downstream of the Hardisty pump station. At that time, company personnel secured the site and began to implement oil containment, oil recovery and pipeline repair operations.

EXHIBIT N



Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

PIPELINE INVESTIGATION REPORT
P02H0017

NATURAL GAS PIPELINE RUPTURE

TRANSCANADA PIPELINES
LINE 100-3, 914-MILLIMETRE-DIAMETER LINE
MAIN-LINE VALVE 31-3 + 5.539 KILOMETRES
NEAR THE VILLAGE OF BROOKDALE, MANITOBA
14 APRIL 2002

Canada

TSB Investigation Report Excerpt 1

"At approximately 2310, the first verbal report from a member of the public indicated that there was an explosion and fire on TransCanada's system near Brookdale, approximately 1.2 km from Rural Road 464. At the same time, TransCanada's SCADA system gave very strong visual and graphical evidence to the CGCC of a possible line break between Stations 30 and 34. From this time on, several calls from the public and emergency services organizations were received by the CGCC related to the explosion and fire."

TSB Investigation Report Excerpt 2

"At approximately 2318, TransCanada advised the Royal Canadian Mounted Police (RCMP) of a possible line break near Brookdale and that TransCanada personnel had been dispatched to the rupture site. The RCMP advised TransCanada that it would be implementing a 4 km radius evacuation area around the rupture site and would be evacuating local residents within this perimeter."

TSB Investigation Report Excerpt 3

"At approximately 0230, the major fire self-extinguished at the break site due to actions undertaken at 0130. The isolation of the break site was accomplished with the automatic closure of four MLVs and various tie-over valves with adjacent lines, by low-pressure shut-off devices and the remote closure of 22 valves by the CGCC through the SCADA system. As a precaution, the operating pressures for Lines 100-2 and 100-4 were temporarily reduced to 1000 kPa, until the integrity of these two adjacent main lines could be confirmed. At the time of the break, the estimated pressure at the rupture site was 6010 kPa. The total volume of natural gas consumed by the fire and lost to atmosphere was estimated at 6 812 600 cubic metres."
(conversion: 240,583,000 cubic feet)

EXHIBIT O

List of Supporting Documents and Files – SD PUC H07-001

1) Source: US-DOT-PHMSA-OPS (Office of Pipeline Safety) Reports
Accident Summary and Annual Mileage Reports
a) Gas Distribution; b) Gas Transmission; c) Hazardous Liquids

2) Source: US-DOT-PHMSA-OPS (Office of Pipeline Safety) Data Files
Hazardous Liquid Incident Databases
a) L_DATA (1985-2002) download files
b) LIQ0102 (2002-2007) download files and Excel spreadsheet file.

3) Source: US-DOT a) Performance Plan – FY 2004

4) Source: US-GAO General Accounting Office
a) Report GAO/RCED-00-128 Pipeline Safety

5) Source: Enbridge
a) Environment Health and Safety Reports: 2001, 2002, 2003
b) Corporate Social Responsibility Reports: 2004, 2005, 2006
c) Web Pages detailing Cass Lake Spill and Recovery Efforts

6) Source: Alberta Energy and Utilities Board
a) Report 2007-A: Pipeline Performance in Alberta, 1990-2005

7) Source: Transportation Safety Board (Canada)
Pipeline Rupture Investigations (Enbridge, TransCanada)
a) Report P01H0049 b) Report P01H0004 c) Report P99H0021
d) Report P96H0008 e) Report P94H0048 f) Report P02H0017

8) Source: National Transportation Safety Board (US)
a) NTSB/SS-05/02 SCADA in Liquid Pipelines Safety Study
b) NTSB/PAR-04/01 Cohasset, MN spill

9) Source: Association of Oil Pipelines (AOPL)
a) Shifts in Petroleum Transportation (1984-2004) Report
b) Web pages - 1 gallon spilled per million barrel miles

10) Source: CONCAWE (Conservation of Clean Air and Water in Europe)
a) Report no. 4/07 - Performance of European Cross-Country Pipelines

11) Source: National Energy Board – Canada
a) List of Ruptures investigated by TSB

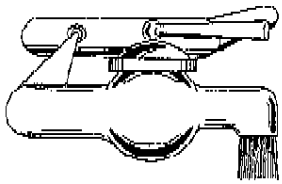
12) Source: California State Fire Marshall
a) Hazardous Liquid Pipeline Risk Assessment – Conclusion

13) TransCanada a) Press Releases

14) Source: Alaska Department of Environmental Conservation
a) Statewide 10 Year Summary b) TAPS After Action Report

15) Press Reports (including photos)
a) Burnaby, BC spill b) Alaska TAPS spill
c) TransCanada Pipeline order (India)

EXHIBIT P



BROWN DAY MARSHALL

P.O. Box 49
703 7th Street
Britton, South Dakota 57430
Phone 605-448-5417

Rural Water System, Inc.

SD PUBLIC UTILITIES COMMISSION
500 E. Capitol Ave. Phone 605-773-3201
Pierre, SD 57501 (fax) 1866-757-6031

WEDNESDAY, OCTOBER 31, 2007

David C. Wade, General Manager
BDM Rural Water System, Inc.
P.O. Box 49 Phone 605-448-5417
Britton, SD 57430 (fax) 605-448-2124

BDM RURAL WATER SYSTEM, INC. is a member owned rural water system in NE SD that serves water to 2,000 members, 15 bulk users and several large animal units. The system is about 4,500 square miles in size and a population total of about 7,000 people drink the water on a daily basis.

1) Our main concern is the proposed crossing of the Middle James aquifer. This is our only source of drinking water and could easily become contaminated in the event of a crude oil or fuel spill. The Middle James is very close to the surface in the proposed crossing area. Most recharge to the James aquifer is by percolation of precipitation in ranges 58 and 59 W of T 128 N. This puts the proposed pipeline directly through the most important part of our drinking water source.

PROPOSAL: Our first proposal is to move the pipeline out of the aquifer. If this is not possible then we would like to see TransCanada line the pipeline with a special fabric that would protect the Middle James aquifer from any type of spill. If this is not possible, we would like to see TransCanada sleeve the line through the aquifer as to prevent any leakage into the aquifer. BDM also insists that the precaution of doubling the line thickness for the six miles through the Middle James aquifer must be implemented.

2) Our second concern is with the proposed pipeline crossings of BDM lines.

PROPOSAL: BDM will require a crossing permit of our existing 30 ft. or 60 ft. easements. We would also like TransCanada, in good faith, to pay BDM for the expense to install ductile iron pipe or lower pvc and case with steel pipe, in BDM's existing system for 250 feet on each side of each crossing (500 ft.) to reduce or prevent

contamination in the event of a spill close to the 12 proposed crossings. This is a way to be proactive in the prevention of contamination and destruction to BDM's pipeline system. Also, BDM would like TransCanada to be above each crossing as opposed to them digging under each crossing, since we would like 500' of ductile iron pipe or a steel casing to be installed at each crossing.

3) Our third concern is with future crossings

PROPOSAL: We propose that TransCanada and all of the Rural Water Systems in South Dakota come to an agreement (one agreement) on the crossing of each other and agree that all future crossings will be made with agreed upon specs. and at no charge to each other.

4) Our fourth concern is with cleanup of spills in the aquifer and by a crossing site.

PROPOSAL: We propose that TransCanada place a cash bond in the bank to take care of the cleanup that will occur in the event of a spill. TransCanada acknowledges that they will clean up any spill, but its much deeper than that. There would be much more expense to our water system, county property, township property, and state property than just the cleanup. BDM may need to find an alternate water source or perform different treatment on the finished water if there was a spill. This could cost millions of dollars. The total amount of the cash bond could be determined by a percentage of the total miles of pipe that cross our system based on the total cost of the 1,800 mile TransCanada pipeline. The account should contain enough funds to secure a new water source and should not be less than $20 million dollars for the entire state.

10/31/2007 WED 14:46 FAX 605 448 2124 BDM Rural Water 003/003

Dustin Johnson, Chair
Gary Hanson, Vice Chair
Steve Kolbeck, Commissioner

SOUTH DAKOTA
PUBLIC UTILITIES COMMISSION

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1-800-332-1782

October 31, 2007

RE: TransCanada Keystone Pipeline, LP

Enclosed you will find copies of Testimony of William Walsh, Testimony of Jenny Hudson, Testimony of David Schraam, Direct Testimony of John Muehlhausen, Direct Testimony of Bryan Murdock, Direct Testimony of Dan Hannan, Direct Testimony of Tom Janssen and Direct Testimony of Brenda Winkler with reference to the above captioned matter. Also enclosed you will find a copy of Limited Application Review Report. This document is referred to in the Direct Testimony of Bryan Murdock, Dan Hannan, Tom Janssen and Brenda Winkler and is a part of their testimony. This is intended as service upon you either by mail or electronically.

Very truly yours,

Kara Semmler

Enc.

I. WITNESS INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is William Walsh. My business address is 7135 Janes Avenue, Woodridge, Illinois, 60517.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as a Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design services for the oil and gas industry.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I hold a Ph. D. in Theoretical and Applied Mechanics from Northwestern University (Evanston, Illinois). In addition, I hold an M.S. degree in Metallurgical Engineering and a B.S. degree in Engineering Mechanics from the University of Illinois at Urbana-Champaign. I am a registered professional engineer in the state of Illinois. My professional experience consists of employment in the pipeline industry with EN Engineering and with Natural Gas Pipeline Company of America, both in the Metallurgy groups. My responsibilities in these positions range from material specification for pipe and components, welding procedure development, investigation and root cause analysis of failures, non-destructive testing, and fitness-for-service evaluations. In addition, I have worked in the manufacturing industries with Rexam Beverage Can and Snap-on Tools, and as a Research Scientist at Battelle Columbus Laboratories. My resume is included in Exhibit A.

Q. ON WHOSE BEHALF WAS THIS TESTIMONY PREPARED?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

II. PURPOSE OF THE TESTIMONY

Q. PLEASE STATE THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING.

A. The main objective of the Staff in this testimony is to ensure that TransCanada Keystone Pipeline, LP (Keystone) has met the requirements of the Federal Pipeline Safety Regulations 49CFR 195, Transportation of Hazardous Liquids by Pipeline, with respect to Keystone's application for a permit (Permit) to construct and operate a crude oil pipeline in South Dakota as well as additional filings. This testimony deals specifically with the areas of Design Requirements (Subpart C), Construction (Subpart D), Pressure Testing (Subpart E), and Operation and Maintenance (Subpart F). Additional requirements in these areas have been placed upon Keystone as a condition of being granted a special permit to operate the pipeline at a hoop stress level of 80% of the

specified minimum yield strength (SMYS) of the pipe material. These additional requirements will be noted in the appropriate portions of this testimony.

Q. HOW WILL YOUR TESTIMONY BE ORGANIZED?

A. The testimony will address the relevant portions of the Federal requirements related to Keystone's application and supplemental filings. Since the conditions of the special permit to operate at 80% of SMYS affect the requirements of the Federal regulations, an overview of the permit provisions will be presented first. Each subpart of the Federal requirements will then be addressed separately. At the conclusion of the testimony, I will present an overall assessment of the pipeline design, construction, and operation practices and their relative risk to the environment and safety.

III. EVALUATION OF THE APPLICATION

a. Special Permit Considerations

Q. HOW DOES THE SPECIAL PERMIT TO OPERATE THE KEYSTONE PIPELINE AT 80% OF SMYS RELATE TO THE FEDERAL SAFETY REGULATIONS?

A. The internal design pressure section of the Federal Regulation section 195.106 requires that pipelines be designed to operate at maximum pressures that result in hoop stresses in the pipe of 72% of Specified Minimum Yield Strength (SMYS). The granting of the special permit, attached as Exhibit B, allows Keystone to operate the majority of the pipeline at 80% of SMYS. Pipe at pump stations, road crossings, railroad crossings, launcher/receiver fabrications, population High Consequence Areas (HCA's) and navigable waterways must be designed at 72% SMYS. The special permit places more stringent conditions on other parts of the Federal Safety Regulations in order to maintain or exceed the level of safety of the pipeline operation. These additional safety measures will be addressed in other sections of this testimony.

Q. WHAT IS THE PHYSICAL DIFFERENCE BETWEEN THE PIPELINE DESIGN AT 72% OF SMYS AND AT 80% OF SMYS?

A. Comparing two pipe designs, each with the same strength steel and outside diameter (OD), the pipe at 80% SMYS design will have a 10% thinner wall than the 72% SMYS design. This is illustrated in the following example. Using the design formula in section 195.106:

80% SMYS design

- SMYS of the steel = 80,000 pound per square inch (psi)
- OD = 30 inches
- Maximum Operating Pressure (MOP) = 1440 psi
- Design Factor F = 0.80
- Pipe Wall Thickness = 0.338 inches

72% SMYS design

- SMYS of the steel = 80,000 pound pre square inch (psi)
- OD = 30 inches
- Maximum Operating Pressure (MOP) = 1440 psi
- Design Factor F = 0.72
- Pipe Wall Thickness = 0.375 inches

(0.338" – 0.375") / 0.375" = -0.10 = 10% wall thickness reduction

Q. WHAT AREAS OF THE FEDERAL SAFETY REGULATIONS ARE MADE MORE STRINGENT IN ORDER TO MAINTAIN OR EXCEED THE LEVEL OF SAFETY AFFORDED THE PIPELINE AT A 72% SMYS DESIGN?

A. A total of 51 additional conditions are required of Keystone in order to operate under the provisions of the special permit. More stringent requirements are applied to:

- Pipe steel mechanical and chemical properties
- Inspection and pressure testing
- Depth of cover over the buried pipe
- Leak detection through Supervisory Control and Data Acquisition (SCADA) system
- Internal and external corrosion prevention procedures
- Integrity management.

b. 49CFR 195 Requirements

Q. WHAT ASPECTS OF PIPELINE SAFETY ARE ADDRESSED IN SUBPART C - DESIGN REQUIREMENTS?

A. Subpart C addresses the aspects of pipeline design pertaining to pipe materials and manufacture, pipeline components such as fittings and valves, design requirements for external loading, and leak detection systems. Many of the requirements for pipe and pipeline components are included in external specifications and are incorporated by reference into 49 CFR 195. These documents are listed in 195.3.

Q. 195.102 – WHAT IS THE DESIGN TEMPERATURE FOR THE PIPELINE SYSTEM?

A. The special permit condition (16) stipulates that the pipeline temperature shall not exceed150° F. Keystone uses a design temperature of 167° F for choosing pipeline components (Data Response 6-16). The pipeline will operate at a minimum temperature of 45.5-degrees F, and a maximum temperature of 100.4-degrees F. The design temperatures therefore result in a conservative design. Since the actual temperature will be maintained below the design temperature, components will undergo less deformation under operating conditions. The stiffness of steel components decreases as temperature

increases, so maintaining actual temperature below the design temperature increases stiffness and eliminates excessive deformation.

The minimum temperature specifications of -50° F for above ground piping and -45° F for equipment are consistent for expected minimum temperatures for South Dakota winters. Fracture toughness specifications for pipe required in the special permit condition (4) ensure adequate fracture initiation and propagation at the minimum design temperature.

Q. 195.110 – WHAT EXTERNAL LOADS HAVE BEEN CONSIDERED IN THE DESIGN OF THE PIPELINE SYSTEM?

A. All crossings will utilize thicker pipe instead of cased crossings. This is generally the preferred design method due to the increased risk of corrosion occurring on the carrier pipe inside the casings. The design of the crossings is discussed in more detail regarding part 195.256 in this testimony.

External loadings from blasting at the Spencer Quarry near milepost 376 were brought up as concerns in a public hearing on the Keystone pipeline. Keystone has indicated the blasting at the quarry will not affect the pipeline (Data Response 6-18). The effect of loads on pipelines from blasting was studied in a Pipeline Research Committee International (PRCI) report titled Pipeline Response to Blasting in Rock published in 1991. The models in this report suggest that even large blasts of 32 tons result in only an additional 1300 psi stress on the line or about 2% additional stress. This result is insignificant on the operational integrity of the pipeline.

Q. 195.112 – WHAT PROVISIONS FOR PIPE MATERIAL QUALITY ARE BEING USED IN THE KEYSTONE PIPELINE?

A. CFR 49 195 requirements are modified by the special permit conditions 1,2,4,5,6,8,and 9.

Condition 1 – Steel Properties: The requirements in this section state the steel is to be made to the highest steelmaking technology standards in use for making pipe currently available. This requirement is typically in most pipeline operator pipe specifications. This condition ensures that the practice must be used for the Keystone pipeline.

Condition 2 – Manufacturing Standards: The pipe must be made to API 5L Product Specification Level 2. This is the highest specification and is typically specified for oil and gas applications. The carbon equivalent in the steel is specified to be held below 0.23 (Pcm formula). Carbon equivalent is a measure of susceptibility to cracking during welding; the lower the carbon equivalent, the less susceptibility to cracking. The 0.23 level required in this condition is adequate to minimize risk of cracking.

Condition 4 – Fracture Control: The fracture control conditions specify shear areas for Charpy V-Notch and Drop Weight Tear Testing in excess of 80% (all heat average). This stipulation should ensure that ductile fracture propagation will not occur in the Keystone crude oil pipeline. Keystone has also indicated in the application for the special permit

that absorbed energy during the Charpy V-Notch test will maintain an all heat average above 74 ft.-lbs. This steel toughness level will provide sufficient protection against the initiation of a fracture.

Condition 5 – Steel Plate Quality Control: The steel mills supplying pipe must have a quality program in place to monitor for laminations by ultrasonic testing and for centerline segregation by macro etch testing. Both of these monitoring requirements are typically not included in the production of line pipe so they provide a higher level of pipe steel quality.

Condition 6 – Pipe Seam Quality Control: Cross section samples for each heat of steel are monitored for excessive hardness which may lead to cracking. This quality measure is required by API 5L - PSL 2 pipe.

Condition 8 – Puncture Resistance: An excavator size of 65 tons is required for a tooth size of 3.54 inches by 0.137 inches wide. The strength of the steel and wall thickness of the pipe are enough to satisfy this requirement.

Condition 9 – Mill Hydrostatic Test: The required test of 95% of SMYS for 10 seconds is greater than the typically applied 90%, again resulting in a conservative design.

The stipulations in place on steel quality manufacture, properties, and inspection ensure that the pipe used on this project is of very high quality. These requirements have been evolving, becoming steadily more stringent, as PHMSA has reviewed more special permit applications for 80% SMYS pipeline applications.

Q. 195.120 – WHAT PROVISIONS FOR INTERNAL INSPECTION DEVICES ARE INCLUDED IN THE KEYSONE PIPELINE?

A. First, I will provide additional information of the capabilities of internal inspection devices. Internal inspection devices, often referred to as pigs or in-line inspection tools, are tools used to non-destructively test the pipe from the inside by using sensors. Internal inspection tools have various capabilities such as detecting metal loss, cracks and dents. In order for a pipeline to accept internal inspection devices, the pipeline must be equipped with pig launchers and receivers.

In the Keystone pipeline design, pig launchers and receivers are spaced at about 230 mile intervals to accommodate internal inspection tools. This is generally adequate to ensure the line has the capability for proper in-line inspection.

Q. 195.134 – WHAT PLANS FOR LEAK DETECTION ARE INCLUDED IN THE KEYSONE PIPELINE?

A. Special Permit Conditions 25-33 outline requirements that essentially state that Keystone's Supervisory Control and Data Acquisition (SCADA) Systems must employ state of the art technology for leak detection. The system must be approved by PHMSA prior to operation.

Q. WHAT ASPECTS OF PIPELINE SAFETY ARE ADDRESSED IN SUBPART D - CONSTRUCTION?

A. Subpart D provides the minimum requirements for construction practices for hazardous liquid pipelines. The areas addressed are inspection of pipe on the right of way, welding practices including repair and removal of defects, installation of pipes in the ditch, backfill, crossing of roads and railroads, valves, pumping equipment, and facility security. The granting of the special permit places additional stringent requirements on construction practices.

Q. 195.202 – HAS KEYSTONE WRITTEN A SET OF COMPREHENSIVE CONSTRUCTION SPECIFICATIONS FOR THE EXECUTION OF THIS PROJECT?

A. The special permit requires that construction plans, schedules, and specifications be submitted to PHMSA for review two months prior to start of construction (Condition 18). In addition, a construction quality assurance plan is required to be maintained throughout the construction process (Condition 21). A draft of the Construction Specifications is currently being prepared by Keystone for this project (Data Response 6-25). The document will be finalized upon receipt of applicable Federal and State permits required to construct the project.

Q. 195.212 – WHAT IS THE SPECIFICATION FOR FIELD BENDING OF PIPE?

A. For 30" diameter line pipe, the specification is 1.5° per 30" length of pipe. This specification is typical in the pipeline industry and will likely result in pipe bends free of wrinkles. (Data Response 6-27). Wrinkle free bends are desired to maintain the pipe steel integrity.

Q. 195.214 – HAVE WELDING PPROCEDURES BEEN PREPARED FOR THIS PIPELINE PROJECT?

A. Welding procedures are typically developed prior to the commencement of construction. Keystone is required by Condition (19) of the special permit to notify PHMSA within 14 days of the beginning of the welding qualification activities.

Q. 195.246 – WILL KEYSTONE'S PROCEDURE FOR LOWERING THE PIPE INTO THE DITCH RESULT IN LOW STRESSES AND A MINIMAL CHANCE OF COATING DAMAGE?

A. In Data Response 6-29, Keystone indicated that a minimum of four side booms and a backhoe, spaced 60 to 80 feet apart, will be used for lowering the pipe into the ditch. The bending stress resulting from this procedure is only about 5% of SMYS. Select fine material will be used to provide a uniform and padded ditch bottom for pipe support. Also, the coating will be inspected with an electronic holiday detector (a holiday is a small hole in the pipe coating) prior to being placed in the ditch. This procedure is typical during pipeline construction.

Q. 195.248 – IS THE DEPTH OF COVER FOR THE PIPELINE ADEQUATE TO PROTECT AGAINST THIRD PARTY DAMAGE?

A. Special Permit Condition (20) requires that the depth of cover over the pipeline be increased from the values in 195.248 to add an increased measure of protection against third party damage. Keystone will use 48" of cover, increased from 36" required in 195.428 in all areas except in consolidated rock. The requirement for extra cover is a very good measure of protection against the possibility of damage to the pipeline.

In addition, where pipeline is buried less than 42" (consolidated rock), additional markers must be placed along the pipeline.

Q. 195.256 – WHAT ARE THE DESIGN REQUIREMENTS FOR PIPELINES CROSSING ROAD AND RAIL CROSSINGS?

A. Section 195.256 requires that the pipeline must be designed to withstand vehicular loads at crossings. Keystone will use pipe with 0.515 inch wall thickness at all crossings. This wall thickness provides adequate protection when analyzed using the methodology developed at Cornell University by Stewart and O'Rourke, commonly referred to as 'PC Picses' in the pipeline industry. The wall thickness was adequate at rail crossings for depths ranging from 6 feet to 14 feet deep, and highway crossings from 3 feet to 10 feet deep. Typically the wall thickness is determined by the stresses during installation by boring rather than the requirement for withstanding vehicular loads (Data Response 6-19).

Q. 195.260 – WHAT CONSIDERATIONS ARE REQUIRED FOR PLACEMENT OF VALVES ALONG THE PIPELINE?

A. Section 195.260 requires valves be placed at the following:

(a) On the suction end and the discharge end of a pump station in a manner that permits isolation of the pump station equipment in the event of an emergency.

(b) On each line entering or leaving a breakout storage tank area in a manner that permits isolation of the tank area from other facilities.

(c) On each mainline at locations along the pipeline system that will minimize damage or pollution from accidental hazardous liquid discharge, as appropriate for the terrain in open country, for offshore areas, or for populated areas.

(d) On each lateral takeoff from a trunk line in a manner that permits shutting off the lateral without interrupting the flow in the trunk line.

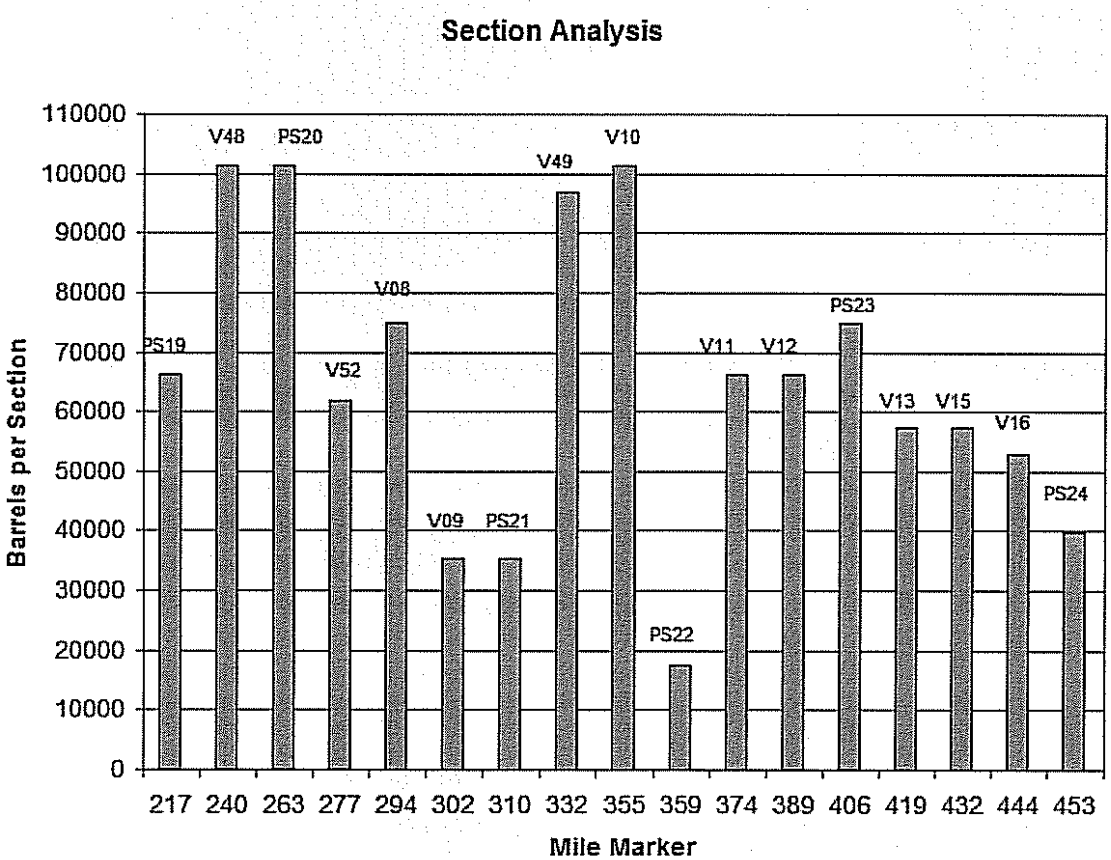
(e) On each side of a water crossing that is more than 100 feet (30 meters) wide from high-water mark to high-water mark unless the Administrator finds in a particular case that valves are not justified.

(f) On each side of a reservoir holding water for human consumption.

Sub sections (b), (d), and (f) are not applicable to the Keystone pipeline. The Keystone pipeline system has 14 valves planned within the state of South Dakota. From Data Response 6-33, Keystone complies with valve placement requirements at all pumping stations, sub section (a). Valves V13 and V15 are in compliance with sub section (e) pertaining to the James River for both V13 and V15, and the Missouri River for V 15. All other valves are listed as sub section (c), minimizing damage and pollution.

The placement of valves along the Keystone pipeline is discussed in the Pipeline Risk Assessment and Environmental Consequence Analysis which was filed with the Keystone Site Application as Exhibit C. The document and its appendices, A – Frequency-Volume Study of Keystone Pipeline, and B – Preliminary Evaluation of Risk to High Consequence Areas, discuss the rationale for the placement of valves along the pipeline route.

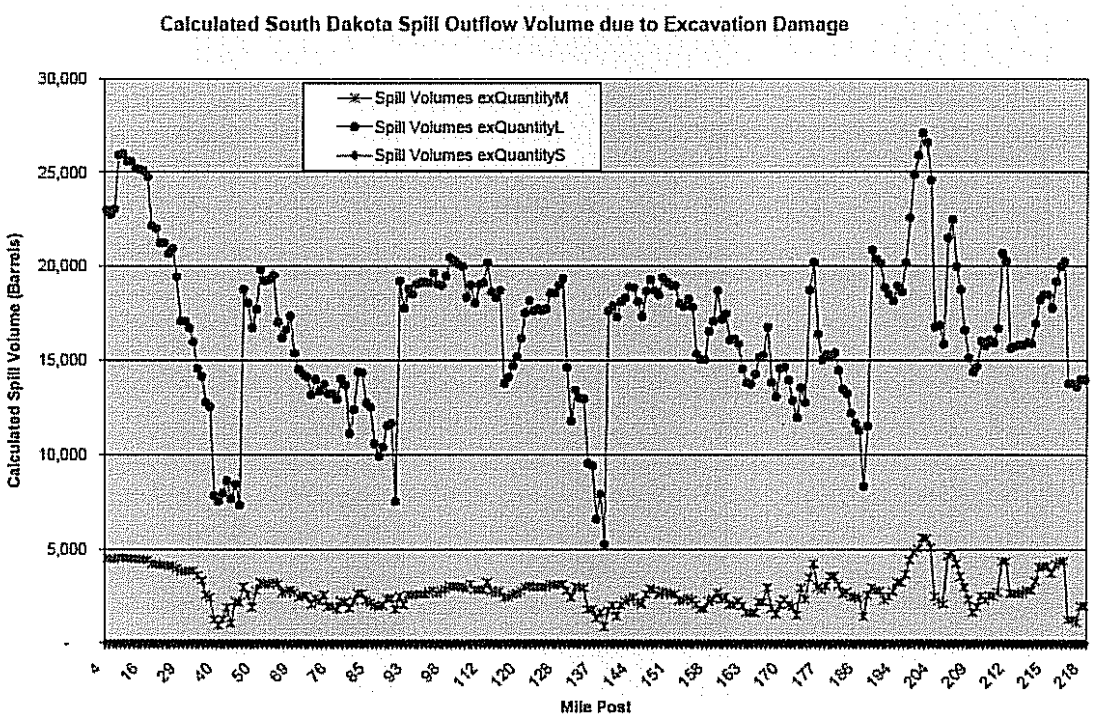
The plot below shows the pipeline segments between valves and their volume capacity in barrels of oil. The Barrels per Section is the volume the segment can hold upstream of the valve. For example, if all the valves on the system were closed, the pipeline segment between valves V52 and V08 would hold about 75,000 barrels. The graph could also be plotted as miles instead of barrels (17 miles for the example segment), but the volume of oil emphasizes the risk of a spill.



Assessing the valve placement with the aid of the elevation profile of the pipeline helps to reveal some patterns for managing risk. The primary pattern is that segments with less than 60,000 barrel capacity are typically protecting HCAs against large volumes of oil in the event of a release. Those segments with capacities above 60,000 barrels tend to have very uniform elevation profiles, typically less than a 100 feet difference between any two points along the line. Those longer segments were chosen with small drain down volumes, most having very localized, if any, low elevation regions.

The exceptions are the two large capacity segments in the north, V48 and PS 20. Both segments have long (6 and 10 mile respectively), continuous elevation differences of 100 feet with large drain down volumes. The segments could result in spill volumes of over 40,000 barrels in the unlikely event of a large hole (10" diameter from the Frequency – Volume Study of Keystone Pipeline) resulting in a release near the bottom of the slope.

Data Response 2-14 presents a plot (Figure 2, shown below) of calculated spill volumes along the pipeline route in South Dakota. The large volume (over 25,000 barrels) on the north portion corresponds to these valve segments. Using the equations for the flow rates from the Frequency – Volume Study of Keystone Pipeline, the large diameter hole (10") releases approximately 19,500 barrels before detection and isolation (11.5 minutes). After isolation, the balance of the 25,000 would take approximately 45 minutes to drain down from a 100 foot elevation difference. The emergency response team would have to have the leak excavated and clamped within 45 minutes to keep the spill at 25,000 barrels. From the drain down calculation, a 2 hour response time to clamp the leak would result in a total spill volume of 37,000 barrels, 3 hours – 46,000 barrels.



The response time that Keystone indicates for the high volume area with tier 1 resources is 6 hours (Data Response 2-12). It seems unlikely that the calculated spill volume could

be contained to just over 25,000 barrels based on this response time. For completeness of available information regarding the risks for this project, we request that Keystone present the assumptions and justifications for the calculated spill volumes.

With the above considerations noted, the overall selection of valve placement appears to provide a rational, risk-based approach to protecting populated areas, the environment, and drinking water supplies. As the requirements for HCAs are re-evaluated for the region in the vicinity of the pipeline, the location of valves installed to protect these areas should be continually re-assessed.

Q. 195.262 – WHAT SAFETY AND EMERGENCY POWER SUPPLY CONSIDERATIONS ARE INCLUDED AT PUMPING STATIONS?

A. Data Response 6-34 indicates that Keystone pumping stations will include safety devices that will prevent over-pressure of pumping equipment. Auxiliary power will be provided by an uninterruptible power supply (UPS) system.

Q. WHAT ASPECTS OF PIPELINE SAFETY ARE ADDRESSED IN SUBPART E - PRESSURE TESTING?

A. The Federal Safety Regulations require that the pipeline be pressure tested to 1.25 times the maximum operating pressure (MOP) for a duration of 8 hours. The pressure testing is performed to ensure the integrity of the pipeline design and construction prior to placing the line in operation.

Q. 195.304 – HOW DOES KEYSTONE PLAN TO PRESSURE TEST THE PIPELINE IN ORDER TO SATISFY THE FEDERAL REGULATION?

A. Keystone's initial plan was submitted in Data Response 6-35 as a draft entitled 'KPP-901 Specification for Cleaning, Filling, Hydrostatic Testing, Dewatering and Drying Rev. 0, dated August 13, 2007.' Also included were hydraulic profile sheets of the pipeline with proposed elevations and test pressures. The final plan is expected to be completed in April, 2008 when all permits have been received.

The plan includes using 9 test segments within South Dakota. Each segment will have a minimum pressure of 1800 psi (1.25 times the 1440 psi MOP). Sections at lower elevations will be tested at higher pressure. The highest pressure in the proposed plan is 1981 psi in the directional drill section of the Missouri River crossing. The wall thickness of the pipe in river crossings is 0.611 inches so the stress in the pipe wall resulting from the 1981 psi pressure from the test is only 60% of SMYS.

Execution of the submitted hydrostatic test plan will be in compliance with the Federal Safety Regulations.

Q. WHAT ASPECTS OF PIPELINE SAFETY ARE ADDRESSED IN SUBPART F - OPERATIONS AND MAINTAINENCE?

A. Subpart F provides the minimum requirements for performing operation and maintenance on hazardous liquid pipelines. Addressed in this subpart are procedural manuals, emergency response training, maximum operating pressure, communications, line markers, security of facilities, public awareness, and damage prevention programs.

Q. 195.402 – HAS KEYSTONE DEVELOPED A PROCEDURAL MANUAL FOR OPERATIONS, MAINTENANCE, AND EMERGENCIES?

A. The manuals will be developed in 2008 and completed prior to commencing operations in 2009 as stated in Data Response 3-36. The Emergency Response Plan presented in the Siting Application Exhibit C is reviewed in other testimony prepared by Staff.

Q. 195.406 – WHAT PROVISIONS ARE PLANNED TO MAINTAIN LINE PRESSURE FROM EXCEEDING 110% OF MOP DURING SURGES?

A. Keystone has performed a preliminary surge analysis using a transient hydraulic pipeline model as stated in Data Response 6-38. Safety devices at the station to prevent the pipeline from over-pressuring include safety relief systems, pump station discharge pressure control valve or pump speed control, automated flow rate or suction pressure control set points, and automatic pump station shut down if pressure exceeds a preset limit.

The importance of minimizing pressure surges is increased with the granting of the 80% SMYS special permit. The decrease in wall thickness results in higher hoop stress and a higher percentage of SMYS being utilized during a pressure surge.

We would request that Keystone include the effects of unexpected, instantaneous loss of pumping equipment in the surge analysis to ensure that the pipe stress remain with the acceptable limit.

Q. 195.430 – WHAT FIREFIGHTING EQUIPMENT WILL BE AVAIALBLE AT PUMPING STATIONS?

A. Fire and lower explosive level (LEL) gas detectors will be installed in electrical buildings at each pump station as indicated in Data Response 6-41. Electrical buildings will be equipped with high and low temperature alarms and intrusion switches. Fire extinguishers will be installed inside buildings near the entrance. These fire safety measures should provide adequate protection for the pumping stations.

Q. 195.436 – WHAT PROVISIONS ARE PLANNED FOR SECURITY OF FACILITIES FROM UNAUTHORIZED ENTRY AND VANDALISM?

A. Pump stations will be enclosed by a security fence and gates will be kept locked as stated in Data Response 6-42. The pump stations will also be remotely monitored 24

hours a day from the operations control center. Other above ground facilities, such as valve sites, will be fenced.

These security measures are adequate for protecting the pipeline facilities from unauthorized entry.

Q. TO THE EXTENT THAT DATA IS AVAILABLE, DOES IT APPEAR THAT TRANSCANADA KEYSTONE PIPELINE, LP IS IN COMPLIANCE WITH PART 195 AND THE SPECIAL PERMIT CONDITIONS?

A. The data that has been presented through the siting application, the granting of the special permit, testimony from Keystone, and responses to data requests provide sufficient information to conclude that Keystone is in compliance with Part 195, Subparts C, D, and F as presented in this testimony. The Integrity Management Plan of Subpart F and Subpart H, Corrosion Control, are examined in other testimony.

Q. ARE THERE ANY OTHER RECOMMENDATIONS THAT YOU HAVE REGARDING THIS PROJECT?

A. I recommend clarification on two points:

1. As discussed in the section regarding Valve Location (195.260), I recommend that Keystone should provide justification and assumptions for limiting the maximum spill volumes to 25,000 barrels from a 10 inch diameter hole. Isolation times and field response times suggest that the volumes could exceed 40,000 barrels.

2. I recommend that Keystone present the final surge mitigation design including surge analysis and validation results for review. The granting of the 80% SMYS special permit removes some of the safety factor in line pipe that the current CFR 49 195 requirement of 72% SMYS affords.

ENEngineering

William J. Walsh, Ph.D., PE
Senior Project Manager

Education

Ph.D. Theoretical and Applied Mechanics, Northwestern University, 2004
M.S. Metallurgical Engineering, Univ. of Illinois at Urbana-Champaign, 1986
B.S. Engineering Mechanics, Univ. of Illinois at Urbana-Champaign, 1984

Professional Registrations

Registered Professional Engineer – Illinois

Affiliations

American Society of Mechanical Engineers (ASME)

Summary of Experience

Engineering Project Manager skilled in applying principles of mechanics and material science to the solution of industrial problems in pipeline, manufacturing and research environments. Certified Six-Sigma Black Belt. Proficient in the use of ABAQUS™ and other finite element codes.

Project Experience

EN Engineering, Woodridge, Illinois

Fracture Control Plan Development – 80% SMYS Special Permits – Perform engineering assessment of fracture initiation and ductile fracture propagation properties in support of clients permit requests from PHMSA.

Pipe Buckling Failure Analysis of HDD Installation – Root cause determination of pipe failure resulting from severe overstress by contractor. Mechanics analysis and metallography were critical aspects of determining sequence of loading and ultimate cause.

Girth Weld Crack Analysis – Verification of rail crossing case design for a girth weld crack immediately outside of casing pipe. Crack initiation and growth determined to be unrelated to rail traffic loads.

Microbiologically Influenced Corrosion (MIC) Leak in Pipeline Drip – High strength fitting leak determined to be caused by MIC through liquids analysis and metallographic corrosion pattern identification.

Rexam Beverage Can North America, Elk Grove Village, Illinois

Aluminum Bottle Development and Commercialization – Coordinate technical activities between team members at Rexam and outside vendors to bring drawn-and-ironed aluminum bottles to the North American market by 2Q07. Responsibilities include solid modeling of potential bottle shapes for marketing and engineering evaluation, establishing metalworking parameters for bottle performs, coordinating commercial manufacturing facility development, budgeting and scheduling project activities.

24 oz. Down Gauging / Light Weighting – Implemented program in 3 can plants by installing new cupping press die sets and bottom dome profile tooling. Worked with plant personnel bring plant to full production with minimal downtime. Metal savings resulted in $3,000,000 annually.

Engineering Database Implementation (SAP) – Coordinated the conversion of 3 separate engineering group's drawing databases into a centralized database system. Responsible for guiding consultant activities, developing training materials, and instructing database users on procedures for new system.

ENGineering

William J. Walsh, Ph.D., PE
Senior Project Manager

Project Experience (cont'd)

Standardize Finite Element Process for Designing Can Bottom Dome Profile – Implemented web based system for performing routine finite element runs for bottom dome designs. Prepared ABAQUS™ script in Python programming language to automate material selection, boundary condition application, and pressure loading. Analysis time reduced from 1 hour to 8 minutes.

12 oz Light Weighting – Assisted with program to reduce metal volume in can wall. This six-sigma black belt program resulted in annual savings of $7,000,000.

Snap-on Tools, Bensenville, Illinois
Room Temperature Forming Process Development – Snap Ring Pliers – Lead engineer on project to develop novel room temperature forming process for snap ring pliers. Designed progressive die sequence for Grabner ten station press utilizing properties of low temperature flow stresses. Finite element analyses performed to eliminate die fracture using DEFORM™ and ANSYS™ software.

Powder Metal Forging Program – Responsible for design of press-fit tooling for hot impact powder forging resulting in increased die life under large forging stresses. Die stresses verified with strain gages and accelerometers using LabView™ data acquisition software

Natural Gas Pipeline Company of America, Lombard, Illinois
Press-fit Flywheel Design – Discovered cracking in crankshaft of natural gas compression using NDE techniques. Designed press-fit flywheel hub repair for the shaft, extending flywheel life for more than 10 years.

Strain Gauges for Service Critical Piping – Directed the strain gauge placement and data acquisition monitoring of stresses for critical gas storage piping subjected to excessive bending during service.

Pipeline Integrity Assessment – Development of integrity management procedures, integrity management database and risk based threat assessment algorithm PIMAR

Station Piping Design – Lead on design of header piping for compressor station cooling unit to achieve increased horsepower capacity.

Failure Analysis Investigations – Responsible for investigating pipeline and component failures including:

- corrosion leak failures in underground storage main gathering laterals and wellhead leads
- weld cracking on compressor station heat exchanger unit

Material and Welding Specifications – Developed company pipe material and welding procedure specifications. Represented company at pipe mill pre-production meetings for new pipeline construction.

ENengineering

William J. Walsh, Ph.D., PE
Senior Project Manager

Project Experience (cont'd)

Battelle Columbus Laboratories, Columbus, Ohio
Metals and Ceramics Group
Tungsten Extrusion – Developed thermo-mechanical processing methods resulting in 5% performance increase for anti-tank kinetic energy penetrators.

Beryllium Technology – Prepared summary paper on beryllium alloy processing and properties for Metals and Ceramic Information Center.

Mechanics Group
Gas Industry Projects – Contributed to the development of mechanics based model for predicting stress corrosion cracking in steel pipelines. Developed ANSYS™ analyses procedures for estimating corrosion allowance for operation of pressurized line pipe.

Fatigue of Weldments – Developed prediction schemes for fatigue of weldments containing porosity for use in Coast Guard design criteria.

U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

APR 30 2007

Mr. Robert Jones
Vice President
TransCanada Keystone Pipeline, LP
450 1st Street, SW
Calgary, Alberta, T2P 5H1
Canada

Dear Mr. Jones:

On November 17, 2006 you wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a waiver of compliance from PHMSA's pipeline safety regulation 49 CFR 195.106 for two pipelines. The regulation specifies the design factor used in the design pressure formula to establish the maximum operating pressure for a hazardous liquid pipeline.

The PHMSA is granting this waiver through the enclosed special permit. This special permit will allow TransCanada Keystone Pipeline, LP (Keystone) to establish a maximum operating pressure for two pipelines using a 0.80 design factor in lieu of 0.72, with conditions and limitations. The proposed pipelines covered by this special permit are the 1,025-mile, 30-inch, mainline from the Canadian border at Cavalier County, North Dakota, to Wood River, Illinois; and, the 291-mile, 36-inch, Cushing Extension from Jefferson County, Nebraska, to Cushing (Marion County), Oklahoma. The special permit provides some relief from the Federal pipeline safety regulations for Keystone while ensuring that pipeline safety is not compromised.

If necessary, my staff would be pleased to discuss this special permit or any other regulatory matter with you. Florence Hamn, Director, Office of Regulations (202-366-4595) would be pleased to assist you.

Sincerely,

Jeffrey D. Wiese
Acting Associate Administrator
for Pipeline Safety

Enclosure

009926

DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION (PHMSA)

SPECIAL PERMIT

Docket Number: PHMSA-2006-26617
Pipeline Operator: TransCanada Keystone Pipeline, L.P.
Date Requested: November 17, 2006
Code Section(s): 49 CFR 195.106

Grant of Special Permit:

Based on the findings set forth below, the Pipeline and Hazardous Materials Safety Administration (PHMSA) grants this special permit to TransCanada Keystone Pipeline, L.P. (Keystone). This special permit allows Keystone to design, construct and operate two new crude oil pipelines using a design factor and operating stress level of 80 percent of the steel pipe's specified minimum yield strength (SMYS) in rural areas. The current regulations in 49 CFR 195.106 limit the design factor and operating stress level for hazardous liquids pipelines to 72 percent of SMYS. This special permit is subject to the conditions set forth below.

Except for the non-covered portions of the pipelines described below, this special permit covers two proposed pipelines in the United States:

- The 1,025-mile, 30-inch, Mainline from the Canadian border at Cavalier County, North Dakota, traversing the States of South Dakota, Nebraska, Kansas and Missouri, to Wood River, Illinois; and

- The 291-mile, 36-inch, Cushing Extension from Jefferson County, Nebraska, through Kansas, to Cushing (Marion County), Oklahoma.

This special permit does not cover certain portions of the Mainline and Cushing Extension pipelines. These non-covered portions are the following:

- Pipeline segments operating in high consequence areas (HCAs) described as commercially navigable waterways in 49 CFR 195.450;

- Pipeline segments operating in HCAs described as high population areas in 49 CFR 195.450;

- Pipeline segments operating at highway, railroad and road crossings; and

- Piping located within pump stations, mainline valve assemblies, pigging facilities and measurement facilities.

For the purpose of this special permit, the "special permit area" means the area consisting of the entire pipeline right-of-way for those segments of the pipeline that will operate above 72 percent of SMYS.

Findings:

PHMSA finds that granting this special permit to Keystone to operate two new crude oil pipelines at a pressure corresponding to a hoop stress of up to 80 percent SMYS is not inconsistent with pipeline safety. Doing so will provide a level of safety equal to, or greater than, that which would be provided if the pipelines were operated under existing regulations. We do so because the special permit analysis shows the following:

- Keystone's special permit application describes actions for the life cycle of each proposed pipeline addressing pipe and material quality, construction quality control, pre-in service strength testing, the Supervisory Control and Data Acquisition (SCADA) system inclusive of leak detection, operations and maintenance and integrity management. The aggregate affect of these actions and PHMSA's conditions provide for more inspections and oversight than would occur on pipelines installed under existing regulations; and

- The conditions contained in this special permit grant require Keystone to more closely inspect and monitor the pipelines over its operational life than similar pipelines installed without a special permit.

Conditions:

The grant of this special permit is subject to the following conditions:

1) Steel Properties: The skelp/plate must be micro alloyed, fine grain, fully killed steel with calcium treatment and continuous casting.

2) Manufacturing Standards: The pipe must be manufactured according to American Petroleum Institute Specification 5L, *Specification for Line Pipe* (API 5L), product

specification level 2 (PSL 2), supplementary requirements (SR) for maximum operating pressures and minimum operating temperatures. Pipe carbon equivalents must be at or below 0.23 percent based on the material chemistry parameter (Pcm) formula.

3) Transportation Standards: The pipe delivered by rail car must be transported according to the API Recommended Practice 5L1, *Recommended Practice for Railroad Transportation of Line Pipe* (API 5L1).

4) Fracture Control: API 5L and other specifications and standards address the steel pipe toughness properties needed to resist crack initiation. Keystone must institute an overall fracture control plan addressing steel pipe properties necessary to resist crack initiation and propagation. The plan must include acceptable Charpy Impact and Drop Weight Tear Test values, which are measures of a steel pipeline's toughness and resistance to fracture. The fracture control plan, which must be submitted to PHMSA headquarters, must be in accordance with API 5L, Appendix F and must include the following tests:

   a) SR 5A - Fracture Toughness Testing for Shear Area: Test results must indicate at least 85 percent minimum average shear area for all X-70 heats and 80 percent minimum shear area for all X-80 heats with a minimum result of 80 percent shear area for any single test. The test results must also ensure a ductile fracture;

   b) SR 5B – Fracture Toughness Testing for Absorbed Energy; and

   c) SR 6 – Fracture Toughness Testing by Drop Weight Tear Test: Test results must be at least 80 percent of the average shear area for all heats with a minimum result of 60 percent of the shear area for any single test. The test results must also ensure a ductile fracture.

   The above fracture initiation, propagation and arrest plan must account for the entire range of pipeline operating temperatures, pressures and product compositions planned for the pipeline diameter, grade and operating stress levels, including maximum pressures and minimum temperatures for start up and shut down conditions associated with the special permit area. If the fracture control plan for the pipe in the special permit area does not meet these specifications, Keystone must submit to PHMSA headquarters an alternative plan providing an acceptable method to resist crack initiation, crack propagation and to arrest ductile fractures in the special permit area.

5) Steel Plate Quality Control: The steel mill and/or pipe rolling mill must incorporate a comprehensive plate/coil mill and pipe mill inspection program to check for defects and

inclusions that could affect the pipe quality. This program must include a plate or rolled pipe (body and all ends) ultrasonic testing (UT) inspection program per ASTM A578 to check for imperfections such as laminations. An inspection protocol for centerline segregation evaluation using a test method referred to as slab macro-etching must be employed to check for inclusions that may form as the steel plate cools after it has been cast. A minimum of one macro-etch or a suitable alternative test must be performed from the first or second heat (manufacturing run) of each sequence (approximately four heats) and graded on the Mannesmann scale or equivalent. Test results with a Mannesmann scale rating of one or two out of a possible five scale are acceptable.

6) Pipe Seam Quality Control: A quality assurance program must be instituted for pipe weld seams. The pipe weld seam tests must meet the minimum requirements for tensile strength in API 5L for the appropriate pipe grade properties. A pipe weld seam hardness test using the Vickers hardness testing of a cross-section from the weld seam must be performed on one length of pipe from each heat. The maximum weld seam and heat affected zone hardness must be a maximum of 280 Vickers hardness (Hv10). The hardness tests must include a minimum of two readings for each heat affected zone, two readings in the weld metal and two readings in each section of pipe base metal for a total of 10 readings. The pipe weld seam must be 100 percent UT inspected after expansion and hydrostatic testing per APL 5L.

7) Monitoring for Seam Fatigue from Transportation: Keystone must inspect the double submerged arc welded pipe seams of the delivered pipe using properly calibrated manual or automatic UT techniques. For each lay down area, a minimum of one pipe section from the bottom layer of pipes of the first five rail car shipments from each pipe mill must be inspected. The entire longitudinal weld seam must be tested and the results appropriately documented. For helical seam submerged arc welded pipe, Keystone must test and document the weld seam in the area along the transportation bearing surfaces and all other exposed weld areas during the test. Each pipe section test record must be traceable to the pipe section tested. PHMSA headquarters must be notified of any flaws that exceeded specifications and needed to be removed. Keystone's findings will determine if PHMSA will require the testing program be expanded to include a larger sampling population for seam defects originating during pipeline transportation.

8) Puncture Resistance: Steel pipe must be puncture resistant to an excavator weighing up to 65 tons with a general purpose tooth size of 3.54 inches by 0.137 inches. Puncture resistance will be calculated based on industry established calculations such as the Pipeline Research Council International's *Reliability Based Prevention of Mechanical Damage to Pipelines* calculation method.

9) Mill Hydrostatic Test: The pipe must be subjected to a mill hydrostatic test pressure of 95 percent of SMYS or greater for 10 seconds. Any mill hydrostatic test failures must be reported to PHMSA headquarters with the reason for the test failure.

10) Pipe Coating: The application of a corrosion resistant coating to the steel pipe must be subject to a coating application quality control program. The program must address pipe surface cleanliness standards, blast cleaning, application temperature control, adhesion, cathodic disbondment, moisture permeation, bending, minimum coating thickness, coating imperfections and coating repair.

11) Field Coating: Keystone must implement a field girth weld joint coating application specification and quality standards to ensure pipe surface cleanliness, application temperature control, adhesion quality, cathodic disbondment, moisture permeation, bending, minimum coating thickness, holiday detection and repair quality must be implemented in field conditions. Field joint coatings must be non-shielding to cathodic protection (CP). Field coating applicators must use valid coating procedures and be trained to use these procedures. Keystone will perform follow-up tests on field-applied coating to confirm adequate adhesion to metal and mill coating.

12) Coatings for Trenchless Installation: Coatings used for directional bore, slick bore and other trenchless installation methods must resist abrasions and other damages that may occur due to rocks and other obstructions encountered in this installation technique.

13) Bends Quality: Certification records of factory induction bends and/or factory weld bends must be obtained and retained. All bends, flanges and fittings must have carbon equivalents (CE) equal to or below 0.42 or a pre-heat procedure must be applied prior to welding for CE above 0.42.

14) Fittings: All pressure rated fittings and components (including flanges, valves, gaskets, pressure vessels and pumps) must be rated for a pressure rating commensurate with the MOP of the pipeline.

15) Design Factor - Pipelines: Pipe installed under this special permit may use a 0.80 design factor. Pipe installed in pump stations, road crossings, railroad crossings, launcher/receiver fabrications, population HCAs and navigable waters must comply with the design factor in 49 CFR 195.106. If portions of the pipeline become population HCAs during the operational life of the pipeline, Keystone will apply to PHMSA headquarters for a special permit for the affected pipeline sections.

16) Temperature Control: The pipeline operating temperatures must be less than 150 degrees Fahrenheit.

17) Overpressure Protection Control: Mainline pipeline overpressure protection must be limited to a maximum of 110 percent MOP consistent with 49 CFR 195.406(b).

18) Construction Plans and Schedule: The construction plans, schedule and specifications must be submitted to the appropriate PHMSA regional office for review within two months of the anticipated construction start date. Subsequent plans and schedule revisions must also be submitted to the PHMSA regional office.

19) Welding Procedures: The appropriate PHMSA regional office must be notified within 14 days of the beginning of welding procedure qualification activities. Automated or manual welding procedure documentation must be submitted to the same PHMSA regional office for review. For X-80 pipe, Keystone must conform to revised procedures contained in the 20th edition of API Standard 1104, *Welding of Pipelines and Related Facilities* (API 1104), Appendix A, or by an alternative procedure approved by PHMSA headquarters.

20) Depth of Cover: The soil cover must be maintained at a minimum depth of 48 inches in all areas except consolidated rock. In areas where conditions prevent the maintenance of 42 inches of cover, Keystone must employ additional protective measures to alert the public and excavators to the presence of the pipeline. The additional measures shall include placing warning tape and additional pipeline markers along the affected pipeline segment. In areas where the pipeline is susceptible to threats from chisel plowing or other activities, the top of the pipeline must be installed at least one foot below the deepest penetration above the pipeline. If routine patrols indicate the possible loss of cover over the pipeline, Keystone must perform a depth of cover study and replace cover as necessary to meet the minimum depth of cover requirements specified herein. If the replacement of cover is impractical or not possible, Keystone must install other protective measures including warning tape and closely spaced signs.

21) Construction Quality: A construction quality assurance plan for quality standards and controls must be maintained throughout the construction phase with respect to: inspection, pipe hauling and stringing, field bending, welding, non-destructive examination (NDE) of girth welds, field joint coating, pipeline coating integrity tests, lowering of the pipeline in the ditch, padding materials to protect the pipeline, backfilling, alternating current (AC) interference mitigation and CP systems. All girth welds must be NDE by radiography or alternative means. The NDE examiner must have all current required certifications.

22) Interference Currents Control: Control of induced alternating current from parallel electric transmission lines and other interference issues that may affect the pipeline must be incorporated into the design of the pipeline and addressed during the construction phase. Issues identified and not originally addressed in the design phase must be brought to PHMSA headquarters' attention. An induced AC program to protect the pipeline from corrosion caused by stray currents must be in place and functioning within six months after placing the pipeline in service.

23) Test Level: The pre-in service hydrostatic test must be to a pressure producing a hoop stress of 100 percent SMYS and 1.25 X MOP in areas to operate to 80 percent SMYS. The hydrostatic test results from each test after completion of each pipeline must be submitted to PHMSA headquarters.

24) Assessment of Test Failures: Any pipe failure occurring during the pre-in service hydrostatic test must undergo a root cause failure analysis to include a metallurgical examination of the failed pipe. The results of this examination must preclude a systemic pipeline material issue and the results must be reported to PHMSA headquarters and the appropriate PHMSA regional office.

25) Supervisory Control and Data Acquisition (SCADA) System: A SCADA system to provide remote monitoring and control of the entire pipeline system must be employed.

26) SCADA System – General:

    a) Scan rate shall be fast enough to minimize overpressure conditions (overpressure control system), provide very responsive abnormal operation indications to controllers and detect small leaks within technology limitations;

    b) Must meet the requirements of regulations developed as a result of the findings of the National Transportation Safety Board, *Supervisory Control and Data Acquisition (SCADA) in Liquid Pipelines,* Safety Study, NTSB/SS-05/02 specifically including:

- Operator displays shall adhere to guidance provided in API Recommended Practice 1165, *Recommended Practice for Pipeline SCADA Display* (API RP 1165)
- Operators must have a policy for the review/audit of alarms for false alarm reduction and near miss or lessons learned criteria
- SCADA controller training shall include simulator for controller recognition of abnormal operating conditions, in particular leak events
- See item 27b below on fatigue management
- Install computer-based leak detection system on all lines unless an engineering analysis determines that such a system is not necessary

c) Develop and implement shift change procedures for controllers;

d) Verify point-to-point display screens and SCADA system inputs before placing the line in service;

e) Implement individual controller log-in provisions;

f) Establish and maintain a secure operating control room environment;

g) Establish controls to functionally test the pipeline in an off-line mode prior to beginning the line fill and placing the pipeline in service; and

h) Provide SCADA computer process load information tracking.

27) SCADA – Alarm Management: Alarm Management Policy and Procedures shall address:

a) Alarm priorities determination;

b) Controllers' authority and responsibility;

c) Clear alarm and event descriptors that are understood by controllers;

d) Number of alarms;

e) Potential systemic system issues;

f) Unnecessary alarms;

g) Controllers' performance regarding alarm or event response;

h) Alarm indication of abnormal operating conditions (AOCs);

i) Combination AOCs or sequential alarms and events; and

j) Workload concerns.

28) SCADA – Leak Detection System (LDS): The LDS Plan shall include provisions for:

a) Implementing applicable provisions in API Recommended Practice 1130, *Computational Pipeline Monitoring for Liquid Pipelines* (API RP 1130), as appropriate;

b) Addressing the following leak detection system testing and validation issues:
   - Routine testing to ensure degradation has not affected functionality
   - Validation of the ability of the LDS to detect small leaks and modification of the LDS as necessary to enhance its accuracy to detect small leaks
   - Conduct a risk analysis of pipeline segments to identify additional actions that would enhance public safety or environmental protection

c) Developing data validation plan (ensure input data to SCADA is valid);

d) Defining leak detection criteria in the following areas:
   - Minimum size of leak to be detected regardless of pipeline operating conditions including slack and transient conditions
   - Leak location accuracy for various pipeline conditions
   - Response time for various pipeline conditions

e) Providing redundancy plans for hardware and software and a periodic test requirement for equipment to be used live (also applies to SCADA equipment).

29) SCADA – Pipeline Model and Simulator: The Thermal-Hydraulic Pipeline Model/ Simulator including pressure control system shall include a Model Validation/Verification Plan.

30) SCADA – Training: The training and qualification plan (including simulator training) for controllers shall:

a) Emphasize procedures for detecting and mitigating leaks;

b) Include a fatigue management plan and implementation of a shift rotation schedule that minimizes possible fatigue concerns;

c) Define controller maximum hours of service limitations;

d) Meet the requirements of regulations developed as a result of the guidance provided in the American Society of Mechanical Engineers Standard B31Q, *Pipeline Personnel Qualification Standard* (ASME B31Q), September 2006 for developing qualification program plans;

e) Include and implement a full training simulator capable of replaying near miss or lesson learned scenarios for training purposes;

f) Implement tabletop exercises periodically that allow controllers to provide feedback to the exercises, participate in exercise scenario development and actively participate in the exercise;

g) Include field visits for controllers accompanied by field personnel who will respond to call-outs for that specific facility location;

h) Provide facility specifics in regard to the position certain equipment devices will default to upon power loss;

i) Include color blind and hearing provisions and testing if these are required to identify alarm priority or equipment status;

j) Training components for task specific abnormal operating conditions and generic abnormal operating conditions;

k) If controllers are required to respond to "800" calls, include a training program conveying proper procedures for responding to emergency calls, notification of other pipeline operators in the area when affecting a common pipeline corridor and education on the types of communications supplied to emergency responders and the public using API Recommended Practice 1162, *Public Awareness Programs for Pipeline Operators* (API RP 1162);

l) Implement on-the-job training component intervals established by performance review to include thorough documentation of all items covered during oral communication instruction; and

m) Implement a substantiated qualification program for re-qualification intervals addressing program requirements for circumstances resulting in disqualification, procedure documentation for maximum controller absences before a period of review, shadowing, retraining, and addressing interim performance verification measures between re-qualification intervals.

31) SCADA – Calibration and Maintenance: The calibration and maintenance plan for the instrumentation and SCADA system shall be developed using guidance provided in API 1130. Instrumentation repairs shall be tracked and documentation provided regarding prioritization of these repairs. Controller log notes shall periodically be reviewed for concerns regarding mechanical problems. This information will be tracked and prioritized.

32) SCADA – Leak Detection Manual: The Leak Detection Manual shall be prepared using guidance provided in Canadian Standards Association, *Oil and Gas Pipeline Systems*, CSA Z662-03, Annex E, Section E.5.2, Leak Detection Manual.

33) Mainline Valve Control: Mainline valves located on either side of a pipeline segment containing an HCA where personnel response time to the valve exceeds one hour must be

remotely controlled by the SCADA system. The SCADA system must be capable of opening and closing the valve and monitoring the valve position, upstream pressure and downstream pressure.

34) Pipeline Inspection: The pipeline must be capable of passing in line inspection (ILI) tools. All headers and other segments covered under this special permit that do not allow the passage of an ILI device must have a corrosion mitigation plan.

35) Internal Corrosion: Keystone shall limit sediment and water (S&W) to 0.5 percent by volume and report S&W testing results to PHMSA in the 180-day and annual reports. Keystone shall also report upset conditions causing S&W level excursions above the limit. This report shall also contain remedial measures Keystone has taken to prevent a recurrence of excursions above the S&W limits. Keystone must run cleaning pigs twice in the first full year of operation and as necessary in succeeding years based on the analysis of oil constituents, weight loss coupons located in areas with the greatest internal corrosion threat and other internal corrosion threats. Keystone will send their analyses and further actions, if any, to PHMSA.

36) Cathodic Protection (CP): The initial CP system must be operational within six months of placing a pipeline segment in service.

37) Interference Current Surveys: Interference surveys must be performed within six months of placing the pipeline in service to ensure compliance with applicable NACE International Standard Recommended Practices 0169 and 0177 (NACE RP 0169 and NACE RP 0177) for interference current levels. If interference currents are found, Keystone will determine if there have been any adverse affects to the pipeline and mitigate the affects as necessary. Keystone will report the results of any negative finding and the associated mitigative efforts to the appropriate PHMSA regional office.

38) Corrosion Surveys: Corrosion surveys of the affected pipeline must be completed within six months of placing the respective CP system(s) in operation to ensure adequate external corrosion protection per NACE RP 0169. The survey will also address the proper number and location of CP test stations as well as AC interference mitigation and AC grounding programs per NACE RP 0177. At least one CP test station must be located within each HCA with a maximum spacing between test stations of one-half mile within the HCA. If placement of a test station within an HCA is impractical, the test station must be placed at the nearest practical location. If any annual test station reading fails to meet 49 CFR 195,

Subpart H requirements, remedial actions must occur within six months. Remedial actions must include a close interval survey on each side of the affected test station and all modifications to the CP system necessary to ensure adequate external corrosion control.

39) Initial Close Interval Survey (CIS) - Initial: A CIS must be performed on the pipeline within two years of the pipeline in-service date. The CIS results must be integrated with the baseline ILI to determine whether further action is needed.

40) Pipeline Markers: Keystone must employ line-of-sight markings on the pipeline in the special permit area except in agricultural areas or large water crossings such as lakes where line of sight markers are impractical. The marking of pipelines is also subject to Federal Energy Regulatory Commission orders or environmental permits and local restrictions. Additional markers must be placed along the pipeline in areas where the pipeline is buried less than 42 inches.

41) Monitoring of Ground Movement: An effective monitoring/mitigation plan must be in place to monitor for and mitigate issues of unstable soil and ground movement.

42) Initial In-Line Inspection (ILI): Keystone must perform a baseline ILI in association with the construction of the pipeline using a high-resolution Magnetic Flux Leakage (MFL) tool to be completed within three years of placing a pipeline segment in service. The high-resolution MFL tool must be capable of gouge detection. Keystone must perform a baseline geometry tool run after completion of the hydrostatic strength test and backfill of the pipeline, but no later than six months after placing the pipeline in service under a special permit. The ILI data summary sheets and planned digs with associated ILI tool readings will be sent to the PHMSA regional office. The PHMSA regional office will be given at least 14 days notice before confirmation digs are executed on site. The dimensional data and other characteristics extracted from these digs will be shared with the PHMSA regional office. Keystone will also compare dimensional data and other characteristics extracted from the digs and compare them with ILI tool data. If there are large variations between dig data and ILI tool data, Keystone will submit PHMSA a plan on further actions, inclusive of more digs, to calibrate their analysis and remediation process.

43) Future ILI: Future ILI inspection must be performed on the entire pipeline subject to the special permit, on a frequency consistent with 49 CFR 195.452(j)(3), assessment intervals,

or on a frequency determined by fatigue studies based on actual operating conditions, inclusive of flaw and corrosion growth models.

44) Verification of Reassessment Interval: Keystone must submit a new fatigue analysis to validate the pipeline reassessment interval annually for the first five years after placing the pipeline subject to this special permit in service. The analysis must be performed on the segment experiencing the most severe historical pressure cycling conditions using actual pipeline pressure data.

45) Two years after the pipeline in-service date, Keystone will use all data gathered on pipeline section experiencing the most pressure cycles to determine effect on flaw growth that passed manufacturing standards and installation specifications. This study will be performed by an independent party agreed to by Keystone and PHMSA headquarters. Furthermore, this study will be shared with PHMSA headquarters as soon as practical after its completion, preferably before baseline assessment begins. These findings will determine if an ultrasonic crack detection tool must be launched in that pipeline section to confirm crack growth with Keystone's crack growth predictive models.

46) Direct Assessment Plan: Headers, mainline valve bypasses and other sections covered by this special permit that cannot accommodate ILI tools must be part of a Direct Assessment (DA) plan or other acceptable integrity monitoring method using External and Internal Corrosion Direct Assessment criteria (ECDA/ICDA).

47) Damage Prevention Program: The Common Ground Alliance (CGA) damage prevention best practices applicable to pipelines must be incorporated into the Keystone's damage prevention program.

48) Anomaly Evaluation and Repair: Anomaly evaluations and repairs in the special permit area must be performed based upon the following:

   a) Immediate Repair Conditions: Follow 195.452(h)(4)(i) except designate the calculated remaining strength failure pressure ratio (FPR) = < 1.16;

   b) 60-Day Conditions: No changes to 195.452(h)(4)(ii);

   c) 180-Day Conditions: Follow 195.452(H)(4)(iii) with exceptions for the following conditions which must be scheduled for repair within 180 days:

      - Calculated FPR = < 1.32
      - Areas of general corrosion with predicted metal loss greater than 40 percent

- Predicted metal loss is greater than 40 percent of nominal wall that is located at a crossing of another pipeline
- Gouge or groove greater than 8 percent of nominal wall

d) Each anomaly not repaired under the immediate repair requirements must have a corrosion growth rate and ILI tool tolerance assigned per the Integrity Management Program (IMP) to determine the maximum re-inspection interval.

e) Anomaly Assessment Methods: Keystone must confirm the remaining strength (R-STRENG) effective area, R-STRENG - 0.85dL and ASME B31G assessment methods are valid for the pipe diameter, wall thickness, grade, operating pressure, operating stress level and operating temperature. Keystone must also use the most conservative method until confirmation of the proper method is made to PHMSA headquarters.

f) Flow Stress: Remaining strength calculations for X-80 pipe must use a flow stress equal to the average of the ultimate (tensile) strength and the SMYS.

g) Dents: For initial construction and the initial geometry tool run, any dent with a depth greater than 2 percent of the nominal pipe diameter must be removed unless the dent is repaired by a method that reliable engineering tests and analyses show can permanently restore the serviceability of the pipe. For the purposes of this condition, a "dent" is a depression that produces a gross disturbance in the curvature of the pipe wall without reducing the pipe wall thickness. The depth of the dent is measured as the gap between the lowest point of the dent and the prolongation of the original contour of the pipe.

49) Reporting - Immediate: Keystone must notify the appropriate PHMSA regional office within 24 hours of any non-reportable leaks originating in the pipe body in the special permit area.

50) Reporting – 180 Day: Within 180 days of the pipeline in-service date under a special permit, Keystone shall report on its compliance with special permit conditions to PHMSA headquarters and the appropriate regional office. The report must also include pipeline operating pressure data, including all pressures and pressure cycles versus time. The data format must include both raw data in a tabular format and a graphical format. Any alternative formats must be approved by PHMSA headquarters.

51) Annual Reporting: Following approval of the special permit, Keystone must annually report the following:

a) The results of any ILI or direct assessment results performed within the special permit area during the previous year;

b) The results of all internal corrosion management programs including the results of:
   - S&W analyses
   - Report of processing plant upset conditions where elevated levels of S&W are introduced into the pipeline
   - Corrosion inhibitor and biocide injection
   - Internal cleaning program
   - Wall loss coupon tests

c) Any new integrity threats identified within the special permit area during the previous year;

d) Any encroachment in the special permit area, including the number of new residences or public gathering areas;

e) Any HCA changes in the special permit area during the previous year;

f) Any reportable incidents associated with the special permit area that occurred during the previous year;

g) Any leaks on the pipeline in the special permit area that occurred during the previous year;

h) A list of all repairs on the pipeline in the special permit area during the previous year;

i) On-going damage prevention initiatives on the pipeline in the special permit area and a discussion of their success or failure;

j) Any changes in procedures used to assess and/or monitor the pipeline operating under this special permit;

k) Any company mergers, acquisitions, transfers of assets, or other events affecting the regulatory responsibility of the company operating the pipeline to which this special permit applies; and

l) A report of pipeline operating pressure data to include all pressures and pressure cycles versus time. The data format must include both raw data in a tabular format and a graphical format. Any alternative formats must be approved by PHMSA headquarters.

Limitations:

Should Keystone fail to comply with any conditions of this special permit, or should PHMSA determine this special permit is no longer appropriate or that this special permit is inconsistent with pipeline safety, PHMSA may revoke this special permit and require Keystone to comply with the regulatory requirements in 49 CFR 195.106.

Background and process:

The Keystone Pipeline is a 1,845-mile international and interstate crude oil pipeline project developed by TransCanada Keystone Pipeline L.P., a wholly owned subsidiary of TransCanada Pipelines Limited. The Keystone Pipeline will transport a nominal capacity of 435,000 barrels per day of crude oil from western Canada's sedimentary basin producing areas in Alberta to refineries in the United States. Keystone indicates it has filed an application with the U.S. Department of State for a Presidential Permit for the Keystone Pipeline since the project involves construction, operation and maintenance of facilities for the importation of petroleum from a foreign country. Keystone anticipates receiving all necessary government approvals by November 2007 and beginning construction in late 2007. The targeted in-service date is during the fourth quarter of 2009.

The existing regulations in 49 CFR 195.106 provide the method used by pipeline operators to establish the MOP of a proposed pipeline by using the design formula contained in that section. The formula incorporates a design factor, also called a de-rating factor, which is fixed at 0.72 for an onshore pipeline. Keystone requests the use of a 0.80 design factor in the formula instead of 0.72 design factor.

PHMSA previously granted waivers to four natural gas pipeline operators to operate certain pipelines at a hoop stresses up to 80 percent SMYS. The Keystone pipeline project represents the first request by an operator in the United States for approval to design and operate a hazardous liquid (crude oil) pipeline beyond the existing regulatory maximum level. Canadian standards already allow operators to design and operate hazardous liquids pipelines at 80 percent SMYS.

On January 15, March 27, and April 17, 2006, PHMSA conducted technical meetings to learn more about the technical merits of Keystone's proposal to operate at 80 percent SMYS and to

answer questions posed by internal and external subject matter experts. The meetings resulted in numerous technical information requests and deliverables, to which Keystone satisfactorily responded.

PHMSA also secured the services of experts in the field of steel pipeline fracture mechanics, leak detection and SCADA systems to assist in the review of appropriate areas of Keystone's application. The experts' reports are included in the public docket.

On February 8, 2007, PHMSA posted a notice of this special permit request in the Federal Register (FR) (72 FR 6042). In the same FR notice we informed the public that we have changed the name granting such a request to a special permit. The request letter, the FR notice, supplemental information and all other pertinent documents are available for review under Docket Number PHMSA-2006-26617, in the DOT's Document Management System.

Two comments were received and posted to the public docket concerning the Keystone pipeline project request for a special permit. One commenter listed a number of recommended and relevant conditions for hazardous liquid pipelines to operate at 80 percent SMYS. The conditions developed by PHMSA and incorporated into the grant of special permit include the concerns of the commenter. The second commenter did not provide substantive comments relevant to the special permit request.

AUTHORITY: 49 U.S.C. 60118(c) and 49 CFR 1.53.

Issued in Washington, DC on APR 30 2007.

Jeffrey D. Wiese,

Acting Associate Administrator for Pipeline Safety.

I. WITNESS INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Jenny Hudson. My business address is 7135 Janes Avenue, Woodridge, Illinois, 60517.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as a Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design services for the oil and gas industry.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I hold a B.S. degree in Geological Engineering from the University of Missouri-Rolla. Additionally, I am a registered Professional Engineer in the State of Illinois as well as a registered NACE Cathodic Protection Technologist.

My professional experience consists of employment in the pipeline industry with EN Engineering and previously with Nicor Gas. While at Nicor Gas I had roles in the Storage Department as well as in the Corrosion Control Department. At EN Engineering, my responsibilities have been focused in the areas of corrosion control and pipeline integrity. My current responsibilities include developing and reviewing Integrity Management plans and procedures as well as technical oversight of External and Internal Corrosion Direct Assessments. My resume is included in Exhibit A.

Q. ON WHOSE BEHALF WAS THIS TESTIMONY PREPARED?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

II. PURPOSE OF THE TESTIMONY

Q. PLEASE STATE THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING.

A. The main objective of the Staff in this testimony is to ensure that TransCanada Keystone Pipeline, LP (Keystone) has met the requirements of the Federal Pipeline Safety Regulations 49CFR 195, Transportation of Hazardous Liquids by Pipeline, with respect to Keystone's application for a permit (Permit) to construct and operate a crude oil pipeline in South Dakota. This testimony deals specifically with the area of Integrity Management (§195.452).

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Q. HOW WILL YOUR TESTIMONY BE ORGANIZED?

The testimony will address the relevant portions of the Federal requirements related to integrity management.

III. INTEGRITY MANAGEMENT

Q. CAN YOU PLEASE DESCRIBE THE PURPOSE OF THE LIQUID INTEGRITY MANAGEMENT RULE?

A. Yes. After several high profile pipeline ruptures in the United States, the U. S. government identified the need to implement additional regulations pertaining to the integrity of hazardous liquid pipelines. The rule includes specific regulations to assess, evaluate and analyze the integrity of hazardous liquid pipeline segments that in the event of a pipeline release could affect the public and the environment.

Q. WHEN DID THE HAZARDOUS LIQUID INTEGRITY MANAGEMENT RULE BECOME EFFECTIVE?

A. For hazardous liquid pipeline operators with greater than 500 miles of pipe, the final rule went into effect May 29, 2001. For hazardous liquid pipeline operators with less than 500 miles of pipe, the final rule went into effect February 15, 2002.

Q. DID YOU REVIEW A COPY OF THE TRANSCANADA LIQUID INTEGRITY MANAGEMENT PLAN?

A. No. Per §195.452, a pipeline operator is not required to have a written integrity management plan until one (1) year after the date the pipeline begins operation. TransCanada has stated that development of the integrity management plan for the Keystone Pipeline will begin in 2008.

Q. HAS TRANSCANADA OPERATED LIQUID PIPELINES SINCE THE HAZARDOUS LIQUID INTEGRITY MANAGEMENT RULES BECAME EFFECTIVE?

A. No. TransCanada has not operated liquid pipelines since the 1990s. This was before the hazardous liquid integrity management rule went into effect.

Q. ARE NATURAL GAS PIPELINES GOVERNED BY A SIMILAR RULE?

A. Yes, natural gas pipelines are governed by 49 CFR Part 192, Subpart O, which is the natural gas integrity management rule.

Q. HAS TRANSCANADA OPERATED NATURAL GAS PIPELINES SINCE THE NATURAL GAS INTEGRITY MANAGEMENT RULE BECAME EFFECTIVE?

A. Yes.

Q. ARE ANY OF THE NATURAL GAS PIPELINE ASSETS OWNED OR OPERATED BY TRANSCANADA SUBJECT TO THE NATURAL GAS INTEGRITY MANAGEMENT RULE?

A. Yes. TransCanada has natural gas pipeline assets in both the United States and in Canada. The natural gas pipelines in the United States are subject to 49 CFR Part 192 Subpart O.

Q. HAS THE TRANSCANADA NATURAL GAS INTEGRITY MANAGEMENT PLAN BEEN SUBJECT TO A JURISDICTIONAL AUDIT?

A. Yes.

Q. CAN YOU PLEASE DESCRIBE THE ENFORCEMENT ACTIONS THAT MAY RESULT FROM A JURISDICTIONAL AUDIT?

A. Yes. Common enforcement actions resulting from a jurisdictional natural gas integrity management audit include a Notice of Probable Violation and a Notice of Amendment.

Q. CAN YOU PLEASE DESCRIBE WHAT A NOTICE OF PROBABLE VIOLATION AND A NOTICE OF AMENDMENT ARE?

A. Yes. Specific to the integrity management rule, a Notice of Probable Violation is a notice issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA) indicating that laws or regulations related to the integrity management rule may have been violated by the pipeline operator. Depending upon the nature of the violation, a civil penalty or compliance order may be proposed.

Specific to the integrity management rule, a Notice of Amendment is a notice issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA) that identifies shortcomings in an operator's integrity management plan or procedures. The Notice of Amendment requires that the operator make modifications to the plan or procedure.

Q. HAVE ANY OF THE PIPELINES OWNED OR OPERATED BY TRANSCANADA RECEIVED A NOTICE OF PROBABLE VIOLATION AS A RESULT OF THEIR JURISDICTIONAL INTEGRITY MANAGEMENT AUDIT?

A. No. TransCanada has received a Notice of Amendment, but not a Notice of Probable Violation.

Q. OVER THE LAST FIVE YEARS, HOW MANY FAILURES OR INCIDENTS RELATED TO EXTERNAL OR INTERNAL CORROSION HAVE OCCURRED ON NATURAL GAS LINES THAT TRANSCANADA OWNS OR OPERATES?

A. For the years 2002 to 2007, no failures on natural gas lines attributed to internal corrosion have occurred. Failures as a result of external corrosion are as follows:

Date	Country
October 18, 2002	Canada
September 2, 2003	Canada
December 1, 2003	Canada
January 7, 2004	Canada

Q. OVER THE LAST FIVE YEARS, HOW MANY FAILURES OR INCIDENTS RELATED TO THIRD-PARTY DAMAGE HAVE OCCURRED ON NATURAL GAS LINES OWNED OR OPERATED BY TRANSCANADA?

A. For the years 2002 to 2007 failures on natural gas lines as a result of third-party damage are as follows:

Date	Country
September 7, 2003	Canada
December 23, 2004	Canada
May 25, 2007	USA

Q. CAN YOU PLEASE DEFINE A FAILURE AND AN INCIDENT?

A. Yes. In the pipeline industry, a failure is often defined as a pipeline component that has become completely inoperable, is still operable but is incapable of satisfactorily performing its intended function, or has deteriorated to the point that it has become unsafe for continued use.

Per 49 CFR Part 191 §191.3 an incident includes an event that involves the release of gas from a pipeline and:

1. a death or personal injury necessitating in-patient hospitalization; or
2. estimated property damage, including cost of gas lost, of the operator or others, or both, of $50,000 or more; or
3. an event in the judgment of the operator that is significant but did not meet any of the specific criteria.

Q. HAVE YOU REVIEWED THE HAZARDOUS LIQUID HIGH CONSEQUENCE AREAS IDENTIFIED IN THE STATE OF SOUTH DAKOTA?

A. Yes.

Q. CAN YOU PLEASE EXPLAIN WHAT A HIGH CONSEQUENCE AREA IS?

A. Yes. For hazardous liquid pipelines, a High Consequence Area (HCA) is defined by 49 CFR Part 195 §195.450 as one of the following: a commercially navigable waterway, a high population area, an "other" populated area or an unusually sensitive area.

A high population area is further defined as an urbanized area that contains 50,000 or more people and has a population density of at least 1,000 people per square mile.

An "other" populated area is further defined as a place defined and delineated by the U.S. Census Bureau that contains a concentrated population such as an incorporated or unincorporated city, town, village or designated residential or commercial area.

An unusually sensitive area is defined by 49 CFR Part 195 §195.6 as a drinking water or ecological resource area that is unusually sensitive to environmental damage from a hazardous liquid pipeline release.

Examples of a drinking water resource include but are not limited to the water intake for a Community Water System or a Non-Transient Non-community Water System that obtains its water supply primarily from a surface water source and does not have an adequate alternative drinking water source, and a sole source aquifer recharge area where the sole source aquifer is a karst aquifer.

Examples of ecological resources include but are not limited to a multi-species assemblage area, a migratory water bird concentration area and an area containing an imperiled or endangered species.

Q. HOW MANY MILES OF PIPE HAS TRANSCANADA DETERMINED WILL AFFECT AN HCA IN THE STATE OF SOUTH DAKOTA?

A. TransCanada has identified 40.7 miles of pipe that has the possibility to affect a HCA in the event of a pipeline release.

Q. HOW MANY INDIVIDUAL HCAS HAVE BEEN IDENTIFIED AS HAVING THE POTENTIAL TO BE AFFECTED IN THE EVENT OF A PIPELINE RELEASE?

A. In the state of South Dakota, TransCanada has identified nine (9) HCA locations.

Q. CAN YOU PLEASE EXPLAIN HOW TRANSCANADA IDENTIFIED HCAS ALONG THE PROPOSED PIPELINE ROUTE?

A. Yes. The United States Department of Transportation (USDOT) has developed maps showing the locations of HCAs throughout the nation. The USDOT obtained the information for the maps from organizations such as the U.S. Census Bureau and the Environmental Protection Agency. These maps are available to pipeline operators via the National Pipeline Mapping System (NPMS). TransCanada obtained HCA information for the State of South Dakota from the NPMS.

Q. CAN YOU PLEASE EXPLAIN THE APPROACH TRANSCANADA USED TO IDENTIFY THE HCAS THAT COULD BE AFFECTED IN THE EVENT OF A PIPELINE RELEASE?

A. Yes. TransCanada screened HCAs to determine which HCAs were within a reasonable proximity to the Keystone centerline and also had a possible pathway to transport a spill to the HCA. TransCanada evaluated three (3) spill pathways: overland flow, subsurface flow and downstream transport.

For the overland flow scenario, TransCanada used a proximity criterion of one (1) mile - they assumed overland transport of crude oil could reach an HCA one (1) mile away.

TransCanada did not perform a detailed analysis of the subsurface flow scenario and instead assumed a proximity criterion of one (1) mile. In other words, they assumed subsurface flow could transport a spill to groundwater unusually sensitive areas up to one (1) mile away from the pipeline centerline.

For the downstream transport scenario, TransCanada applied a proximity criterion of five (5) miles. They assumed HCAs located downstream and within five (5) river miles of the pipeline centerline could be affected in the event of a release.

Q. HAS TRANSCANADA UTILIZED A "SAFE DISTANCE" WHEN IDENTIFYING SECTIONS OF PIPELINE THAT WILL AFFECT AN HCA?

A. Yes. Instead of the term "safe distance", TransCanada uses the term "proximity criteria". As previously stated, TransCanada used proximity criteria as follows:

Overland flow – one (1) mile
Subsurface flow – one (1) mile
Downstream transport – five (5) miles

Q. HAS TRANSCANADA JUSTIFIED THESE PROXIMITY CRITERIA?

A. From the information available to me, I have not seen technical justification for these proximity criteria. "Appendix B Preliminary Evaluation of Risk to High Consequence Areas" states the identification of pipeline segments that could affect an HCA is

preliminary. It is acceptable to use assumptions, such as the proximity criteria for an initial evaluation such as this. The expectation is prior to the Keystone Pipeline going into service, TransCanada will further refine the pipeline segments having the ability to affect an HCA. This could entail TransCanada determining that some pipeline segments currently identified as affecting an HCA do not actually have the capability. Likewise, TransCanada could identify additional pipeline segments that could affect an HCA.

Prior to going into service, the Pipeline and Hazardous Material and Safety Administration (PHMSA) would expect TransCanada to have a thorough written justification for any assumptions, such as proximity criteria, that are still being used in the analysis.

Q. IN THE EVENT OF A RELEASE, HAVE POSSIBLE PATHS ALONG DRAIN TILES TO A WATERWAY OR HCA BEEN CONSIDERED?

A. Based upon the information I have received, primarily through the review of "Appendix B Preliminary Evaluation of Risk to High Consequence Areas", it does not appear that transport along drain tiles has been specifically evaluated. In a more general sense, transport along drain tiles has been accounted for through the proximity criteria.

Q. ARE THERE ANY HCAS THAT WILL BE CROSSED BY THE KEYSTONE PIPELINE, BUT IN THE EVENT OF A PIPELINE RELEASE HAVE BEEN DETERMINED TO NOT AFFECT THE HCA?

A. Yes. In the state of South Dakota there is a groundwater HCA that the proposed pipeline will cross. Through work with the South Dakota Department of Environmental and Natural Resources (SDDENR), TransCanada determined the groundwater HCA could not be affected in the event of a release due to the depth of the groundwater. Additionally, the presence of a thick clay layer between the pipeline and the aquifer would prevent crude oil from reaching the aquifer. See also the TransCanada response to Staff Data Request 6-7.

Q. CAN YOU PLEASE DEFINE A PREVENTIVE AND MITIGATIVE MEASURE?

A. Yes. In the pipeline industry, a preventive and mitigative measure is generally defined as a measure to prevent and mitigate the consequences of a pipeline failure. Examples of preventive and mitigative measures include, but are not limited to conducting response drills with local emergency responders, performing line patrols beyond those already required by Part 195 and installing additional valves on the pipeline.

Q. HOW DOES TRANSCANADA PLAN ON DETERMINING PREVENTIVE AND MITIGATIVE MEASURES?

A. TransCanada plans on using what they refer to as the Maintenance Management Process. This process uses information from various sources including risk assessment, regular operation and maintenance activities and integrity management activities as a trigger to identify additional preventive and mitigative measures.

Q. CAN YOU PLEASE EXPLAIN WHAT AN EMERGENCY FLOW RESTRICTING DEVICE IS?

A. Yes. An Emergency Flow Restricting Device (EFRD) is defined in Part 195 §195.40 as a check valve or remote control valve.

A check valve is further defined as a valve that permits fluid to flow freely in one direction and contains a mechanism which automatically prevents flow in the opposite direction.

A remote control valve is further defined as any valve that is operated from a location remote from the location where the valve is actually installed.

Q. CAN YOU DESCRIBE THE PROCESS TRANSCANADA USED TO IDENTIFY THE LOCATIONS FOR EMERGENCY FLOW RESTRICTION DEVICES?

A. Yes. 49 CFR 195 requires that valves be placed on either side of large rivers and on each side of a reservoir containing water for human consumption. TransCanada initially placed valves to meet these minimum federal requirements. Once the pipeline segments having the ability to affect an HCA in the event of a pipeline release were identified, TransCanada re-evaluated the locations of EFRDs to determine if relocating or adding additional valves could further mitigate the risk to HCAs.

Q. DID TRANSCANADA MODIFY THE LOCATION OR ADD ADDITIONAL EMERGENCY FLOW RESTRICTING DEVICES IN ORDER TO HELP PROTECT AN HCA IN THE EVENT OF A RELEASE?

A. Yes. After TransCanada reviewed the initial list of valve locations and the location of pipe segments that could affect an HCA, they made several modifications in the State of South Dakota. This included the addition of one (1) valve and the relocation of three (3) valves.

Q. TO THE EXTENT THAT DATA IS AVAILABLE, DOES IT APPEAR THAT TRANSCANADA KEYSTONE PIPELINE, LP IS IN COMPLIANCE WITH PART 195 §195.452 AND THE SPECIAL PERMIT CONDITIONS?

A. To the extent data is available, yes.

Q. ARE THERE ANY CONDITIONS THAT YOU RECOMMEND AS PART OF GRANTING THE SITING PERMIT FOR SOUTH DAKOTA? IF SO, WHAT ARE THEY?

A. No.

ENGineering

Jenny Hudson, P.E.

Project Manager, Technology

Education	BS, Geological Engineering, University of Missouri, Rolla, Missouri, 1997
Professional Registrations	Professional Engineer, Illinois
Professional Certifications	NACE – International Cathodic Protection Technologist (CP Level 3)
Continuing Education and Training	NACE International AC Mitigation Course NACE International Designing for Corrosion Control Course
Professional Accomplishments	Co-Author of "Cathodic Protection of a Large-Diameter Distribution System: Corrosion Monitoring and Testing", American Water Works 2004 DSS conference
Summary of Experience	Ms. Hudson has over nine years of cathodic protection and pipeline integrity experience. Project experience includes developing pipeline integrity procedures, implementing External Corrosion Direct Assessment methodology and cathodic protection design work.

Project Experience

Southern Star Central Gas Pipeline
Develop written integrity management plan procedures and supporting documentation including ECDA and ICDA plans. Manage implementation of External Corrosion Direct Assessment methodology as well as review and analyze data. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA. Actively participate in PHMSA jurisdictional audit.

Vectren Energy Delivery
Develop written integrity management plan procedures and supporting documentation. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.

Oklahoma Natural Gas
Perform gap analysis of written integrity management plan. Provide documented feedback on plan including recommended modifications.

Nicor Gas
Perform and manage External Corrosion Direct Assessment projects. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.

DTE / Michcon
Manage implementation of External Corrosion Direct Assessment and Internal Direct Assessment projects. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.

ENEngineering

Jenny Hudson, P.E. (continued)
Project Manager, Technology

Project Experience (cont'd)

United States Gypsum
Develop Integrity Management Plan. Manage External Corrosion Direct Assessment. Perform risk analysis and risk ranking. Perform on-site review of integrity management and O&M records.

Alvord, Burdick and Howson
Corrosion evaluation surveys for over 30 miles of PCCP and steel water transmission main. Testing included structure-to-electrolyte readings, AC readings, isolation flange testing, Panhandle Eastern Testing, stray current interference testing and close-interval survey. Project also included analysis of data and recommendations.

Northwest Suburban Municipal Joint Action Water Agency
Evaluation of cathodically protected PCCP water transmission main. Testing included close-interval survey (on, instant off and depolarized), isolation flange testing and cathodic protection test point readings. Project also included analysis of data and recommendations.

I. WITNESS INTRODUCTION

1. Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is David Schramm. My business address is 7135 Janes Avenue, Woodridge, Illinois, 60517.

2. Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as a Vice-President and Senior Project manager by EN Engineering, an engineering and consulting firm specializing in pipeline design services for the oil and gas industry.

3. Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I hold a B.S from Iowa State University (Ames, Iowa) and am a NACE (National Association of Corrosion Engineers) certified Cathodic Protection Specialist (#3178) and Corrosion Technologist (#3178). My professional experience consists of employment in the pipeline industry with EN Engineering (present employer), NICOR Technologies, NICOR Gas (Northern Illinois Gas), Corrpro Companies, Inc. and HARCO Corporation. My responsibilities in these positions include over twenty-six (26) years of extensive experience in the direct and practical application of pipeline integrity and corrosion control including corrosion engineering analysis and design, process control and measurement, internal "smart" tooling analysis, cathodic protection design, installation and maintenance, computerized close interval potential survey, direct current voltage current survey, telluric current monitoring, measurement and investigation, stray DC interference testing and mitigation, coating selection and inspection, and material selection and purchasing.

I am currently responsible for the technical support of the Pipeline and Corrosion Control service offering including the development and maintenance of technical specifications and procedures, project oversight and quality assurance for

corrosion control, cathodic protection, field failure and integrity management projects and proposals, and the qualification and training of corrosion control, field failure, and system integrity personnel.

Within the corrosion control and cathodic protection industry I have served in a Chair position for NACE T-10-A-11 Gas Industry Corrosion Problems (1995 – 2001), NACE Certification Committee (2001 – 2005), and am incoming Vice-Chair to the NACE Professional Activities Committee (PAC). In addition, I am a Certified Craft Instructor for the National Center for Construction Education (NCCER) as it relates to their *American Petroleum Institute (API) Operator Qualification Program*, a Veriforce Operator Qualification Evaluator, and, as a member of the NACE Cathodic Protection Training and Certification Program Task Group, was instrumental in the development and review of the NACE Cathodic Protection Training and Certification program.

My Resume is attached to this document as Appendix A.

4. Q. ON WHOSE BEHALF WAS THIS TESTIMONY PREPARED?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

II. PURPOSE OF THIS TESTIMONY

5. Q. PLEASE STATE THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING.

A. The main objective of the Staff in this testimony is to ensure that TransCanada Keystone Pipeline, LP (Keystone) has met the requirements of the Federal Pipeline Safety Regulations 49CFR 195, Transportation of Hazardous Liquids by Pipeline, with respect to Keystone's application for a permit (Permit) to construct and operate a crude oil pipeline in South Dakota. This testimony deals specifically with the areas of Corrosion Control (Subpart H.)

Additional requirements in these areas have been placed upon Keystone as a condition of being granted a special permit to operate the pipeline at a hoop stress level of 80% of the specified minimum yield strength (SMYS) of the pipe material. These additional requirements will be noted in the appropriate portions of this testimony.

6. Q. HOW WILL YOUR TESTIMONY BE ORGANIZED?

A. The testimony will address the relevant portions of the Federal requirements related to ensuring that the design, construction, and operation of the facility will produce minimal adverse effects on the environment and the citizens of South Dakota. Each subpart of the Federal requirements will be addressed separately. At the conclusion of the testimony, I will present an overall assessment of the corrosion control program planned by TransCanada Keystone Pipeline, LP.

49CFRCh.1- Subpart H – Corrosion Control

7. Q. Is Keystone in compliance with §195.551 – What do the regulations in this subpart cover?

A. This section of code prescribes the minimum requirements for the protection of steel pipelines against corrosion. I have reviewed the PHMSA Grant of Waiver, TransCanada Petition, and the Direct Testimony of Robert Jones, Meera Kothari, Loys Gray, and Brian Thomas, and find the proposed design, construction, and installation of this pipeline meets the requirements of this subpart. Additional reference is detailed in Exhibit A.

8. Q. §195.553 – What special definitions apply to this subpart?

A. This section of code contains special definitions which apply to this subpart. I would not expect to see any documentation supplied to address this section by TransCanada or PHMSA. For clarification to later sections found below, the following definitions from this section of code are:

- Direct Assessment means any integrity assessment method that utilizes a process to evaluate certain threats (i.e., external corrosion, internal corrosion and stress corrosion cracking) to a pipeline segment's integrity. The process includes the gathering and integration of risk factor data, indirect examination or analysis to identify areas of suspected corrosion, direct examination of the pipeline in these areas, and post assessment evaluation.
- External corrosion direct assessment (ECDA) means a four-step process that combines pre-assessment, indirect inspection, direct examination, and post-assessment to evaluate the threat of external corrosion to the integrity of a pipeline.

9. Q. – Does Keystone have a plan for supervisor qualification in the areas of corrosion control and does it meet the requirements of §195.555 – What are the qualifications for supervisors?

A. In my opinion, Keystone's plan needs additional documentation and providing this additional documentation is recommended as a condition of issuing a construction permit as discussed in more detail in Exhibit B.

10. Q. Must the Keystone pipeline have a coating for external corrosion control under the provisions of §195.557 – Which pipelines must have coating for external corrosion control?

A. This section of code requires that each buried or submerged pipeline to have an external coating for external corrosion control if installed after October 20, 1985. TransCanada will provide an external corrosion control coating on the Keystone pipeline that will meet all requirements with this section of code as discussed in more detail in Exhibit C.

11. Q. Has Keystone selected an approved coating for external corrosion control per §195.559 – What coating material may I use for external corrosion control?

A. TransCanada is taking a good proactive approach to coating selection and, as contained in Exhibit D, the inspection of the coating prior to installation. Fusion bonded epoxy (FBE) coatings are indeed the industry "best practice" choice and that will possess and meet all of the properties required by this section of code.

12. Q. Will Keystone's plan meet the inspection timing requirements for external corrosion control in §195.561 – When must I inspect pipe coating used for external corrosion control?

A. TransCanada is taking a good proactive approach to coating inspection, selected industry "best practice" choices, and will meet the intent of this code section. Additional detail is provided in Exhibit E.

13. Q. Must the Keystone pipeline have cathodic protection under the provisions of §195.563 – Which pipelines must have cathodic protection (CP)?

A. Based on the PHMSA Grant of Waiver requirements and the revised April 10, 2007 TransCanada Petition, detailed in Exhibit F, the proposed Keystone pipeline will be provided with cathodic protection that will meet or exceed the requirements of this code section.

14. Q. Must Keystone install cathodic protection on breakout tanks under the provisions of §195.565 – How do I install cathodic protection on breakout tanks?

A. As indicated in Exhibit G, TransCanada does not intend to install any breakout tanks as part of this petition in the State of South Dakota.

15. Q. Has Keystone provided for corrosion control test leads as contained in §195.567 – Which pipelines must have test leads and what must I do to install and maintain the leads?

A. As a recommendation, Keystone needs to provide additional documentation and clarification that acknowledges the PHMSA Grant of Waiver requirements and addresses the installation methods that will be used to install the test lead wires, connect the wire to the pipe, and the protective coating that will be used over the connection. This is discussed in more detail under Exhibit H.

16. Q. Does Keystone's plan meet the requirements in §195.569 – Do I have to examine exposed portions of buried pipe?

A. In my opinion, Keystone's plan needs additional documentation and providing this additional documentation is recommended as a condition of issuing a construction permit as discussed in more detail in Exhibit I.

17. Q. Has Keystone provided information as to a cathodic protection criteria under §195.571 – What criteria must I use to determine the adequacy of cathodic protection?

A. The PHMSA Grant of Waiver and the revised April 10, 2007 TransCanada Petition both acknowledge compliance to this industry "best practice" document - meeting the requirements of this code section. Additional detail can be found in Exhibit J.

18. Q. Has Keystone provided a plan to monitor for external corrosion under §195.573 – What must I do to monitor external corrosion control?

A. The revised April 10, 2007 TransCanada Petition acknowledges the requirements to meet this code section. The April 30, 2007 PHMSA Grant of Waiver is more stringent and places additional direction and requirements with regard to this code section. Additional details can be found in Exhibit K.

19. Q. Must Keystone provide electrical isolation required under §195.575 – Which facilities must I electrically isolate and what inspection, tests, and safeguards are required?

A. TransCanada has chosen to not electrically isolate the pipeline from the pumping stations. Based on this design, TransCanada is taking a good proactive approach, has selected industry "best practices" and, as proposed, will meet the requirements of this code section. Additional detail is provided in Exhibit L.

20. Q. Must the Keystone pipeline alleviate interference currents under the provision of §195.577 – What must I do to alleviate interference currents?

A. Significant testimony and documentation has been provided with regards to this code section including: defined requirements by PHMSA in the Grant of Waiver. I would agree that TransCanada is taking a proactive approach to this issue and, as proposed, will meet the requirements of this code section. Additional detail is provided in Exhibit M .

21. Q. Will Keystone's plan meet mitigation requirements for internal corrosion under the provisions of §195.579 – What must I do to mitigate internal corrosion?

A. TransCanada has taken a more stringent approach with regard to the mitigation of internal corrosion as it relates to operating design (turbulent mode) and reduced sediment and water levels. PHMSA acknowledges this approach and places additional requirements which include operational notification requirements, cleaning intervals and the required use of corrosion coupons. This approach as presented meets the requirements of this code section. More detail is provided in Exhibit N.

22. Q. Has Keystone selected an approved coating for Atmospheric Corrosion per §195.581 – Which pipelines must I protect against atmospheric corrosion and what coating material may I use?

A. In my opinion, Keystone's plan needs additional documentation and providing this additional documentation is recommended as a condition of issuing a construction permit as discussed in more detail in Exhibit O.

23. Q. Has Keystone provided how they will monitor for atmospheric corrosion control under §195.583 – What must I do to monitor atmospheric corrosion control?

A. In my opinion, Keystone's plan needs additional documentation and providing this additional documentation is recommended as a condition of issuing a construction permit as discussed in more detail in Exhibit P.

24. Q. Is Keystone's plan to correct corroded pipe adequate under the provisions of §195.585 – What must I do to correct corroded pipe?

A. In my opinion, Keystone's plan needs additional documentation and providing this additional documentation is recommended as a condition of issuing a construction permit as discussed in more detail in Exhibit Q.

25. Q. Will the Keystone plan meet the requirements for determining the strength of corroded pipe under §195.587 – What methods are available to determine the strength of corroded pipe?

A. The PHMSA Grant of Waiver requires that Keystone apply the most conservative methods in order to confirm and determine the strength of corroded pipe based on remaining wall thickness. In addition the PHMSA Grant of Waiver requires that Keystone must confirm the remaining strength tools (RSTRENG), RSTRENG-0.85dL and ASME B31G are valid for this pipeline. These more

stringent requirements as imposed meet and exceed the requirements of this code section. Additional detail is provided in Exhibit R.

26. Q. Will Keystone's plan meet the standards that apply for direct assessment under the provision of §195.588 – What standards apply to direct assessment?

A. In my opinion, Keystone's plan needs additional documentation and providing this additional documentation is recommended as a condition of issuing a construction permit as discussed in more detail in Exhibit S.

27. Q. Will Keystone's plan meet the requirements for the retention of corrosion control information under the provision of §195.589 – What corrosion control information do I have to maintain?

A. PHMSA places more stringent record keeping requirements on the Keystone Pipeline in their Grant of Waiver. TransCanada's Petition for the Keystone Pipeline and subsequent request for information acknowledge the requirements of this code section. Assuming plan follow-through, the Keystone Pipeline will meet the record keeping requirements contained in this code section

28. Q. Does this conclude your Testimony?

A. Yes it does

ENGineering

David A. Schramm

Vice President, Pipeline Integrity & Corrosion Services

Education

BS, Resource Management, Iowa State University, Ames, Iowa, 1978

Professional Certifications

National Association of Corrosion Engineers International (NACE) – Cathodic Protection Specialist #3178
National Association of Corrosion Engineers International (NACE) – Corrosion Technologist #3178
Clockspring Trainer/Installer Certified
National Center for Construction and Research (NCCER) Certified Craft Instructor
National Association of Corrosion Engineers
Veriforce Operator Qualification Evaluator
Operator Qualification ISNETWORLD #00425152
West Virginia University, Appalachian Underground Course – Advanced Corrosion Control

Summary of Experience

Twenty-six (26) years of extensive experience in the direct and practical application of pipeline integrity and corrosion control including corrosion engineering analysis and design, process control and measurement, internal "smart" tooling analysis, cathodic protection design, installation and maintenance, computerized close interval potential survey, direct current voltage current survey, telluric current monitoring, measurement and investigation, stray DC interference testing and mitigation, coating selection and inspection, and material selection and purchasing.

Responsible for the technical support of the Pipeline and Corrosion Control service offering including the development and maintenance of technical specifications and procedures, project oversight and quality assurance for corrosion control, cathodic protection, field failure and integrity management projects and proposals, and the qualification and training of corrosion control, field failure and system integrity personnel.

In addition to pipelines, has additional experience with underground storage tanks, above grade storage tanks, power plant structures, condenser/chiller equipment, water well casings, lead sheath cable, underground electric cable, and marine structures.

Project Experience

Corrosion Control Operations, *Illinois*

Managed and directed the Corrosion Control Service Group for Nicor Technologies and Nicor Gas providing corrosion control consulting services to distribution and transmission pipelines, municipal and utility organizations, and commercial and industrial customers. Responsible for the performance of all operating corrosion control programs (internal, external and atmospheric) on the Nicor Gas pipeline system including specification, performance and day-to-day operation. As a member of the Nicor Gas welding and joining, system integrity, and code committee operating task groups provided technical expertise in pipeline integrity, research and testing, corrosion control and cathodic protection issues. Having responsibility for the due diligence corrosion control and cathodic protection evaluations on acquisition projects in Argentina and Tennessee. Developed risk, quality, and integrity management programs related to corrosion control and cathodic protection operations.

ENengineering

David A. Schramm
Vice President, Pipeline Integrity & Corrosion Services

Project Experience (cont'd)

Corrosion Control and Research Program Services, *Illinois*

Directed and coordinated the Nicor Gas corrosion control programs for distribution, transmission, and storage facilities. Directly supervision responsibility for the completion of annual corrosion control and corrosion control activities which include: annual reading programs, close interval survey, stray current interference, and impressed current rectifier system replacement. Managed and directed the research lab for Nicor Gas and was responsible for day-to-day operation, quality performance, testing, recommendation and approval, including the performance and analysis ASTM and ANSI test standards and methods. Directly responsible for the purge routine process for all large-diameter high- pressure pipelines. Conducted, analyzed and developed corrosion control action and recommendation for all wall loss and field failure events.

Lakehead Pipe Line Company, *North Dakota, Minnesota, Wisconsin, Illinois, Michigan, and New York*

Directed the completion of all annual cathodic protection reading programs, close interval survey, stray current interference, impressed current rectifier system replacement, and field failure investigations for the Lakehead Pipe Line Company over a six (6) year period on facilities that include pipeline, compression, substation, and storage facilities.

Portal Pipe Line Company, *North Dakota*

Supervised and completed the annual cathodic protection reading program for the Portal Pipe Line Company including pipeline, gathering and wellhead systems.

Alyeska Pipeline Service Company, *Alaska*

In-state direction, supervision and related to the process of conducting, analyzing and performing telluric based close interval surveys for the Trans-Alaska Pipeline System (TAPS) over a four (4) year period. Direct responsible for the performance, provision, data quality, data analysis and report recommendations.

Deseret Generation and Transmission Company, *Utah*

Supervised, conducted and performed the design and testing services for the Deseret Generation and Transmission Company. Planned and performed a wide variety of duties involving the evaluation, design, and installation of cathodic protection systems to inhibit corrosion on pipelines, tanks, and similar underground and submerged structures including electrical continuity and protection of concrete steel cylinder pipe.

ENGineering

David A. Schramm
Vice President, Pipeline Integrity & Corrosion Services

Project Experience (cont'd)

Mobil Oil, *Illinois*

Conducted and analyzed all underground facilities for the potential application of cathodic protection for the Mobil-Joliet Refinery. Operational and performance responsibilities related to installation of new and existing cathodic protection systems: design, redesign, and installation of impressed current systems for tank bottoms.

Montana Power, *Montana*

Conducted, analyzed and performed close interval and leak detection surveys on large diameter - high pressure – natural gas transmission pipelines owned and operated by Montana Power near Helena, Montana.

Northern Natural Gas, *Michigan*

Conducted, analyzed and performed close interval surveys on large diameter - high pressure – natural gas transmission pipelines owned and operated by Northern Natural Gas (NNG) in the Upper Peninsula of Michigan.

Mountain Bell Telephone, *Wyoming*

Supervised, conducted, analyzed and performed the corrosion control and cathodic protection analysis of the Mountain Bell Telephone lead sheath cable running between Evanston and Cheyenne, Wyoming.

Coffeen Power Plant, *Illinois*

Supervised, conducted, analyzed, designed and installed cathodic protection systems for the Coffeen Power Plant Facilities operated by the Central Illinois Light Company (CILCO).

LaGrange Hospital, *Illinois*

Designed, analyzed and supervised the installation of galvanic anode systems designed to protect the interior water box of condenser/chiller units operated by the LaGrange Hospital.

Union 76, *Illinois, Kentucky, Indiana*

Supervised, conducted and analyzed the cathodic protection systems installed on over 250 underground gasoline and waste oil storage tanks systems owned and operated by Union 76.

O'Hare Airport, *Illinois*

Designed and supervised the installation of galvanic anode protection systems for aviation fuel pipelines related to jet-way expansions. Responsible for the cathodic protection assessment, design, and mitigation on jet-way expansions of the G & H terminals as well as field supervision on the United Airlines terminal 1 construction project.

ENengineering

David A. Schramm
Vice President, Pipeline Integrity & Corrosion Services

Project Experience (cont'd)

City of Viburnum, *Missouri*

Designed and supervised the installation of down-hole impressed current systems for the City of Viburnum including the protection of water well casing, column and bowls.

Exhibit A - §195.551

Many times documentation or information which is not directly related to corrosion will have a direct effect on the ability to provide long term corrosion control. Examples of this found below include: the installation of the pipe at a greater depth to protect against third party damage – as third party damage can lead to corrosion wall loss; or the installation and commissioning of cathodic protection during construction rather than after pipeline start-up. The following general impact items and/or project definitions are provided as reference:

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Depth of Cover: The soil cover must be maintained at a minimum depth of 48 inches in all areas except consolidated rock. In areas where the pipeline is susceptible to threats from chisel plowing or other activities, the top of the pipeline must be installed at least one foot below the deepest penetration above the pipeline.

Revised April 10, 2007 – Petition of TransCanada (Excerpt):

- Keystone will purchase and utilize X-70 and X-80 grade steel pipe from technically pre-qualified pipe mills.
- Coating – Pipe: The pipe will be coated externally with plant applied fusion-bonded epoxy (FBE), girth welds will be coated with field applied FBE or liquid epoxy.
- Coating – Field Welded Joints: Field welded joints will be prepared and coated with FBE or liquid epoxy in accordance with TransCanada coating specifications.
- Coatings – Directional Drills/Slick Bores – Line pipe installed in a bored or directional drill crossing will be coated with FBE and an additional protective abrasion-resistant FBE outer coating or liquid epoxy.
- Keystone will design the pipeline to exceed the depth of cover requirements for installation of new oil pipelines set out in 49 CFR §195.248, Part D. Keystone will generally provide 4 feet of cover over the pipeline as compared with 30 inch minimum required by CFR 195. Depth of cover will be a minimum of 5 feet below the bottom of road ditches and water bodies, which includes rivers, creeks, streams, ditches and drains.
- External corrosion will be addressed by utilizing high performance coatings on the mainline pipeline, including girth welds, with additional protective abrasion-resistant coatings where required (e.g., bored crossings, HDD). In addition the cathodic protection system will be installed and progressively activated during the construction phase (instead of within one year of operation) to control corrosion immediately and thereby reducing any initial growth (sic., "of wall loss by corrosion"). Keystone's mill wall thickness tolerance will be more stringent than that required by API 5L, resulting in an increased initial minimum wall thickness.

Direct Testimony of Robert Jones:

- The pipeline is proposed to enter South Dakota in Marshall County and extend southerly, exiting the state underneath the Missouri River near Yankton, South Dakota.
- The length of the pipeline in South Dakota will be approximately 220 miles and will cross 10 counties.
- There will be aboveground facilities including four pump stations, remotely activated isolation valves, and densitometers. Power lines required providing power to pump stations, remotely activated isolation valves, and densitometers will be permitted and constructed by local utilities and not by Keystone.

Direct Testimony of Meera Kothari:

- No lateral lines will be constructed in South Dakota.
- The four pump stations in South Dakota will be in Day, Beadle, Miner and Hutchinson Counties. The stations and the pumps are electrically driven and will be required to pump the crude oil through the line.
- Fourteen mainline valves will be installed in South Dakota. Seven valves will be remotely controlled.
- Corrosion can be both internal and external. Corrosion defects are defects which develop over time during operation. Fusion bonded epoxy (FBE) is a protective coating that is applied to the external surface of the pipe to prevent corrosion. A cathodic protection system installed, comprised of engineered metal allows or anodes, which are connected to the pipeline. A low voltage direct current is applied to the pipeline; the process corrodes the anodes rather than the pipeline. The two combined mitigate external corrosion.

Exhibit B - §195.555

This section of code requires that supervisors maintain a thorough knowledge of that portion of the corrosion control procedures established under §195.402(c)(3) for which they are responsible for insuring compliance. Section §195.402(c)(3) relates to the operating, maintenance, and repair of the pipeline system in accordance with each of the requirements of this subpart (§195.402) and subpart H under §195. Although this section is more applicable to an operating pipeline and not a pipeline during construction, the intent is to insure that responsible individuals be required to have a thorough knowledge of corrosion control procedures and those requirements contained under §195.402.

In relative context to this section of code, the PHMSA Grant of Waiver and the Petition of TransCanada do focus on the direction and action related to §195.587, *Methods available to determine the strength of corroded pipe.* However, none of the documents specifically reviewed describe how compliance with this section of code will be achieved. Only a small reference section contained in the *revised April 10, 2007– Petition of TransCanada document* - as it relates to the application and performance testing for field applied coatings – was found and is provided below.

TransCanada should be able to provide additional plan documentation as to how it will require pipeline supervisors and/or inspectors to have a thorough knowledge of the corrosion control procedures and those contained under §195.402 during the design (corrosion control and cathodic protection design), installation, and operation of this pipeline.

Revised April 10, 2007 – Petition of TransCanada (Excerpt):
The application procedures used in the field have been tested and proven to provide the level of performance required when used with an approved coating material. The field applicators are trained and tested to prove they are capable of following the application procedure.

Exhibit C - §195.557

This section of code requires that each buried or submerged pipeline must have an external coating for external corrosion control if installed after October 20, 1985. As indicated below in reference, TransCanada meets all requirements with this section of code.

Revised April 10, 2007 – Petition of TransCanada (Excerpt):

- Keystone will purchase and utilize X-70 and X-80 grade steel pipe from technically pre-qualified pipe mills.
- Coating – Pipe: The pipe will be coated externally with plant applied fusion-bonded epoxy (FBE), girth welds will be coated with field applied FBE or liquid epoxy.
- Coating – Field Welded Joints: Field welded joints will be prepared and coated with FBE or liquid epoxy in accordance with TransCanada coating specifications.
- Coatings – Directional Drills/Slick Bores – Line pipe installed in a bored or directional drill crossing will be coated with FBE and an additional protective abrasion-resistant FBE outer coating or liquid epoxy.

Exhibit D - §195.559

This section of code describes the properties that a coating material must possess in order to be used on buried or submerged pipelines. In synopsis, the requirements are:

- Be designed to mitigate corrosion;
- Have sufficient adhesion to the metal surface to prevent under film migration of moisture;
- Be sufficiently ductile to resist cracking;
- Have enough strength to resist damage due to handling and soil stress;
- Support any supplemental cathodic protection; and
- If the coating is an insulating type, have low moisture absorption and provide a high electrical resistance.

TransCanada provides significant detail with regard to its selection of the pipeline coating, the coating to be used for bore operations, and the field coating that will be used on this pipeline.

For bore operations, TransCanada indicates their desire to use a "dual" FBE coating applied in plant using a parent FBE coating and a secondary FBE coating that is modified to have additional properties to increase its hardness and abrasive resistance properties. The advantage of this coating system is that there is no physical separation in the two coatings – as they are blended together at their interface during application. The outer layer FBE coating acts to protect the inner FBE coating which is considered to be the primary corrosion barrier. Again I would consider this to be an industry "best practice" choice which possesses all of the properties required by this section of code.

The same conclusion holds true for use of an "induction heated" field applied FBE or liquid epoxy coating indicated as the field joint coating. Again I would consider this selection to be an industry "best practice" choice which possesses all of the properties required by this section of code.

The TransCanada design parameters and the requirements contained in the PHMSA Grant of Wavier, requires the temperature of the pipeline to be held less than 150 degrees Fahrenheit in order to remain under the FBE coating limitation of 150 degrees F. TransCanada indicates a maximum temperature value on the pipeline at 100.4-degrees F

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Temperature Control: The pipeline operating temperatures must be less than 150 degrees Fahrenheit.

Revised April 10, 2007 – Petition of TransCanada (Excerpt):

- Coatings – Temperature Rating: The pipeline will operate at a minimum value temperature of 45.5-degrees F, and a maximum value temperature of 100.4-degrees F. the FBE (150-degrees F) and liquid epoxy coating systems (185-degrees F) are rated well above and below these respective temperatures.
- Coatings – Cased Crossings: All railroads, highways and roads will be crossed without casings unless otherwise requested and will minimize carrier pipeline corrosion due to mechanical or electrolytic shorts developed by casings over time.
- TransCanada's experience has shown that following this proactive approach to preventing and detecting coating disbonding in the factory and the field results in pipelines with a high degree of integrity and safety. To date, TransCanada has not experienced integrity issues with Fusion Bond Epoxy coated pipelines, some of which have been in service for 28 years. Keystone will take additional steps to ensure a higher quality pipe coating than is required by the latest editions of NACE International's Recommended Practice, RP-0169, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.

Direct Testimony of Meera Kothari:

- TransCanada has thousands of miles of this particular grade of pipeline steel installed and in operation. TransCanada pioneered the use of FBE, which has been in use on our system for over 28 years. There have been no leaks on this type of pipe installed by TransCanada with the FBE coating and cathodic protection system during that time. When TransCanada has excavated pipe to validate FBE coating performance, there has been not evidence of external corrosion.

Q7-1: Data Request: For those pipelines that TransCanada owns or operates over the last five (5) years, which are coated with a plant applied fusion bonded epoxy coating (FBE), how many failures or incidents related to external corrosion have occurred?

R7-1: Response: *There have been no failures or incidents on this type of pipe during the last five years on TransCanada's owned and operated pipelines that are coated with plant-applied FBE. TransCanada has not experienced a failure due to external corrosion on this type of pipe with FBE coating in over 28 years of experience.*

Q7-2: Data Request: Please provide additional information on the type and description of the coating that will be used for directional bored or thrust-bore locations? What quality control testing will be performed after bore operations to evaluate as-installed coating condition for acceptability?

R7-2: Response: *Directional bored pipe will be coated with plant-applied fusion bond epoxy ("FBE") to serve as the primary corrosion barrier. An additional topcoat of plant-applied FBE, formulated for abrasion resistance (i.e., the abrasion-resistant*

coating), will be applied to protect the primary FBE coating from damage during the directional drilling operation.

One full, additional joint of pipe is typically pulled through the bore location and is visually inspected for damage. This will provide an indication of the coating condition for the remaining joints within the bore location. The information will be recorded and incorporated in the performance testing for the cathodic protection system in the area.

Exhibit E - §195.561

This section of code requires that all external pipeline coatings be inspected with specific reference to the inspection of the pipe just prior to lowering into the ditch or submergence. It also requires the repair of any damage discovered.

Protective coatings on buried or submerged structures are required by code on this pipeline and are the initial defense in controlling pipeline corrosion. Protective coatings provide corrosion prevention by isolating the external surface of the pipeline from the surrounding environment. When used in conjunction with cathodic protection, they reduce cathodic protection current requirements and improve current distribution.

In addition to the specific reference to the inspection of the pipe just prior to lowering into the ditch or submergence, PHMSA in the Grant of Waiver is requesting a coating application quality control program to address surface cleanliness standards, blast cleaning, application temperature control, adhesion, cathodic disbondment, moisture permeation, bending, minimum coating thickness, coating imperfections and coating repairs. TransCanada acknowledges this requirement in their petition document dated as "revised – April 10, 2007.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Pipe Coating: The application of corrosion resistant coating to the steel pipe must be subject to a coating application quality control program. The program must address pipe surface cleanliness standards, blast cleaning, application temperature control, adhesion, cathodic disbondment, moisture permeation, bending, minimum coating thickness, coating imperfections and coating repair.
- Field Coating: Keystone must implement a field girth weld joint coating application specification and quality standards to ensure pipe surface cleanliness, application, temperature control, adhesion quality, cathodic disbondment, moisture permeation, bending, minimum coating thickness, holiday detection and repair quality must be implemented in field conditions. Field joint coatings must be non-shielding to cathodic protection (CP). Field coating applicators must use valid coating procedures and be trained to use these procedures. Keystone will perform follow-up tests on field-applied coating to confirm adequate adhesion to metal and mill coating.
- Coatings for Trenchless Installation: Coatings used for directional bore, slick bore and other trenchless installation methods must be resistant to abrasions and other damages that may occur due to rocks and other obstructions encountered in this installation technique.

Revised April 10, 2007 – Petition of TransCanada (Excerpt):

- (sic., "A") Test (sic., "of the") coating systems to insure that they meet the strict material property requirements of NACE RP-0394 Application, Performance, and Quality Control of Plant-Applied, Fusion Bonded Epoxy External Pipe Coating. Cure, flexibility, impact resistance, blast profile, interfacial contamination, thickness and cathodic disbondment resistance are some of the properties evaluated.
- Perform a pre trial to insure that the coating factory or application plant is capable of applying the coating such that the requirements of the above referenced specifications are met on a consistent basis in the finished product.
- Perform regular non-destructive and destructive tests during plan application on coated pipe samples obtained from the process to confirm the coated pipe meets the specified requirements. Unacceptable coated pipes are rejected and run through the process again until an acceptable product is produced.
- Inspect the coated pipe for "holidays" or coating defects prior to leaving the plant and repair any deficiencies found.
- Take care in handling the pipe in stockpiling, transportation and stringing to minimize any coating damage that may occur.
- Inspect the pipes after welding for "holidays" and again, all deficiencies are repaired prior to backfilling.
- Coat girth weld areas in the field using coating materials that have been previously tested and approved to provide acceptable levels of long term performance. The application procedures used in the field have been tested and proven to provide the level of performance required when used with an approved coating material. The field applicators are trained and tested to prove they are capable of following the application procedure. Periodic process parameter and coating cure tests insure that the girth weld coating us properly applied and will provide the high degree of protection required. Welds with unacceptable cure process parameters are cleaned off and recoated.
- TransCanada's experience has shown that following this proactive approach to preventing and detecting coating disbonding in the factory and the field results in pipelines with a high degree of integrity and safety. To date, TransCanada has not experienced integrity issues with Fusion Bond Epoxy coated pipelines, some of which have been in service for 28 years. Keystone will take additional steps to ensure a higher quality pipe coating than is required by the latest editions of NACE International's Recommended Practice, RP-0169, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.

Q7-4: Data Request: Describe TransCanada's quality control and inspection process as it relates to the protection of the external pipe coating as the pipe is lowered into the ditch or submerged? And during backfill operations?

R7-4: Response: *In order to verify that the construction specifications are followed by the construction contractor, Keystone will implement a quality control and quality*

assurance plan ("QC/QA Plan"). The OC/QA Plan will establish technical inspection policies and procedures (including those for protection of the external pipe coating) and delineate the duties and responsibilities of each construction inspector assigned to the Keystone project:

Keystone will have a lowering-in inspector assigned to the project to ensure that the external pipe coating is protected during this operation. Pipe will not be lowered into the ditch without the lowering-in inspector being present. Prior to lowering-in, the inspector will ensure that the contractor inspects all external pipe surfaces for coating defects and damage with a properly calibrated operable holiday detector and that any coating flaws are immediately marked and repaired. Additionally, the lowering-in inspector will ensure that the ditch bottom is free of rock and other construction debris and confirm that the ditch bottom is prepared and any required support pillows or padding have been placed. During lowering-in, the inspector will inspect the pipe handling equipment for properly manufactured slings, belts and cradles to protect the external pipe coating and the pipe handling to prevent it from swinging or rubbing against the sides of the ditch or making contact with the sidebooms.

Where pipe is submerged during lowering-in and is not concrete coated, the inspector will inspect the ditch spoil materials for the presence of rock or other debris that could damage the external pipe coating and, if these materials are present, require installation of rick shield or wood lagging to protect the external pipe coating prior to lowering in the pipe.

Keystone will also have a padding and backfill inspector assigned to ensure that the pipe and external coating are protected from physical damage. The padding and backfill inspector will confirm that any specified cathodic protection appurtenances have been installed and, where rocky or frozen ditch spoils are encountered, that acceptable padding material is made utilizing mechanical padders from the ditch spoil or imported padding material is placed over the pipe prior to backfilling or rock shield or wood lagging is utilized.

Keystone's QC/QA Plan will include periodic audits by construction management to confirm that inspections are being properly performed and documented.

Exhibit F - §195.563

This section of code requires that each buried or submerged pipeline must be cathodically protected if the pipeline is to be installed after October 20, 1985. The cathodic protection system must be in operation not later than 1 year after the pipeline is constructed.

For this pipeline, PHMSAs' Grant of Waiver specifically requires that the initial CP system be operational within six months of placing a pipeline segment into service – a more stringent requirement.

In the revised April 10, 2007 Petition, TransCanada indicates that they will be taking a more proactive approach to the application of cathodic protection and will install and commission into service CP systems along with pipeline construction.

Although not as common as historical practice, a pipeline operator under the code reference §195.563(a) could take up to a year after a pipeline is constructed to provide operational cathodic protection. Under this scenario, a pipeline completed in May of 2007 would not need to demonstrate the operation and the appropriate level of cathodic protection until May of 2008. The intent of the PHMSA Grant of Wavier is not to reduce code requirements but to acknowledge increased requirements (either at the Operator's commitment or by PHMSA requirement). As such, the 6-month stipulation that the initial CP system must be operational within six months of placing a pipeline segment in service is considered to be more stringent and mimics the increased intent by TransCanada to provide for the installation of cathodic protection timed to occur with each construction spread.

There are issues related to pipe construction where the commission of the rectifier into service (energize) can create safety issues to workers and welding operations during construction. As interpreted as intent of this section, and consistent with these potential safety issues, it is my opinion that TransCanada/Keystone must have an operational CP system within 6 -months of completion of an (electrically continuous) pipeline segment of pipe that is in-service (has been tested, dewatered, and nitrogen filled as in the case of first year build). This effectively increases the code requirement to just ½ the timeline allowed by code and increases the requirement to pipeline segment rather than pipeline.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Cathodic Protection (CP): The initial CP system must be operational within six months of placing a pipeline segment in service.

Revised April 10, 2007 – Petition of TransCanada (Excerpt): The pipeline will include an impressed current cathodic protection (CP) system in accordance with 49 CFR §195.563 which will be progressively activated during the construction phase.

Q7-3: Data Request: Will the entire pipeline and all appurtances (valves, stations, etc.) as proposed, be protected exclusively using an impressed type cathodic protection system? Or will additional types of cathodic protection systems be used?

R7-3: Response: *The entire pipeline and all appurtances will be protected exclusively using an impressed current cathodic protection system.*

Q7-5: Data Request: Describe where TransCanada is proposing to locate and how easements are to be secured for the proposed impressed current rectifier and groundbed systems?

R7-5: Response: *Keystone anticipates using deep well anode groundbeds, and locating these facilities within the fenced pump station sties. Pump station sites are being acquired in fee. If any intermediate deep well anode groundbeds are required, Keystone anticipates locating them within fenced mainline valve sites. Mainline valve sites are being acquired with the pipeline easement.*

Q7-11: Data Request: Please provide additional detail on how TransCanada's proposed to install and progressively activate the cathodic protection system especially under a multiple spread scenario?

R7-11: Response: *Keystone's pipeline construction contractor will install cathodic protection ("CP") test lead wires to the proposed pipeline and will facilitate the installation of any necessary test leads by foreign utilities crossed by Keystone. Keystone will use a CP contractor to install CP rectifiers, junction boxes, deep well groundbeds, and test stations, as well as to commission and startup the CP system.*

Keystone proposes to construct one pipeline spreads in 2008 and two in 2009. The CP contractor will install the deep well ground beds, junction boxes and rectifiers simultaneously with the pipeline construction. Upon completion of the pipeline construction in 2008, the CP system on that portion of the pipeline will be commissioned and started up by the CP contractor. The 2009 work will be completed in similar manner.

Exhibit G - §195.565

This section of code requires cathodic protection to be installed to the bottom of an above-grade breakout tank more than 500 barrels in capacity if installed after October 2, 2000.

Q7-12: Data Request: Please provide the number of breakout type tanks that will be installed in the State of South Dakota and the means that will be used for the application of cathodic Protection.

R7-12: Response: *There are no breakout tanks to be installed in South Dakota*

Deleted: ¶

Exhibit H - §195.567

This section of code requires that all pipelines under cathodic protection must have electrical test leads for external corrosion control. Further this code section requires that:

- **The leads are located at intervals frequent enough to determine the adequacy of cathodic protection.**
- **Looping or slack is provided during installation so that undue stress on the connection or wire does not occur.**
- **Lead attachments are prevented from causing stress concentration on the pipe.**
- **Each connection is coated to the pipeline (and bared wire) with an electrical insulating material compatible with the pipe coating and the insulation on the wire.**
- **The test lead wires are maintained in a condition that enables future electrical measurements to be made.**

Based on review of the documentation available and pertinent to this code section, a discrepancy exists between the language used in the revised April 10, 2007 petition by TransCanada and the PHMSA Grant of Waiver. Specifically, PHMSA is requiring more stringent requirements for the location of test points in and adjacent to HCA segments and requires that upon commission testing of the pipeline be completed within 6 months and address the proper number and location of CP test stations, AC interference mitigation, and AC grounding programs. PHMSA also requires that remedial action must occur (when test station readings fail to meet 49 CFR 195, Subpart H requirements within six months. Remedial actions must include a close interval survey on each side of the affected test station.

As described in the revised April 10, 2007 Petition and the PHMSA Grant of Waiver, the information and procedures will meet or exceed the requirements contained in this code section with regard to the location of test points and what must occur when a test station is "lost" or "unusable" during construction activities or during pipeline operations.

Most likely due to the stage of this petition, no documentation could be found that relates and addresses that middle three (3) bullets items describing how the wires will be installed (loop or slack), what methods of attachment will be used to prevent stress risers, and how the connection will be coated.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Corrosion Surveys: Corrosion surveys of the affected pipeline must be completed within six months of placing the respective CP system(s) in operation to ensure adequate external corrosion protection per NACE RP0169. The survey will also

address the proper number and location of CP test stations as well as AC interference mitigation and AC grounding programs per NACE RP0177. At least one CP test station must be located within each HCA with a maximum spacing between test stations of one-half mile within the HCA. If placement of a test station within an HCA is impractical, the test station must be placed at the nearest practical location. If any annual test station reading fails to meet 49 CFR 195, Subpart H requirements, remedial actions must occur within six months. Remedial actions must include a close interval survey on each side of the affected test station and all modifications to the CP system necessary to ensure adequate external corrosion control.

Revised April 10, 2007 – Petition of TransCanada (Excerpt): Test stations will be attached to the pipeline at intervals averaging one mile and not exceeding two miles, and at all public road and railroad crossings. Test leads and CP bond wires will be installed on the Keystone Pipeline at foreign pipeline crossings and installed on the foreign pipeline being crossed, when approved by the owner of the foreign pipeline.

Q7-11: Data Request: Please provide additional detail on how TransCanada's proposed to install and progressively activate the cathodic protection system especially under a multiple spread scenario?

R7-11: Response: *Keystone's pipeline construction contractor will install cathodic protection ("CP") test lead wires to the proposed pipeline and will facilitate the installation of any necessary test leads by foreign utilities crossed by Keystone. Keystone will use a CP contractor to install CP rectifiers, junction boxes, deep well groundbeds, and test stations, as well as to commission and startup the CP system.*

Keystone proposes to construct one pipeline spreads in 2008 and two in 2009 in South Dakota. The CP contractor will install the deep well ground beds, junction boxes and rectifiers simultaneously with the pipeline construction. Upon completion of the pipeline construction in 2008, the CP system on that portion of the pipeline will be commissioned and started up by the CP contractor. The 2009 work will be completed in similar manner.

Exhibit I – 195.569

This section of code requires that if you have knowledge that any portion of the buried pipeline will be exposed, you must examine the exposed portion for evidence of corrosion if the pipe is bare or if the coating is deteriorated. If you find external corrosion at a level that requires corrective action you must investigate in all directions to determine if any additional corrosion exists in the vicinity that might require correction action. The investigation can be done by visual and/or indirect methods.

This code section is more applicable to a pipeline that is in operation rather than the during the construction and installation process – for the simple fact that the pipeline has not been placed in an environment long enough for corrosion (time dependent threat) to have occurred. In addition, during lay-in operations the pipeline is required and has undergone a 100% visual inspection prior to burial.

Most pipeline companies have detailed Operations and Maintenance procedures with regard to the inspection of pipe when exposed. TransCanada should be able to provide additional plan documentation as to how it will meet this code regulation during pipeline operation. This process should be followed during the exposure of any section of pipe after backfill operations are complete – regardless of how long the pipe has been buried or submerged.

Exhibit J - §195.571

This section of code requires that cathodic protection under this subpart must comply with one or more of the criteria contained in paragraphs 6.2 and 6.3 of the National Association of Corrosion Engineers (NACE) Standard RP 0169.

Both the TransCanada Petition and the PHMSA Grant of Waiver acknowledge the use of RP-0169 as the criteria for cathodic protection that will be used.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Corrosion Surveys: Corrosion surveys of the affected pipeline must be completed within six months of placing the respective CP system(s) in operation to ensure adequate external corrosion protection per NACE RP0169. The survey will also address the proper number and location of CP test stations as well as AC interference mitigation and AC grounding programs per NACE RP0177. At least one CP test station must be located within each HCA with a maximum spacing between test stations of one-half mile within the HCA. If placement of a test station within an HCA is impractical, the test station must be placed at the nearest practical location. If any annual test station reading fails to meet 49 CFR 195, Subpart H requirements, remedial actions must occur within six months. Remedial actions must include a close interval survey on each side of the affected test station and all modifications to the CP system necessary to ensure adequate external corrosion control.

Q7-14: Data Request: Please provide the criteria for cathodic protection that will be used for this pipeline and related appurtances? Please provide the procedures that will be used to ensure the requirements for the criterion are met?

R7-14: Response: *The criteria for cathodic protection that will be used for this pipeline will correspond with the requirements of 49 CFR Part 195 Subpart H and NACE recommended practice RP 0169 (sic., "SP-0169 as of 2007"). Keystone's Integrity Management Plan will ensure the requirements for the criteria are met.*

Exhibit K - §195.573

This section of code requires (cathodically) protected pipelines similar to this project to be monitored with activities to include:

- Conduct an annual test to determine the level of cathodic protection applied (each calendar year not to exceed 15 months from the last inspection).
- Assess the facility and determine the circumstances in which a close-interval survey (CIS) or compatible technology is practicable and necessary – with the implication that if you determine that a CIS is required that it is performed.
- Perform testing to determine the performance of impressed current rectifiers and other devices for operation. Rectifiers are to be inspected at a minimum at least six times each calendar year and at intervals not exceeding 2.5 months. Interference bonds (where failure of the bond would jeopardize integrity are to be inspected at a minimum of at least six times each calendar year and at intervals not exceeding 2.5 months. All other bond locations are to be inspected each calendar year not to exceed 15 months from the last inspection.

The revised April 10, 2007 TransCanada Petition acknowledges the requirements to meet this code section. The April 30, 2007 PHMSA Grant of Waiver is more stringent and places additional direction and requirements with regard to this code section. This includes:

- That a corrosion survey be completed within six months of placing the respective CP system(s) in operation.
- That the corrosion survey must also address the proper number and location of CP test station, AC interference mitigation and AC grounding locations.
- The requirement to install test stations with High Consequence Areas (HCA) at a defined interval increases the monitoring requirements for cathodic protection in within the HCA.
- A close interval survey (CIS) must be performed on the pipeline within two years of the pipeline in-service date.
- The CIS results must be integrated with the baseline ILI to determine whether further action is needed.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Pipeline Inspection: The pipeline must be capable of passing in line inspection (ILI) tools. All headers and other segments covered under this special permit that do not allow the passage of an ILI device must have a corrosion mitigation plan.
- Corrosion Surveys: Corrosion surveys of the affected pipeline must be completed within six months of placing the respective CP system(s) in operation to ensure adequate external corrosion protection per NACE RP0169. The survey will also address the proper number and location of CP test stations as well as AC interference mitigation and AC grounding programs per NACE RP0177. At least one CP test station must be located within each HCA with a maximum spacing between test stations of one-half mile within the HCA. If placement of a test station within an HCA is impractical, the test station must be placed at the nearest practical location. If any annual test station reading fails to meet 49 CFR 195, Subpart H requirements, remedial actions must occur within six months. Remedial actions must include a close interval survey on each side of the affected test station and all modifications to the CP system necessary to ensure adequate external corrosion control.
- Initial Close Interval Survey (CIS) – Initial: A CIS must be performed on the pipeline within two years of the pipeline in-service date. The CIS results must be integrated with the baseline ILI to determine whether further action is needed.

Q7-13: Data Request: Please provide any detail of, if any, the measurements that will be obtained during pipeline construction that relate to §195, subpart H? What measurements will be taken during pipeline operation?

R7-13: Response: *Measurements that will be obtained during pipeline construction relating to 49 CFR Part 195 Subpart H includes:*

- *Part 195.561 – The external coating will be checked for holidays using visual inspection and electronically using a holiday detector ("jeep").*
- *Part 195.563 – Measurements will be taken to determine soil resistivities to enable design of the cathodic protection system.*
- *Part 195.575 – Keystone will electrically interconnect and cathodically protect its pipeline and aboveground facilities as a single unit and therefore, measurements related to isolation equipment are not required.*
- *Part 195.577 – Electrical measurements will be taken to identify any HVAC and HVDC interference currents, and interference with any close paralleling pipelines.*

During operations, monthly rectifier readings to check for voltage, current, and resistance will be performed consistent with Part 195.573(c). An annual test lead survey will also be performed to check system performance, and an annual equipment and maintenance check will be conducted on the rectifiers consistent with Part 195.573(a).

Exhibit L - §195.575

This section of code requires the electrical isolation of a buried or metallic or submerged pipeline from other metallic structures unless by design it is electrically interconnected and cathodically protected with the pipeline as a single structure. Where necessary to electrically isolate a portion of the pipeline - to facilitate the application of corrosion control - you must install one or more electrically insulating devices. And where installed, you must inspect and test to assure the isolation is adequate.

In addition, if you install an insulating device in area where a combustible atmosphere could exist or reasonably foreseen, you must take precautions to prevent arcing. And finally, if a pipeline is in close proximity to an electrical transmission tower footing, ground cable, counterpoise (buried ground cables that connect between towers) or other areas where it is reasonable to foresee fault currents or an unusual risk for lightning, you must protect the pipeline against this type of damage and take protective measures at insulating devices.

By design the casing pipe at a cased pipeline crossing is electrically isolated from the carrier pipe (the pipeline carrying the product). This is achieved through the use of electrically isolating casing spacers. An installation completed in this manner complies with the intent of code. I would agree with the Testimony of Meera Kothari that industry "best practice" has moved away from designing and building pipelines that are cased and, as proposed, TransCanada indicates that they are not intending to make use of cased crossings.

TransCanada indicates that the pump station and pipeline will be protected as a single unit and therefore electrical isolation will not be required. Under this design the cathodic protection system will not only protect the pipeline but the electrical ground system within the pump station and that which is common to the incoming AC power supply system. This is simply a matter of cathodic protection design philosophy and one that is common to many pipeline systems operating in the United States today.

The advantages of this design include (but are not limited to):

- Elimination of stray current issues on the AC grounding system.
- The application of cathodic protection to the AC grounding system to mitigate corrosion loss of electrical ground.
- Reduced maintenance and monitoring activities in context to locations where electrical isolation and the protective devices that would exist.
- Common grounding path in the event of electrical ground fault conditions.

It should be noted that TransCanada indicates the pipeline will not be collocated with any AC power lines or corridors within the State of South Dakota.

Direct Testimony of Meera Kothari:

- Casings have been proven to be a significant risk for the development of corrosion. TransCanada, along with the rest of the pipeline industry, has moved away from designing and building pipelines that are cased.

Q7-8: Data Request: Please confirm the amount of pipeline rights-of-way through the State of South Dakota that will cohabitate with an AC power line or corridor? Also where applicable, indicate the size of the AC power line(s)?

R7-8: Response: *Keystone's proposed pipeline routing will not be collocated with any AC power lines or corridors in South Dakota*

Q7-15: Data Request: Please provide additional information on how the pipeline will be electrically constructed in philosophy? Will pump stations be protected independently or under common protection with the pipeline? Where will electrical isolation be installed?

R7-15: Response: *Keystone will electrically interconnect and cathodically protect its pipeline and aboveground facilities, including pump stations, as a single unit. An electrical isolation design philosophy will not be used. Therefore, there will be no need for electrical isolation between each pump station and pipeline.*

Q7-16: Data Request: Please describe how any points of electrical isolation will be protected from electrical surges or lightning?

R7-16: Response: *There will be no points of electrical isolation, as Keystone will not electrically isolate pump stations from the pipeline.*

Q7-17: Data Request: Will electrical ground at motorized valves and pump stations facilities be electrically independent from the pipeline or protected in common with the pipeline cathodic protection system?

R7-17: Response: *The electrical ground at motorized valves and pump station facilities will be protected in common with the pipeline cathodic protection system.*

Exhibit M - §195.577

This section of code requires a program to identify, test for, and minimize the detrimental effects if the pipeline is exposed to stray electrical currents. In addition, you must design and install each impressed current or galvanic anode system to minimize any adverse effects on existing adjacent metallic structures.

Significant documentation has been provided with regards to this code section. A summary follows:

- A large section of documentation relates to the assessment and protection of the pipeline when collocated with high voltage electric transmission lines.
    - Within the State of South Dakota, the Keystone pipeline will not be installed collocated with any high voltage electric transmission lines. Based on the PHMSA Grant of Waiver, this does not eliminate Keystone from the requirement to conduct an AC assessment survey and installing mitigation equipment (as required) along this section of the pipeline.

- Both the TransCanada Petition and PHMSA Grant of Waiver acknowledge and address interference surveys and the requirements to document the results and take corrective actions to mitigate any adverse effects.
    - As detailed in the table at the end of this section, approximately 1 mile of pipeline cohabitates with other foreign pipeline systems.

- The design of the cathodic protection system (impressed current, deep anode groundbed systems at station locations and mainline valve sites is described with the intent to reduce stray current effects on other metallic facilities and reduce issues with animal livestock. The end effect of this design minimizes earth gradient potential differences.

- TransCanada acknowledges the issues with Telluric currents and describes an operational plan to address this issue if it is found along the pipeline.

- Protection of AC ground in the stations can eliminate potential adverse effects on neighboring AC and electrically continuous grounding systems.

In this particular case, collocation or cohabitation is when differently operated pipelines or even electrically and independently isolated pipelines are installed in common rights-of way. When multiple pipelines are installed in a common rights-of-way, additional measures are required to ensure that a proper and representative pipe-to-soil is obtained over the line being inspected and can at times increase the difficulty locating the pipeline. Since TransCanada has provided that there are

there are three (3) actual pipeline crossings with other regulated pipeline facilities in South Dakota and no common rights-of-way this is not an issue.

Code requires a 12-foot minimal spacing between electrically independent structures. Although spacing between facilities plays a role in, stray current interference and its detection relies more on the understand of where foreign operated cathodic protection systems are located with respect to the pipeline being tested; and based on those locations, where interference might occur. Once determined, specific site testing is performed to confirm or rule-out if this condition exists. Typically uncongested rights-of-way (as in the case reported by TransCanada) reduce the number of locations that would need to be assessed. This condition is also affected by the soil resistivity values along the pipeline rights-of-way. Based on the information provided by TransCanada, the testing as proposed is consistent with that required to detect, monitor and mitigate stray current interference.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Interference Currents Control: Control of induced alternating current from parallel electric transmission lines and other interference issues that may affect the pipeline must be incorporated into the design of the pipeline and addressed during the construction phase. Issues identified and not originally addressed in the design phase must be brought to PHMSA headquarters' attention. An inducted AC program to protect the pipeline from corrosion caused by stray currents must be in place and functioning within six months after placing the pipeline into service.
- Interference Current Surveys: Interference surveys must be performed within six months of placing the pipeline in service to ensure compliance with applicable NACE International Standard Recommended Practices 0169 and 0177 (NACE RP0169 and NACE RP0177) for interference current levels. If interference currents are found, Keystone will determine if there have been any adverse affects to the pipeline and mitigate the effects as necessary. Keystone will report the results of any negative finding and the associated mitigative efforts to the appropriate PHMSA regional office.

Revised April 10, 2007 – Petition of TransCanada (Excerpt):

- The proposed Keystone pipeline is not co-located with high voltage power transmission lines and exposure to inducted alternating current (AC) electric currents is therefore minimal. Corrosion due to AC interference is very rate. Research by PRCI (GRI8187) concluded AC corrosion is possible only in special circumstances of current density and holiday size. The concern for AC interference in personnel safety (step and touch potentials). Keystone will install CP and stray current mitigation facilities during pipeline construction. The requirements of OSHA 1910.269(n) Grounding for Protection of Employees, 1910.269 Appendix C Protection from Step and NACE PR0177 Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion

Control Systems will be met. Specifically, step and touch potential will be maintained at no more than 15 Volts RMS AC. During operation, the effectiveness of the original mitigation designs will be evaluated and modification made as required.

- Telluric currents are currents flowing in the crust of the planet earth as a result of inductive and capacitive effects from the aurora borealis. The aurora borealis is produced when solar wind charged particles are trapped by the earth's magnetic field. Trans Canada has been doing research on the effects of telluric currents on pipelines with Carlton University and the Geomagnetic Laboratory of Natural Resources Canada for over 10 years. TransCanada originally performed research on telluric currents as part of the pre-engineering for the Alaska Highway Gas Pipeline Project in the late 1970's and early 1980's. Earth magnetic fields can make it difficult to perform CP surveys, but have little to no effect on pipeline integrity. Methods for correcting for earth currents are used on a regular basis in CP surveys at TransCanada. The methodology employs a satellite based CP power source interruption system which is synchronized with stationary reference cell data collectors on both sides of the survey region. Baseline ground potentials are recorded in sync with the pipe-to-soil survey potentials in order that the CP survey potential readings can be corrected for the deviations produced by Telluric Currents.

Direct Testimony of Meera Kothari:

- Federal pipeline regulations require pipelines to have a minimum clearance of 12 inches from foreign utilities. Typical industry practice is to under cross an existing utility.

Q7-7: Data Request: How is TransCanada addressing the location of the impressed current groundbeds with respect to animal livestock?

R7-7: Response: *To protect animal livestock against the potential for adverse impacts, Keystone will install deep groundbed cathodic protection systems within the fenced pump station and mainline valve sites.*

Q7-8: Data Request: Please confirm the amount of pipeline rights-of-way through the State of South Dakota that will cohabitate with an AC power line or corridor? Also where applicable, indicate the size of the AC power line(s)?

R7-8: Response: *Keystone's proposed pipeline routing will not be collocated with any AC power lines or corridors in South Dakota.*

Q7-9: Data Request: For areas of cohabitation with AC power (as applicable) or any other locations where electrical shock is possible, what safety precautions will be taken to prevent electrical shock to employees or the general public? What safety precautions or monitoring will be taken to prevent excessive AC current from discharging from small pipeline holidays?

R7-9: Response: *There are no locations in South Dakota where the Keystone Pipeline will collocate with AC power lines. There is a potential for electrical shock at certain areas, including electrical substations and electrical switchgear buildings located within the pump station and mainline valve sites. Because the pump station and mainline valve sites will be fenced, the general public will be protected from electrical shock. These facilities will be designed in accordance with the applicable codes and regulations to protect employees and other authorized personnel from electrical shock.*

Stray current discharging from pipeline holidays will be mitigated through interference surveys and adjustments to the cathodic protection system during operations, which will be done as part of the Integrity Management Program.

Q7-10: Data Request: Please confirm the amount of pipeline rights-of-way through the State of South Dakota that will cohabitate with another foreign pipeline system? Also where applicable indicate the type (gas, liquid, etc.) of product contained in the foreign pipeline?

R7-10-Response: *Keystone's proposed pipeline routing will be collocated with existing pipelines as follows:*

Begin MP	***End MP***	***Sic "(Distance Calculated)"***	***Existing Pipeline***	***Product***	***Type***
427.2	*427.8*	*0.6 miles*	*Kaneb*	*Refined Product*	*Liquid*
436.5	*436.7*	*0.2 miles*	*Local Gas Pipeline*	*Natural Gas*	*Gas*
436.7	*436.9*	*0.2 miles*	*Kaneb*	*Refined Product*	*Liquid*

Exhibit N - §195.579

This section of code requires that if you transport any hazardous liquid that would corrode the pipeline, you must investigate the corrosive effect of the hazardous liquid and take adequate steps to mitigate internal corrosion.

If inhibitors are used, then they must be of sufficient quantity to protect the entire system, coupons or other monitoring equipment must be installed to determine the effectiveness of the inhibitor. The monitoring equipment must be examined at least twice per year and not to exceed 7.5 month intervals

This section of code requires procedures and action to perform an inspection of the internal surface of the pipe whenever you remove a section of pipe from the pipeline. If corrosion is found, you must investigate and take corrective action.

As described below, the revised April 10, 2007 TransCanada Petition indicates a more stringent limit level to sediment and water levels than industry standards and has designed the pipeline to operate in a turbulent flow mode. The PHMSA Grant of Waiver acknowledges this more stringent level as a requirement to construct. This Grant of Waiver includes operational notification requirements, cleaning intervals and the required use of corrosion coupons.

During construction, sufficient activities are in place to remove any leftover hydro-test water and, during construction hold-up, a nitrogen purge will in place to prevent internal corrosion and to monitor pressure (of the nitrogen) for any indication of wall loss.

The approach as outlined meets or exceeds the requirements contained in this code section.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Pipeline Inspection: The pipeline must be capable of passing in line inspection (ILI) tools. All headers and other segments covered under this special permit that do not allow the passage of an ILI device must have a corrosion mitigation plan.
- Internal Corrosion: Keystone shall limit sediment and water (S&W) to 0.5 percent by volume and report S&W testing results to PHMSA in the 180-day and annual reports. Keystone shall also report upset conditions causing S&W level excursions above the limit. This report shall also contain remedial measures Keystone has taken to prevent a recurrence of excursions above the S&W limits. Keystone must run cleaning pigs twice in the first full year of operation and as necessary in succeeding years based on the analysis of oil constituents, weight loss coupons located in areas with the greatest internal corrosion threat and other

internal corrosion threats. Keystone will send their analysis's and further actions, if any, to PHMSA.

Revised April 10, 2007 – Petition of TransCanada (Excerpt):

- Internal corrosion will be addressed utilizing a more stringent tariff S&W requirement to reduce the corrosivity of the transported liquid, and ultimately resulting in lower corrosion rates. Internal corrosion will also be addressed through a pipeline design resulting in turbulent flow in all flow regimes to prevent the drop out of water or solids and, as set out above, through the use of a more stringent mill wall thickness tolerance. In addition, Keystone proposes to utilize a cleaning program to confirm the effectiveness of its program. Effectiveness of the internal corrosion program will be reported to PHMSA for the first five years of operation.

Direct Testimony of Meera Kothari:

- A tariff specification of 0.5% solids and water by volume is contained in Keystone's transportation agreement with its shippers. This specification is lower than the industry standard of 1% to minimize the potential for internal corrosion. The pipeline is designed to operate in turbulent flow to minimize water drop out, which is also a potential cause of internal corrosion. During operations the pipeline is cleaned using in-line inspection tools. The pipeline is inspected with a smart in-line inspection tool, which measures and records internal and external metal loss.

Q7-18: Data Request: Please describe any activities and parameters that will be used to reduce the risk for internal corrosion after completion of the hydro-test, during and immediately after the de-watering process?

R7-18: Response: *In 2008, once the pipeline is tested and dewatered, the pipeline will be purged of air and filled with nitrogen. In 2009, filling the pipeline with crude oil will immediately follow once the pipeline is tested and dewatered.*

Q7-19: Data Request: Please describe what measurements will be taken or designed into to this pipeline to monitor the pipeline and appurtances for internal corrosion during its operation?

R7-19: Response: *Keystone has conducted an internal corrosion ("IC") susceptibility study (oil/water flow model). The follow model results indicate:*

- *No considerable risk of IC at normal operating conditions*
- *Risk of water stratification and IC resulting from "near minimum flow" (worst case) condition showed allowance of 40% - 75% reduction in flow rate below minimum operation flow rate of 340,000 bpd for water drop-out to occur; and*
- *Residual risk to be mitigated through Integrity Management Program*

Keystone will monitor the product for compliance with the specification of 0.5% sediment and water, (the current U.S. industry standard is 1%). Keystone will conduct sampling for sulphur (sic, "Sulfur"), micro-carbon residue ("MCR") and total acid number

("TAN") to determine product quality. If there is any indication of corrosion effects Keystone will implement mitigation methods which may include one or more of the following methods to manage internal corrosion susceptibility: corrosion coupons; use of cleaning and MFL tools to identify anomalies; and chemical treatment (Corrosion Inhibitors and/or Biocides).

Exhibit O - §195.581

This section of code requires the pipeline or portion of the pipeline to be cleaned and protectively coated if it is exposed to the atmosphere. This must be done with a coating material suitable for the prevention of atmospheric corrosion. This section of code applies to all atmospherically exposed locations unless demonstrated by test, investigation, or experience - appropriate to the environment - that only a light surface oxide will develop or that any atmospheric corrosion that occurs will not affect the safe operation of the pipeline before the next scheduled inspection. This exemption does not apply to locations of interface between soil and air (such as at pipe risers, valve stems etc.).

The revised April 10, 2007 TransCanada Petition and the PHMSA Grant of Waiver generally focus on those areas of pipe manufacture and construction which are significant to the integrity of the pipeline and which are difficult to resolve once the pipeline is buried. As such, the issue of an atmospheric coating – at this stage of the project – would not be expected and has not been address nor defined in any reviewed document.

TransCanada should be able to provide additional plan documentation as to how it will protect the above grade portions of this pipeline (and related appurtances) from atmospheric corrosion. Response from TransCanada should address the protective coating for atmospheric coating and provide specific reference as to how the interface area between the soil and air (such as at risers) will be addressed. This should include, but not be limited to:

- Project timeline as it relates to the application of a protective coating and how this timeline protects the safe operation of the pipeline
- Surface preparation
- Material specifications
- Procedures for installation
- Quality control measures and procedures

- If TransCanada will not be using a protective coating:
    - Than documentation should be provided as to how TransCanada will demonstrate by test, investigation, or experience - appropriate to the environment - that only a light surface oxide will develop or that any atmospheric corrosion that occurs will not affect the safe operation of the pipeline.

Exhibit P - §195.583

This section of code requires the inspection for atmospheric corrosion of each pipeline or portion of pipeline exposed to the atmosphere occur at least once every 3 calendar years, with intervals not exceeding 39 months between inspections.

This inspection must give particular attention to the pipe at the soil-to-air interface, under thermal insulation, under disbonded coatings, at pipe supports, at deck penetrations, and on spans over water. If atmospheric corrosion is found during the inspection you must address and provide/restore atmospheric corrosion protection consistent with §195.581.

The revised April 10, 2007 TransCanada Petition and the PHMSA Grant of Waiver generally focus on those areas of pipe manufacture and construction which are significant to the integrity of the pipeline and which are difficult to resolve once the pipeline is buried. As such, the inspection of an atmospheric coating – at this stage of the project – would not be expected and has not been address nor defined in any reviewed document.

TransCanada should be able to provide additional plan documentation as to how it will monitor and inspect the above grade portions of this pipeline (and related appurtances) for atmospheric corrosion. Response from TransCanada should address the protective coating for atmospheric coating and provide specific reference as to how the interface area between the soil and air (such as at risers) and under thermal insulation will be addressed. This should include, but not be limited to:

- Procedures related to inspection performance
- Assessment criteria that will be used
- Response timelines for resolution of any issues found
- Procedures related to repair and restoration

Exhibit Q - §195.585

This section of code requires that if you find pipe generally corroded so that the remaining wall thickness is less than that required for the maximum operating pressure (MAOP) of the pipe you must replace the pipe. This must be done unless you:

- Reduce the maximum operating pressure commensurate with the strength of the pipe needed for service ability based on actual remaining wall thickness; or
- Repair the pipe by a method that reliable engineering tests and analysis show can permanently restore the serviceability of the pipe.

If pipe is found to have localized corrosion pitting to a degree that leakage might result, you must replace or repair the pipe, unless you reduce the maximum operating pressure (MAOP) commensurate with the strength of the pipe based on remaining wall thickness in the pits.

This section of code is more applicable to an operating pipeline. The revised April 10, 2007 TransCanada Petition and the PHMSA Grant of Waiver generally focus on those areas of pipe manufacture and construction which are significant to the integrity of the pipeline and which are difficult to resolve once the pipeline is buried. The pipeline is under continual inspection prior to installation as documented subsequent to this Exhibit.

TransCanada should be able to provide additional plan documentation as to how it will monitor and inspect portions of this pipeline (and related appurtances) if found to have generalized corrosion or localized corrosion pitting - either during installation and/or operation. This should include, but not be limited to:

- Procedures related to inspection performance and the operating actions that will occur.
- Assessment criteria that will be used
- Response timelines for resolution of any issues found
- Procedures related to repair and restoration

Exhibit R - §195.587

This section of code indicates you may use the procedure in ASME B31G, *Manual for Determining the Remaining Strength of Corroded Pipelines"* or the procedure developed by AGA/Battelle, *"A Modified Criterion for Evaluating the Remaining Strength of Corroded Pipe (with RSTRENG disk)"* to determine the strength of corroded pipe based on remaining wall thickness. These procedures apply to corroded regions that do not penetrate the pipe wall and the application is subject to the limitations set out in the respective procedures.

Both the revised April 10, 2007 TransCanada Petition and the PHMSA Grant of Waiver acknowledge the use of tools such as ASMEB31G, and the Modified Criterion for Evaluating the Remaining Strength of Corroded Pipe (RSTRENG). The TransCanada Petition provides a high level assessment related to the use of these tools and the applicability for this pipeline project.

The PHMSA Grant of Waiver requires that Keystone apply the most conservative methods in order to confirm and determine the strength of corroded pipe based on remaining wall thickness. In addition the PHMSA Grant of Waiver requires that Keystone must confirm that the remaining strength tools (RSTRENG), RSTRENG-0.85dL and ASME B31G are valid for this pipeline. It addition it applies a more stringent requirement for Anomaly Evaluation and Repair Criteria.

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Anomaly Evaluation and Repair: Anomaly evaluations and repairs in the special permit area must be performed based upon the following:
    - Immediate Repair Conditions: Follow 195.452(h)(4)(i) except designate the calculated remaining strength failure pressure ratio (FPR) =<1.16
    - 60-day Conditions: No changes to 195.452(h)(4)(ii).
    - 180-day Conditions: Follow 195.452 (h)(4)(iii) with exceptions for the following conditions which must be scheduled for repair within 180 days;
        - Calculated FPR =<1.32
        - Areas of general corrosion with predicted metal loss greater than 40 percent.
        - Predicted metal loss is greater than 40 percent of nominal wall that is located as a crossing of another pipeline.
        - Gouge or groove greater than 8 percent of nominal wall
- Each anomaly not repaired under the immediate repair requirements must have a corrosion growth rate and ILI tool tolerance assigned per the Integrity Management Program (IMP) to determine the maximum re-inspection interval.
- Anomaly Assessment Methods: Keystone must confirm the remaining strength (RSTRENG) effective area, RSTRENG-0.85dL and ASME B31G assessment methods are valid for the pipe diameter, wall thickness, grade, operating pressure,

operating stress level and operating temperature, Keystone must also use the most conservative method until confirmation of the proper method is made to PHMSA headquarters.

Revised April 10, 2007 – Petition of TransCanada (Excerpt Appendix G): A review of literature sources and direct contacts with organizations that have been connected with the development validation of methods for the development and validation of methods for the assessment of the remaining strength of corroded pipe (RSTRENG) indicated that the database of validating tests does not extend beyond an SMYS of 70,000 psi. However, methods such as RSTRENG and ASME B31G contain no factors that are grade-dependent other than the flow stress. All other factors are purely geometry-dependent. The usual definition of flow stress for strength grades up to X70 has been SMYS + 10,000 psi for RSTRENG and 1.1 x SMYS for ASME B31G. For X80, this would lead to a flow stress equal or close to the specified minimum tensile strength. While some work indicates that, for modern high-toughness steels, tensile strength may be a better failure criterion than yield strength or flow stress, it is more consistent with the philosophy of approaches based on the Battelle surface flaw equation, like RSTRNG and ASME B31G, to continue to use a flow stress that is intermediate between yield and tensile strength. Accordingly, for higher-grade materials such as X80, a more appropriate minimum flow stress criterion is the mean of SMYS and specified minimum tensile strength (SMTS). Keystone will use this criterion, as required and assuming X80 materials are used, in any application of remaining strength calculations during the operation of the Keystone Pipeline.

Exhibit S - §195.588

This section of code requires that if you use direct assessment on an onshore pipeline you must evaluate the effects of external corrosion using the requirements of this section (does not apply if you are using a direct assessment type of method (i.e., CIS) for other reasons other than for Direct Assessment.

The requirements for the performance of Direct Assessment include:

- Must follow the NACE Standard RP0502
- Must develop and implement an ECDA plan that includes pre-assessment, indirect examination, direct examination, and post assessment.

In addition to the requirements contained in the NACE Standard RP0502 the following is required:

- Pre-assessment:
  - Provisions for applying more restive criteria for ECDA when conducted the first time on a pipeline segment.
  - Document the basis on which the selection of the two different, but complementary indirect assessment tools are chosen for each ECDA region.
  - Utilize an indirect inspection method not in NACE 502 demonstrate the applicability, validation process, equipment used, application procedure, and utilization of data.
- Indirect Examinations
  - Provisions for applying more restive criteria for ECDA when conducted the first time on a pipeline segment.
  - Provide a criteria for identifying and documenting those indications that must be considered for excavation including:
    - Known sensitivities of equipment
    - Procedures for using each tool
    - The approach used
  - Provide documentation for each indication identified to include:
    - The urgency of excavation and direct assessment

This section of code is more applicable to an operating pipeline. The revised April 10, 2007 TransCanada Petition and the PHMSA Grant of Waiver generally focus on those areas of pipe manufacture and construction which are significant to the integrity of the pipeline and which are difficult to resolve once the pipeline is buried. TransCanada should be able to provide additional plan documentation as to how, when, or if it will use a direct assessment methodology consist with the requirements

of this code section and the PHMSA Grant of Waiver requirements. This should include, but not be limited to:

- **Provide documents that define the Keystone Direct Assessment methodology and acknowledges the requirements of this code section and the PHMSA Grand of Waiver**
- **Provide procedures/guidelines that will be used to evaluate where Direct Assessment will be required**
- **Provide the anticipated locations where Direct Assessment will be used**

April 30, 2007– PHMSA Grant of Waiver (Excerpt- Grant subject to following conditions):

- Direct Assessment Plan: Headers, mainline valve bypasses and other sections covered by this special permit that cannot accommodate ILI tools must be part of a Direct Assessment (DA) plan or other acceptable integrity monitoring method using External and Internal Corrosion Direct Assessment criteria (ECDA/ICDA).

Exhibit T - §195.589

This section of code requires that current records and maps to show the location of: cathodically protection pipelines; cathodically protection facilities including galvanic anodes; and neighboring structures if (electrically) bonded to the cathodic protection system. In addition, records or maps are required to be maintained showing the stated number anodes, installed in a stated manner or spacing and the specific distances to each buried anode.

For each analysis, check, demonstration, examination, inspection, review, survey, and test required by this subpart records must be kept in sufficient detail to demonstrate the adequacy of corrosion control measures. The records must be kept for five (5) years unless the records are related to §§195.569, 195.573(a) and (b), and 195.579(b)(3) and (c). These records must be retained for as long as the pipeline remains in service.

Based on review of documents and response it appears that TransCanada acknowledges the requirements of this code section.

Q7-13: Data Request: Please provide any detail of, if any, the measurements that will be obtained during pipeline construction that relate to §195, subpart H? What measurements will be taken during pipeline operation?

R7-13: Response: *Measurements that will be obtained during pipeline construction relating to 49 CFR Part 195 Subpart H includes:*

- *Part 195.561 – The external coating will be checked for holidays using visual inspection and electronically using a holiday detector ("jeep").*
- *Part 195.563 – Measurements will be taken to determine soil resistivities to enable design of the cathodic protection system.*
- *Part 195.575 – Keystone will electrically interconnect and cathodically protect its pipeline and aboveground facilities as a single unit and therefore, measurements related to isolation equipment are not required.*
- *Part 195.577 – Electrical measurements will be taken to identify any HVAC and HVDC interference currents, and interference with any close paralleling pipelines.*

During operations, monthly rectifier readings to check for voltage, current, and resistance will be performed consistent with Part 195.573(c). An annual test lead survey will also be performed to check system performance, and an annual equipment and maintenance check will be conducted on the rectifiers consistent with Part 195.573(a).

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Direct Testimony of John Muehlhausen on Behalf of the Staff of the South Dakota Public Utilities Commission

October 31, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF JOHN MUEHLHAUSEN

Q: Please state your name and business address.

A: John Muehlhausen of Merjent, Inc. of 615 First Avenue Northeast, Suite 425, Minneapolis, Minnesota 55413.

Q: Please briefly describe your post-high school education and work experience.

A: I have bachelor of arts degree in anthropology from the University of Wisconsin-Madison. I am a senior analyst at Merjent, Inc. I am also a founding partner and the chief financial officer of Merjent, Inc. I have 16 years of experience preparing various types of assessments of pipeline expansion and maintenance projects throughout the United States.

Q: Please describe the work of Merjent, Inc.

A: Merjent is a professional consulting company specializing in the pipeline and electric transmission line market segments. Merjent offers its clients project planning, permitting, evaluation, community relations, and environmental inspection services. Merjent staff have experience on thousands of miles of pipeline projects throughout the United States. Merjent represents both industry clients and regulatory agency clients.

Q: What is the purpose of your testimony?

A: Merjent was retained by the staff of the South Dakota Public Utilities Commission to prepare a quantitative assessment of the socioeconomic effects of the construction and operation of the Keystone Pipeline Project. I was the principal author of the socioeconomic assessment. I have personal experience preparing and/or technically editing socioeconomic analyses for several pipeline projects over the past dozen years,

including, most recently, an assessment of a 160-mile-long pipeline in Colorado published by the Federal Energy Regulatory Commission in its Environmental Impact Statement in August 2007.

Q: What methodologies did you use to determine socioeconomic impacts?

A: Two methods were used to gather socioeconomic information for this assessment. The first method involved research and documentation of existing literature regarding socioeconomic conditions of the counties that would be impacted by the project. The second method involved interviews with county commissioners to help identify important economic activities in the project area and to identify socioeconomic concerns of the counties. In some cases, commissioners have not yet responded to our interview requests despite our repeated attempts to contact them.

To estimate overall impacts on economic output, earnings, and employment, I conducted a simple regional input-output analysis using RIMS II multipliers purchased for the project area from the United States Department of Commerce, Bureau of Economic Analysis. The regional input-output analysis was based on estimated final-demand changes for goods and services to be purchased locally. A change-in-bill-of-goods analysis was not conducted because of a lack of data regarding the specific goods and services. Nonetheless, the final-demand analysis provides a reasonable supposition of economic impacts that could be expected from the proposed project.

In addition to analyzing overall economic impacts, the assessment considered some of the socioeconomic issues raised by stakeholders in the public hearing held by the Commission at the end of June. Focusing on some of these concerns allow us to better target mitigation toward the impacts with which the public is most concerned. The

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assessment did not evaluate TransCanada's justification for the project or evaluate project alternatives, such as different routes or alternative energy sources.

Q: Please summarize the findings of your assessment, which is titled "Socioeconomic Assessment of the Keystone Pipeline", is dated October 29, 2007, and is attached to this direct testimony.

A: The proposed project would have both beneficial and adverse impacts on the socioeconomic conditions of the counties crossed by the pipeline as well as South Dakota in general. Most of the impacts would be insignificant. Those adverse impacts that have potential to be significant could be mitigated by following the recommendations identified in the assessment.

Construction of the proposed pipeline would result in up to 1,020 non-local workers and 255 family members temporarily moving into the communities around the project area during the peak of construction. Relative to the current population, the proposed influx of non-local workers and family members would not be significant, and would amount to only about one-third the population loss of the counties due to rural flight since 2000. After construction, Keystone would hire three employees locally to support operation of its pipeline, and there would be no long-term impacts on population.

During construction, the proposed pipeline would result in additional economic output, earnings, and jobs. For every $1.00 spent in South Dakota by TransCanada in the project area, an additional $0.70 of indirect and induced output would be expected in South Dakota. TransCanada is planning on spending about $93.2 million locally for construction of the pipeline. Therefore, an additional $65.2 million of indirect and induced output would be expected in other industries. The largest outputs would be felt

by the construction, retail trade, and health care industries, as well as the accommodations and food services industries.

During operation of the pipeline, for every $1.00 spent in South Dakota by TransCanada in the project area, an additional $0.33 of indirect and induced output would be expected in South Dakota. TransCanada is planning on spending about $11.0 million annually during operation. Therefore, an additional $3.6 million of indirect and induced output would be expected. The largest outputs would be felt by the utilities, construction, and transportation and warehousing industries.

In general, additional economic output is considered a beneficial impact because it results in additional jobs and wages. During construction, the proposed project could result in up to an additional 825 jobs, either directly or indirectly, and wages at least 10% higher than the ten-county median. During operation, 61 direct and indirect jobs could be created. However, as demand for labor rises, so can labor costs. For economic output to be considered beneficial, increases in revenues must exceed increases in costs. The labor supply and number of unemployed in the counties crossed by the project are greater than the number of additional jobs created by the project, and labor costs in the industries most affected by the project are less than one-third revenues, suggesting that the net economic impact of the project would be beneficial.

The proposed pipeline would affect approximately 2,169 acres of cropland. Short-term impacts associated with construction would include loss of standing crops within the construction work area valued at about $550,000. On an individual basis, TransCanada indicated it would compensate farmers for crop loss the year of construction, and provide a reduced compensation for two years following construction

with the understanding that crop yields may be diminished in subsequent years. Compared to the 2.7 million acres of cropland in the counties crossed by the pipeline, the acreage of cropland taken out of production would be insignificant. After construction, agricultural areas, including the permanent right-of-way, would be allowed to revert to former agricultural use.

One potential shortcoming of TransCanada's crop-loss compensation package would be the potential for farmers to have yield losses greater than the compensation amounts provided by TransCanada for the years following construction. TransCanada did indicate that they would conduct yield monitoring upon landowner request. However, we believe that landowners may not be aware that they can request yield monitoring, especially two or more years after construction. Therefore, we recommended that:

- **TransCanada monitor the yield of agricultural lands and hay fields impacted by construction, except where monitoring is waived by the landowner in writing. Monitoring shall be conducted until the area is successfully restored to yields which are similar to adjacent portions of the same field that were not disturbed by construction. TransCanada shall compensate the landowner for reduced yields at market rate until the area is successfully restored.**

During construction, non-local workers would demand many of the same goods and services as tourists. For example, construction workers would utilize hotels, motels, restaurants, and drinking establishments that are also commonly used by tourists. The increase in demand for accommodations and food services would normally be considered

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a positive economic impact, but also could be considered a negative impact if demand creates upward pressure on the cost of labor or the price of rooms, or if non-local construction workers crowd out and displace traditional users. Such impacts are not expected to be significant or widespread and would be temporary in nature if they do occur.

Perhaps the most important tourist activity in the counties crossed by the proposed pipeline is hunting. Eastern South Dakota is especially known for pheasant hunting. Each year thousands of hunters visit the counties crossed by the pipeline for pheasant hunting from late October to early January. Construction would be winding down as the hunting season is starting and only minimal impacts on hunting would be expected.

The only designated recreational area directly affected by the proposed pipeline would be the Missouri River, which has been designated a National Recreational River. TransCanada is proposing to install the pipe under the river using horizontal drilling technology such that the bed, banks, or water quality of the river or areas within the National Recreational River administrative boundary would not be affected. Therefore, the project would not result in adverse impacts on the river or associated recreation.

County commissioners were contacted to determine if there were any special events in the project area that could be affected by construction. The county commissioners did not identify any special events that would require special coordination as of the date of the assessment. However, we noted that Beadle County hosts the state fair in early September each year, and while the influx of non-local workers could result in increased fair attendance and revenue, it could also increase competition for limited fair resources, such as campsites. Because the future of the fair is still somewhat

uncertain and the influx of workers has potential to both positively and negatively impact the fair, we recommend that:

- **TransCanada coordinate project activities with fair administrators so as to best make use of fair resources for traditional users as well as construction workers.**

The proposed project does not cross commercially or industrially developed land in South Dakota, although it also passes within about 2,000 feet one quartzite quarry in McCook County. It also crosses a few farmsteads and approaches a few areas of suburban residential development. Impacts of construction on residences could be significant on a site-specific basis, and might include noise and dust generated by construction equipment, limited access to property, increased traffic and congestion on nearby roads, and loss of valuable trees and landscaping. Communicating information about project schedules, employing appropriate safety procedures, and restoring affected areas can mitigate these impacts. Therefore, we recommended that:

- **TransCanada prepare and submit to the South Dakota Public Utilities Commission for review and approval a residential mitigation plan to:**
  - **a. coordinate construction work schedules with affected residential landowners prior to the start of construction;**
  - **b. maintain access to all residences, except for brief periods essential to pipe-laying as coordinated with affected residential landowners;**
  - **c. installing temporary safety fencing to control access and minimize hazards associated with an open trench in residential areas;**

d. notifying affected residents in advance of any scheduled disruption of utilities and limit the duration of any interruption to the smallest time possible;

e. repairing any damages to property that result from construction activities; and

f. restoring all areas disturbed by construction to preconstruction conditions or better.

After construction, certain structures and uses would be prohibited on the permanent pipeline right-of-way, including construction of aboveground structures, construction of septic systems, planting or cultivation of trees, or quarry and mining activities. These restrictions would not necessarily restrict future development of a particular parcel of land, but could affect the physical layout of how the particular parcel is developed or the methods by which it is developed.

TransCanada has indicated that it would compensate landowners for a permanent easement based on the full market value of the land affected by the pipeline just as if it were purchasing the land in fee, and would compensate at half market value for areas that would be temporarily disturbed during construction but are not retained on a permanent basis. If an easement cannot be negotiated with a landowner, TransCanada may be able to obtain an easement by the use of eminent domain. In this case, the landowner would still be compensated by TransCanada, but the amount of compensation would be determined by the courts.

Frequently, property owners affected by pipeline projects are concerned about property devaluation caused by a permanent pipeline easement. A 2001 study of four

communities around the United States funded by the Interstate Natural Gas Association of America suggested that the presence of a pipeline had no significant impact on the sale price or demand for properties located along pipeline rights-of-way.

The project area has sufficient temporary housing to accommodate the expected influx of workers and family members. Most temporary housing is already serviced by existing utilities, such as gas, electric, water, sewer, solid waste disposal, and telephone. Construction of new utility lines or infrastructure to serve the temporary population influx (other than the electric transmission lines to serve the four new pump stations) would not be required.

Impacts on the existing school system are expected to be minimal. Due to the transitory nature of construction, most workers do not travel with school-age children. Because the peak of construction occurs during the summer months when school is not in session, the educational system would need to accommodate at most 6 children in each grade level during the beginning of the school year. The existing educational system should be able to accommodate this small influx of students. Further, this estimate is probably high because, more likely than not, school age children would return to their permanent residence outside of South Dakota at the start of the school year.

Most law enforcement in the project area is provided on a local level by city police departments or county sheriff departments. In 2006, the ten counties crossed by the proposed pipeline employed 130 full-time law enforcement officers in local sheriff and police departments. This equates to a ratio of 1 local law enforcement officer per 587 people. During the peak of construction, the ratio would be reduced slightly to about 1 local law enforcement officer per 597 people. To maintain the ratio of law enforcement

officers per person, 2 additional officers would be required during the peak of construction.

Historical data suggests that the influx of non-local workers on pipeline projects does not affect local crime rates. Department of Justice crime data for sheriff offices in fourteen counties crossed by a 380-mile pipeline project in Kansas and Colorado with a similar non-local workforce showed no discernable crime bump in 2004 attributable to construction. In fact, aggregate property crime reported by the sheriffs' offices was at its lowest rate compared to the four years preceding and one year following construction and violent crime was slightly lower than average.

As with local law enforcement, demand for firefighting or other emergency services would not be expected to increase dramatically during construction. The community infrastructure just a few years ago accommodated a larger population than the increase expected from the influx of workers. With crude oil pipelines, however, there is always a concern that a leak or incident during operation of the pipeline could require emergency response. TransCanada has developed a draft emergency response plan that is being reviewed for adequacy by the Public Utilities Commission.

In addition to an emergency response plan, federal regulations also require pipeline operators to establish public awareness programs to enable customers, the public, government officials, emergency responders, and those engaged in excavation activities to recognize a pipeline emergency and respond appropriately. According to TransCanada, it would implement a comprehensive integrated public awareness program consistent with that employed by TransCanada on all its pipelines in the United States. As part of its integrated public awareness program, TransCanada would educate

emergency response officials on the company's emergency response procedures and how the company would work with emergency responders during an emergency, and would involve local emergency responders in its training exercises.

The economic impact of a pipeline incident is impossible to predict and would depend on many factors, such as the volume of the spill, the particular type of crude oil spilled, the location of the spill, and the resources affected by the spill. Some incidents may be small or occur in safe locations with little impact, while others may be large or occur in unusually sensitive areas. Regardless of size or location of an incident, almost all incidents would result in additional economic output. However, economic output should not be confused with economic progress because, although cleaning up the leak may generate work, earnings, and spending, it would mainly benefit the clean-up company and would be at the expense of TransCanada, the affected landowner, and the environment. In any case, TransCanada indicated that it would be responsible for losses that arise from a leak on the Keystone Pipeline, including the clean-up expenses and property damages caused by the leak. If the leak were caused by a third party, it seems plausible that TransCanada might seek damages from the third party.

Although health care is readily available in the counties crossed by the proposed pipeline, there is potential for increased demand for emergency medical services to treat injuries from construction-related accidents. Based on accident rates for the construction industry and workforce estimates from TransCanada, about 8 construction-related accidents might be expected in 2008 and 14 construction-related accidents might be expected in 2009. Not all accidents would necessarily require medical attention. The counties and cities in the vicinity of the project appear have adequate health care services

to meet the emergency as well as routine health care needs of the community during construction.

South Dakota's road system serves as the backbone of the state's transportation system and carries the bulk of the state's commercial goods as well as personal travel. The movement of construction equipment, materials, and crew members to the project area would result in additional traffic on the roads in the counties crossed by the pipeline and in adjacent counties. According to county commissioners polled as of the date of the assessment, the existing road infrastructure would be sufficient to accommodate construction traffic, although heavier traffic and slower moving vehicles could be encountered by road users at various times. No new permanent roads would be constructed in South Dakota as part of the proposed project.

On a site-specific basis, impacts associated with installing the pipeline under roads would be temporary and minor and would not be expected to significantly disrupt traffic. Only eight gravel roads and no paved roads of the more than 175 road crossings would be closed and detoured for up to 48 hours each during the two years of construction. TransCanada would be required to obtain all state and local permits necessary to cross roads with the pipeline. It would be the responsibility of the state or local permitting authority to ensure that traffic flow would not be significantly impacted by road closures and that affected roads are restored to preconstruction conditions or better after construction. However, in the interest of public safety, we recommend that:

- **TransCanada coordinate road closures with state and local emergency responders (law enforcement, fire, and medical) and provide sufficient advance notice of road closures to appropriate response agencies.**

Hauling materials to and from the project site would very likely result in deteriorated roadbed conditions, particularly on gravel roads. We recommend that:

- **TransCanada implement a regular program of road maintenance and repair throughout active construction to keep paved and gravel roads in an acceptable condition for travel by the public. Following construction, TransCanada would be responsible for restoring deterioration caused by construction traffic such that the road is returned to its preconstruction condition or better. Repairs during and after construction would be consistent with federal, state, and local requirements.**

The project could also result in damage to roads from tracked vehicles crossing the roads as they move down the construction right-of-way or from heavy equipment tracking dirt and mud on roads, which may become a nuisance to local residents or cause slippery and dangerous road conditions. To minimize these potential problems, we recommend that:

- **TransCanada use rubber mats, tires, plywood sheets, steel plates or similar material to prevent damage to the road surface where tracked vehicles cross paved roads, and TransCanada install a combination of matting, culverts, and/or 50-foot-long crushed stone access pads at road crossings and other ingress and egress points to construction work areas to allow mud to fall off construction-related vehicles prior to leaving the work area. If excess soil or mud is tracked onto roadways, it should be shoveled or swept off immediately.**

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South Dakota law requires and indemnity bond for projects such as this to insure that any damage beyond normal wear to public roads, highways, bridges, or other related facilities would be adequately compensated. We recommend that:

- **TransCanada obtain a bond in the amount of $3 million in 2008 and $12 million in 2009 to insure that any damage beyond normal wear to public roads, highways, bridges, or other related facilities would be adequately compensated. If project plans change such that a different bonding amount is warranted (*e.g.*, the construction schedule or spread lengths change), TransCanada would be required to inform the South Dakota Public Utilities Commission of such changes and propose a different bonding amount of Commission review and approval.**

The proposed project would be subject to 4% sales and use tax and 2% contractors' excise tax, for a total of 6% tax. Based on the taxable value of the project in South Dakota, the state would collect about $18 million from construction. Compared to statewide sales and use tax, the proposed project would result in only a small increase (about 2%) in state revenues. Spread over two years, the benefits would be less noticeable. Furthermore, the proposed pipeline may be eligible for a tax refund of up to 75%, thereby effectively dropping the tax rate to 1.5%, or $4.5 million.

During operation, crude oil shipped in the pipeline would not be retailed within the state; therefore, no sales or use tax would be generated by the product in the pipeline. However, the electricity and other goods and services purchased by TransCanada to operate its pipeline would be subject to a 4% sales and use tax. Electricity purchased

from local utilities would generate an about $404,000 of annual tax revenue; other goods and services could generate about $20,000.

Operation of the proposed pipeline also would be subject to *ad valorem* property taxes. The property tax rate charged in South Dakota varies by property type, by county, and by year. *Ad valorem* property taxes associated with the proposed project would increase countywide tax revenue between 2.6% and 13.7%, which is a significant benefit to the counties. The electric transmission lines associated with the proposed project also would be assessed *ad valorem* property tax. Electric transmission lines, however, only pay *ad valorem* property tax on real property (*i.e.*, land and buildings). Personal property is subject to a 2% gross receipts tax in lieu of property tax. It was assumed that no additional real property would be required for the electric transmission lines and all taxes would be gross receipts taxes. Gross receipts taxes were estimated at $282,000.

Indirect and induced spending associated with construction also would generate tax revenue for the state and local governments, primarily through sales and use tax. Additionally, other types of state taxation would be levied on certain types of spending, such as a 1% tourism tax on hotels and motels. Indirect and induced spending would generate about an additional $2.6 million in tax revenue during construction and $146,000 annually during operation.

In consideration of all the above facts, I have found that the proposed project, with incorporation of the recommended mitigation measures, would not, from a socioeconomic standpoint: 1) pose a threat of serious injury to the socioeconomic conditions in the project area; 2) substantially impair the health, safety, or welfare of the inhabitants in the project area; or 3) unduly interfere with the orderly development of the

region. I note that TransCanada would be required to comply with all applicable laws and rules during construction and operation of the pipeline.

Socioeconomic Assessment of the Keystone Pipeline

October 29

2007

TransCanada Keystone Pipeline, LP is proposing to construct and operate a crude oil pipeline that would extend across ten counties in eastern South Dakota. This assessment provides a socioeconomic impact analysis of the proposed construction and operation of the pipeline on those counties.

prepared by: John Muehlhausen
Merjent, Inc.

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Socioeconomic Assessment of the Keystone Pipeline

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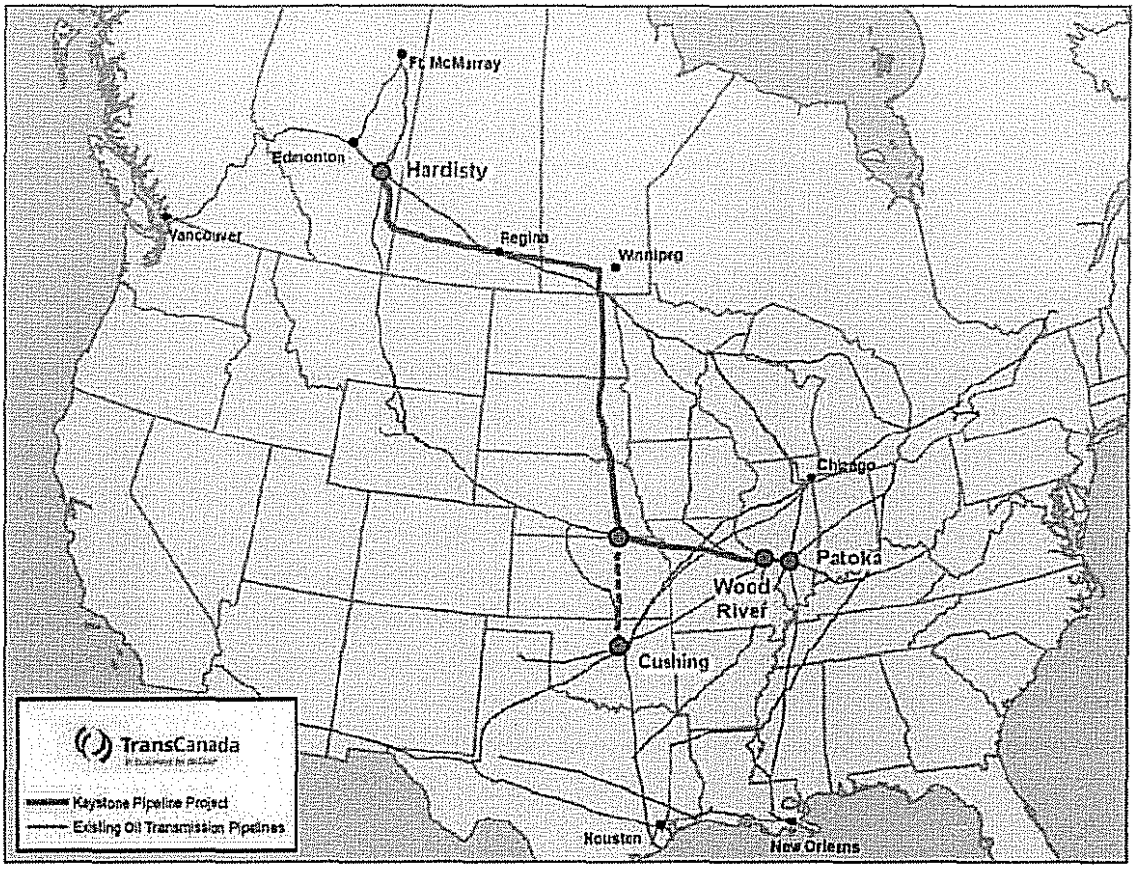
Socioeconomic Assessment of the Keystone Pipeline

Introduction

The purpose of this assessment is to provide a socioeconomic impact analysis of the proposed construction and operation of the Keystone Pipeline Project. TransCanada Keystone Pipeline, LP is proposing to construct and operate a crude oil pipeline system from an oil supply hub in Alberta in Canada to existing terminals in the Midwestern United States. The primary purpose of the project is to transport crude oil from the Western Canadian Sedimentary Basin into the United States to meet the growing demand by refineries and United States markets. In total, the Keystone Pipeline Project would consist of about 1,845 miles of pipeline, 38 pump stations, and numerous mainline valves and other aboveground facilities to be constructed in Canada and the United States (see Figure 1). The proposed facilities would have the capacity deliver up to about 591,000 barrels of heavy crude oil per day.[1]

Figure 1: Keystone Pipeline Project Overview Map



The United States portion of the project would cross North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Missouri, and Illinois. The United States portion of the project would consist of about 1,371 miles of pipeline, 23 pump stations, 52 mainline valves, and other various aboveground facilities. In South Dakota, the Keystone Project would consist of about 219 miles of pipeline, 4 pump stations, and 14 mainline valves (four of which would be at pump stations) (see Figure 2). Keystone proposes to begin construction in January 2008. Construction is expected to last 18 months and be completed in September 2009. The in-service date of the proposed facilities is November 30, 2009.[1]

In addition to pipeline facilities, Keystone estimates that 21 new electric transmission lines would be required to provide electrical power to the proposed pump stations. According to Keystone, approximately 149 miles of new electric transmission lines would be constructed in the United States, including about 63 miles in South Dakota. Electric transmission lines would be either 69-kilovolt, or 115-kilovolt and would be constructed by local utilities.[1]

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Scope and Methodology

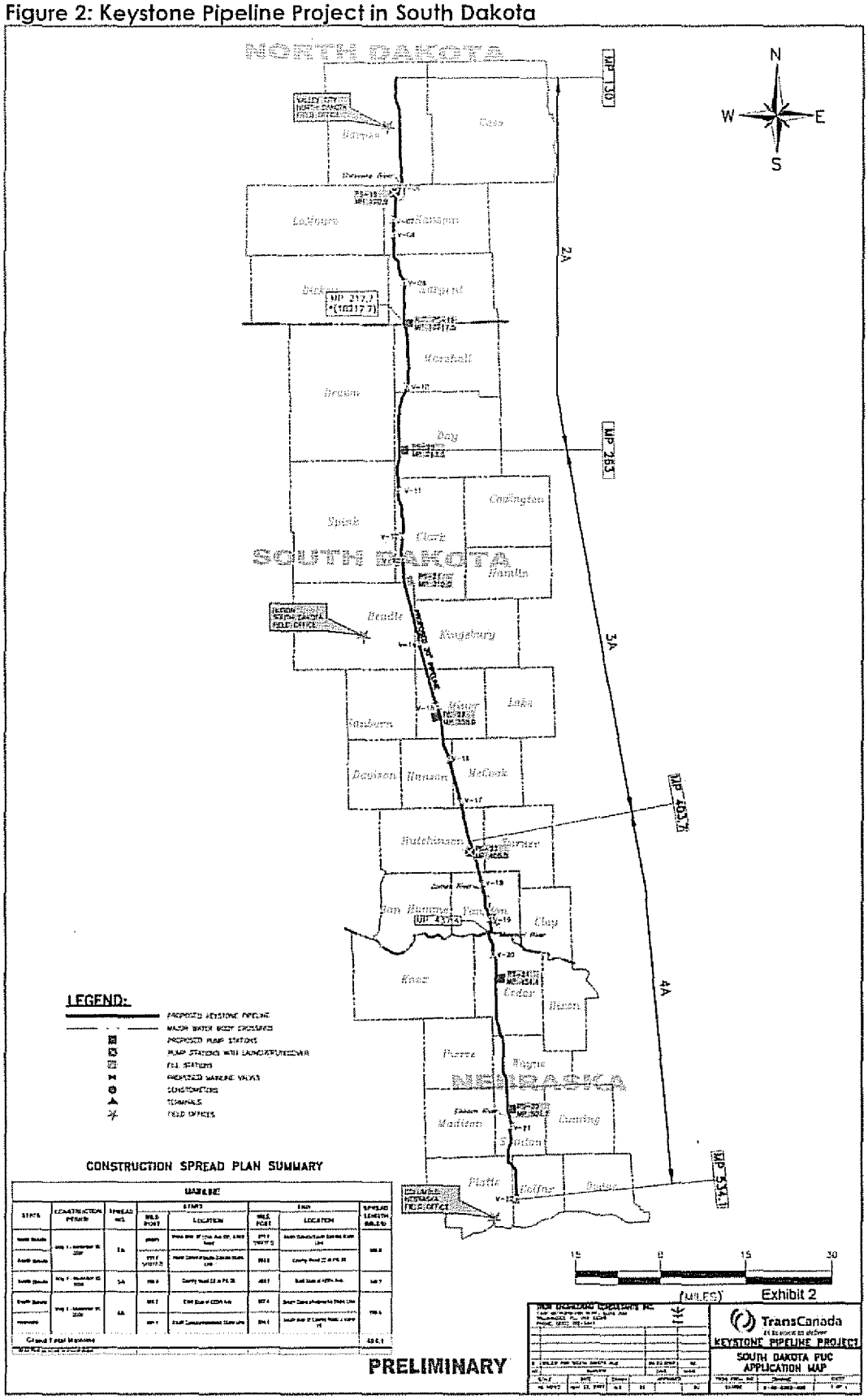
The geographic scope of this socioeconomic assessment is limited to South Dakota, specifically the ten counties crossed by the proposed project: Marshall, Day, Clark, Beadle, Kingsbury, Miner, Hanson, McCook, Hutchinson, and Yankton. Two methods were used to gather socioeconomic information for this assessment. The first method involved research and documentation of existing literature regarding socioeconomic conditions of the counties that would be impacted by the project. All sources are provided in the reference section of this document. The second method involved interviews with county commissioners to help identify important economic activities in the project area and to identify socioeconomic concerns of the counties. In some cases interviews were conducted over the telephone, and in other cases a written questionnaire was provided. In both cases, a fixed-question, open-response format was used for the interviews.

Although electric transmission lines will be constructed for the project, they are being reviewed independently of the proposed pipeline. Impacts associated with electric transmission line construction and operation were limited to discussions of impacts on employment, earnings, and overall economic output. The electric transmission lines would be located in seven of the ten counties crossed by the pipeline, and in Brown County as well.

Population

South Dakota is situated in the north-central United States and is usually considered to be a part of the Midwest, although the state is sometimes considered part of the Great Plains or the West. The Missouri River runs through the central part of South Dakota and divides the state into two socially and economically distinct halves, known to residents as "East River" and "West River."[2]

Figure 2: Keystone Pipeline Project in South Dakota



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East River is the portion of the state of South Dakota located east of the Missouri River with about one-half of the land area and two-thirds of the population of the state. West River lies west of the Missouri River with about one-half of the land area but only of one-third the population. The state population was about 782,919 in 2006.[3] Although the state population has increased about 3.6% since 2000, it lags behind the national average of about 6.4%.[3]

The contrast between East River and West River is significant. East River is defined by fertile farm country. It is predominantly a corn, soybeans, and wheat growing region with large numbers of pigs and poultry. West River is defined by deep gorges and rolling plains. It is predominantly ranching with some dryland farming. Other than aggregates, all mining in South Dakota (including gold and other precious metals, industrial minerals, and iron ore) is located in West River, which includes the Black Hills.[4]

East River was settled largely by homesteaders moving west from Iowa and Minnesota, or immigrants directly by train from eastern United States seaports. West River was settled first by gold-seekers and miners; many from older gold rush locations such as Montana and Colorado, then followed by ranchers from Texas, Kansas, and Colorado. As a result, East River has a high Scandinavian and German-descended population and a culture quite similar to the Midwest; West River has a more general population and a culture similar to the Great Plains and West.[4] The Keystone Pipeline Project would be entirely in the East River region of South Dakota.

Despite an overall growing population, South Dakota is experiencing a trend of falling populations in rural counties. This trend is sometimes referred to as "rural flight." The effect of rural flight has not been spread evenly throughout South Dakota, and while most rural counties and small towns have lost population, the Sioux Falls area and the Black Hills have gained population. In fact, Lincoln County, near Sioux Falls, is the ninth-fastest growing county (by percentage) in the United States. The growth in these areas has compensated for losses in the rest of the state, and South Dakota's total population continues to increase steadily, although at a slower rate than the national average.[2] The proposed project would cross ten counties in South Dakota, all of which are experiencing rural flight and are sparsely populated. Population count, change, density, and various demographics for the ten counties crossed by the pipeline are provided in Table 1.

Within the counties crossed by the pipeline, countywide populations range from 2,553 in Miner County to 21,779 in Yankton County. The least densely populated

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county crossed by the proposed project is Clark County, which has a population density of 3.8 people per square mile, or about one-third the average density on a statewide basis. The most densely populated county crossed by the proposed project is Yankton County, which has a population density of 40.9 people per square mile, or more than four times the average density on a statewide basis. By way of comparison, densely populated communities in South Dakota, such as Sioux Falls, have population densities in excess of 2,500 people per square mile.[5, 6]

Table 1: Population Data for the Keystone Pipeline Project

County Name	Population (2006)	Population Change (2000 - 2006)	Countywide Population Density (2006)	Minority Population (2000)	Disabled Population (2000)	High School Graduates (2000)	Bachelor's Degree or Higher (2000)
Beadle	15,643	-8.1%	12.4	3.2%	13.7%	83.0%	16.3%
Clark	3,683	-11.1%	3.8	1.2%	15.6%	76.6%	11.4%
Day	5,778	-7.8%	5.3	9.5%	13.1%	80.0%	15.4%
Hanson	3,690	17.6%	8.5	0.6%	16.6%	75.1%	14.0%
Hutchinson	7,426	-8.0%	9.1	1.3%	15.5%	71.7%	14.1%
Kingsbury	5,464	-6.0%	6.3	1.4%	13.5%	82.3%	16.2%
McCook	5,851	0.3%	10.1	1.0%	14.1%	82.9%	16.3%
Marshall	4,430	-3.2%	5.0	7.7%	11.6%	75.6%	16.2%
Miner	2,553	-11.5%	4.5	0.9%	15.6%	79.6%	13.5%
Yankton	21,779	0.6%	40.9	5.0%	11.5%	86.1%	23.0%
Statewide	781,919	3.6%	10.1	11.3%	12.3%	84.6%	21.5%

Sources: 5, 6

Seven communities are within the immediate vicinity (2 miles) of the proposed project: Raymond, Iroquois, Roswell, Carthage, Emery, Spencer, and Yankton. The smallest community is Roswell, which has a population of 21. The largest community is Yankton, which has a population of 13,528. The median community population is represented by Carthage, which has a population of 187.[5, 6]

Pipeline construction typically proceeds with numerous crews working in an assembly line fashion. The survey crew begins construction, followed by the clearing crew, the grading crew, the trenching crew, and so on until cleanup is complete. As construction progresses, the workforce migrates down the construction right-of-way from one end of the construction spread to the other. A single pipeline may be divided into one or more construction spreads, with a separate construction crew working on each spread.

Keystone would utilize one construction spread in South Dakota in 2008 and two spreads in 2009. Keystone estimates that construction of the proposed project

would require a peak workforce in South Dakota of about 600 workers per construction spread. This equates to 600 construction workers employed on the project in 2008 and 1,200 workers in 2009.[1,7]

Keystone estimates that up to 15% of the workforce would be local hires and about 85% would be non-local. Therefore, during the peak of construction during 2009, up to 180 workers would be local hires and 1,020 workers would be non-local. Due to the transitory nature and short duration of pipeline construction, most non-local workers do not travel with their families. However, we know that some non-local workers do and, for the purpose of this assessment, we estimated that about 15% of non-local workers may bring their spouse or significant other, for an additional 153 people. It is less likely that non-local workers would travel with school age children. However, for the purpose of this assessment, we estimated that about 5% of non-local workers may travel with 2 school age children, for an additional 102 people. In total, during the peak of construction during 2009, South Dakota would experience an influx of up to 1,275 people. On a statewide basis, the influx of non-local workers would be insignificant (less than a 0.2% increase). Based on our experience working on pipeline projects, we believe our estimates of family members traveling with non-local workers may be high. However, there are no existing studies from which to derive a more reliable number. For the purpose of this assessment, we prefer to err on the side of caution and to slightly overestimate potential impacts on population.

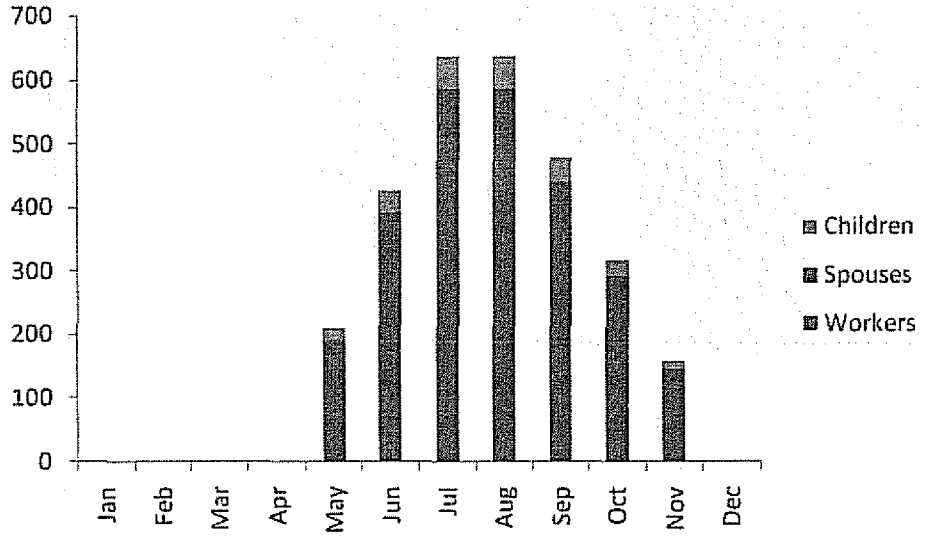
Because construction spreads are independent of each other and do not overlap, the maximum number of non-local people in any one county at the peak of construction in 2009 would be about half of the total number of people, or 638. Although the influx of non-local workers and family members would not be significant on a statewide basis, the influx of 638 people into any one county could be more consequential (anywhere between a 3% and 25% increase).

One mitigating factor on impacts to countywide population would be the fact that workers construct the pipeline in an assembly line fashion with different crews working in different locations (except that some workers would be employed at more stationary locations, such as pump stations and valve sites). The maximum number of non-local people in any one county at the peak of construction may be reduced by 15% down to 542. The influx of 542 people into any one county would be less consequential (anywhere between a 2% and 21% increase).

Another mitigating factor on impacts to countywide population would be the short duration of the peak of the construction season. The typical pipeline construction seasons starts in May and continues through November. Based on our experience, only a few workers are needed in the spring at the start of the season. Workers are added until construction reaches its peak in the summer. Workers are removed in the fall as the project winds down, until construction stops for the winter. Figure 3 illustrates the possible influx of non-local workers over the course of a construction season for a single spread.

A third mitigating factor on population is the fact that most non-local workers and their families will reside in larger communities within a reasonable commuting distance (50 miles) of the project where temporary housing (such as rental units, hotels, and motels) is more widely available. These larger communities might include Aberdeen (population 24,071), Mitchell (population 14,857), Sioux Falls (population 142,396), Watertown (population 20,526), and Yankton (population 13,767). The addition of 542 people to these communities is much less significant (only between a 0.4% and 4% increase).[5]

Figure 3: Possible Influx of Non-local Workers for a Single Spread



A final mitigating factor is rural flight. The influx makes up for only about one-third the population loss since 2000. Seven of ten counties have lost population since 2000. When combined, all ten counties show a cumulative loss of 3,109 people since 2000. Assuming population loss occurs at the same rate until 2009, the cumulative population loss is expected to reach 3,997.[5] The total population influx from the proposed project is 1,275 in 2009, which is significantly less that the population loss.

After construction, there would be no long-term impacts on population. Keystone would hire three employees locally to support operation of its pipeline.

Employment

South Dakota boasts one of the highest employment-to-population ratios in the United States.[8] Employment in the project area ranges from 93.5% of the labor force to 97.7% of the labor force. The employment rate in five of the ten counties crossed by the proposed project is equal to or higher than the state average. The number of unemployed persons in July 2007 in the ten counties crossed by the proposed project was estimated at 1,237, or 3.0% of the labor force (which is slightly higher than the state average of 2.8%). The labor supply in the ten counties crossed by the proposed project in July 2007 was estimated at 5,175.[9, 10] Labor supply includes those who currently hold jobs and would like to change, and those who, for a variety of reasons, do not have jobs. Table 2 provides employment data for the project area.

Table 2: Employment Data for the Keystone Pipeline Project (July 2007)

County Name	Labor Force (people)	Employment (people)	Unemployment (people)	Labor Supply (people)	Unemployment Rate (%)	Rate Change Since 2000 (%)
Beadle	9,548	9,316	232	1,300	2.4	-0.1
Clark	1,987	1,858	129	255	6.5	+3.2
Day	2,979	2,860	119	420	4.0	+1.0
Hanson	2,043	1,982	61	175	3.0	+0.9
Hutchinson	3,782	3,676	106	415	2.8	+0.8
Kingsbury	2,979	2,901	78	290	2.6	+0.6
McCook	3,102	3,032	70	N/A	2.3	+0.5
Marshall	2,241	2,147	94	290	4.2	+1.7
Miner	1,199	1,160	39	130	3.3	+1.5
Yankton	11,960	11,651	309	1,900	2.6	+0.5
Statewide	448,789	436,277	12,512	71,560	2.8	+0.3

Sources: 9, 10

Impacts of the proposed project on employment would be beneficial. The proposed project would directly affect unemployment in the counties affected by the project by hiring local workers and during the construction season. While most workers would be non-local, up to 180 workers would be hired locally during the peak of construction in 2009. About half as many workers would be hired locally in 2008. In South Dakota, most construction positions are typically filled by high school and college students and educational staff who find summer jobs

when school is no longer in session.[11] Assuming there are no dramatic changes over the next few years, the labor supply should be more than sufficient to accommodate local hiring.

The proposed project also would indirectly affect unemployment by stimulating the local economies and motivating local businesses to hire additional employees to support construction. Non-local workers would increase demand for goods and services from local businesses, which would, in turn, encourage local businesses to hire additional employees. Based on the regional input-output multiplier analysis conducted for this project (see the Economic Output section), up to 645 jobs would be indirectly created or induced as a result of construction. These jobs range from retail jobs to agricultural jobs.[16]

When considering jobs directly and indirectly created by construction, a total of 825 local jobs would be created by the project.[16] The counties crossed by the pipeline presently have a labor supply of 5,175 and unemployment of 1,237.[9, 10] Assuming that the labor supply and unemployment levels remain steady until construction and those who currently hold jobs and change would be replaced by those who do not have jobs, the labor supply would be expected to drop from 12% of the total labor force to 10%. Unemployment would be expected to drop from about 3% to 1%. Of course, labor would like also be obtained from some of the larger communities in adjacent counties, so labor supply and unemployment probably would not dip quite so low.

Many economists see the labor market similar to other markets that are affected by supply and demand. The forces of supply and demand jointly determine price (in this case the wage rate) and quantity (in this case the number of people employed). The increase in demand for labor as a result of construction could lead to upward pressure on wages, even more so because the labor market differs from other markets. Perhaps the most important of these differences is the function of supply and demand in setting price and quantity. In markets for goods, if the price is high there is a tendency in the long run for more goods to be produced until the demand is satisfied. With labor, overall supply cannot effectively be manufactured because people have a limited amount of time in the day, and people are not manufactured. A rise in overall wages will not necessarily result in more supply of labor. Furthermore, a rise in labor wages may, in some cases, result in less supply of labor as workers take more time off to spend their increased wages, or it may result in no change in supply. Within the overall labor market, particular segments are thought to be subject to more normal rules of supply and demand as workers are likely to change job types in response to differing wage rates.[12]

The labor market may also be affected by unions and collective bargaining, meaning that the relative negotiating strength, objectives, and aptitude of the union could impact labor price and quantity. There is much debate about the function and value of unions in our economy. Many economists believe unions have beneficial economic effects, such as higher wages and better benefits.[17] Union workers are more apt to be in higher earning ranges and have better employee benefits than nonunion workers.[18, 19] Other economists, however, view unions largely as monopolies in the labor market whose primary economic impact is to raise members' wages at the expense of unorganized labor and of the efficient functioning of the economy.[17] Regardless, the construction contractor likely would be unionized on the proposed project and up to 180 workers would be hired through local union halls (about 22% of local hires). About 645 local jobs could be created through indirect or induced market forces in potential non-union settings (about 78% of local hires).

After construction, Keystone would hire three employees locally to support operation of its pipeline.[20] Besides the local hires, an additional 58 jobs would be expected to be created indirectly as a result of operation of the pipeline (see the Economic Output section). As many as 20 jobs would be added to utility industry to produce and deliver the electricity required by the pump stations, and up to 9 jobs would be added to the construction industry to indirectly support pipeline maintenance activities. Overall, long-term impacts on labor would be expected to be beneficial.

Earnings

In 2005 South Dakota had a per capita personal income of $31,811, which ranked 29th in the United States and was 92% of the national average of $34,685. Over the previous decade, the average annual growth rate of per capita personal income was 5.0%, which exceeded the average annual growth rate for the nation of 4.2%. Earnings of persons employed in South Dakota increased from $17.5 billion in 2004 to $18.1 billion in 2005, an increase of 3.2%. Over the previous decade, the average annual growth rate was 5.6%, which slightly exceeded the average annual growth rate for the nation, which was 5.5%.[13] Table 3 provides earnings data for the project area.

Impacts of the proposed project on earnings would be expected to be beneficial. According to one estimate, for every dollar spent on construction in South Dakota, about 37 cents is earned by construction workers in South Dakota as salary and wages.[16] Based on this model, earnings in the counties crossed by

the project would increase by about $34.3 million. Indirect and induced earnings would add about $18.4 million to the project total (see the Economic Output section). When compared to the aggregate earnings of the ten counties crossed by the pipeline, the proposed project would have about a 2% impact on earnings. The annualized earnings of a full-time-equivalent pipeline construction worker would be about $38,026, which is 10% higher than the ten-county median of earnings per employed person of $34,485.

Table 3: Earnings Data for the Keystone Pipeline Project (2005)

County Name	Earnings ($)	Employed Persons	Earnings per Person ($)
Beadle	356,067,000	8,445	42,236
Clark	72,920,000	1,765	41,314
Day	90,208,000	2,815	32,045
Hanson	25,146,000	1,940	12,962
Hutchinson	110,350,000	3,645	30,274
Kingsbury	97,671,000	2,955	33,053
McCook	73,923,000	2,840	26,029
Marshall	89,172,000	2,005	44,475
Miner	41,124,000	1,145	35,916
Yankton	490,592,000	11,445	42,865
Statewide	18,097,597,000	411,550	43,974

Sources: 14, 15

TransCanada estimates that workers on its project would earn about $53 million, which is significantly higher than the estimate of $34.3 million from the statistical model. TransCanada's estimate also takes into account the fact that labor would account for a larger percentage of local expenditures since most construction materials (e.g., the pipe, valves, pump motors, *etc.*) used during construction would be imported into South Dakota from areas outside of the state. Accordingly, for every dollar spent in South Dakota on construction, about 82 cents would be earned by construction workers as salary and wages. Using TransCanada's estimate, the earnings per annualized full-time worker would be about $58,758, which is about 70% higher than the ten-county median.

After construction, Keystone would hire three employees locally to support operation of its pipeline. Annual earnings associated with the three hires would be about $237,000. In addition, 58 jobs with annual earnings of about $2.6 million would be expected to be indirectly induced by the pipeline (see the Economic Output section). When compared to the aggregate earnings of the ten counties crossed by the pipeline, the proposed project would have less than a 0.1% impact on annual earnings. Overall, impacts of the proposed project on earnings would be beneficial.

Economic Output

The gross state product of South Dakota was $32.3 billion as of 2006. The service industry was the largest economic contributor in South Dakota. This sector includes the retail, finance, and health care industries. Government spending was another important segment of the state's economy, providing over 10% of the gross state product.[2]

Agriculture has historically been a key component of the South Dakota economy. Although other industries have expanded rapidly in recent decades, agricultural production is still very important to the state's economy, especially in rural areas. Major products of South Dakota agriculture include beef, wheat, corn, pork, wool, soybeans, oats, mutton, alfalfa, sunflowers, and poultry. Agriculture-related industries such as meat packing and ethanol production also have a considerable economic impact on the state. South Dakota is one of the top five ethanol-producing states in the nation.[2]

Another important sector in South Dakota's economy is tourism. Many travel to view the attractions of the state, particularly those of the Black Hills region such as historic Deadwood, Mt. Rushmore, and the nearby state and national parks. One of the largest tourist events in the state is the annual Sturgis Motorcycle Rally. The event drew over 450,000 attendants in 2006, which is significant considering the state has a population of only 750,000. In 2006, tourism provided an estimated 33,000 jobs in the state and contributed over $2 billion to the economy of South Dakota.[2]

A basic regional input-output multiplier analysis was conducted for the Keystone Pipeline Project to estimate overall economic impacts of constructing and operating the proposed pipeline system in the ten counties crossed by the pipeline. The analysis accounted for the direct increase in demand for local goods and services that would result from the proposed project, as well as the indirect and induced demand for local goods and services. Indirect effects are changes in backward-linked industries due to the new demand of the directly affected industry. For example, demand for $1 million worth of apples from the apple industry will require the fertilizer industry to increase its output as well. Induced effects take this linkage a step further and measure the changes of all industries output as a result of changes in household consumption generated from the increased household income stemming from the direct and indirect effects of business activity. These types of indirect and induced effects are often likened to a ripple through water.

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Economists have come up with a model for estimating the ripple effect of changes in the economy. This model is complex and relies on multipliers, which are numerical coefficients which relate a change in demand in one industry to consequential changes in total output, wages, and employment in other industries. Fortunately, the United States Department of Commerce, Bureau of Economic Analysis maintains and periodically updates multipliers, which can be used to estimate economic impacts. The multipliers produced by the Bureau of Economic Analysis are known as the "RIMS II" multipliers, RIMS being the acronym for Regional Input-Output Modeling System.

RIMS II multipliers were obtained for this project from the Bureau of Economic Analysis to calculate the economic impact of construction and operation of the proposed project. Empirical tests indicate that RIMS II yields multipliers that are not substantially different in magnitude from those generated by regional input-output models based on relatively expensive surveys. For example, a comparison of 224 industry-specific multipliers from survey-based tables for Texas, Washington, and West Virginia indicates that the RIMS II average multipliers overestimate the average multipliers from the survey-based tables by approximately 5%. For the majority of individual industry-specific multipliers, the difference between RIMS II and survey-based multipliers is less than 10%. In addition, RIMS II and survey multipliers show statistically similar distributions of affected industries.[23]

The output multipliers represent the total dollar change in output (total expenditures) that occurs for each additional dollar of output (direct expenditures). For example, an output multiplier of 1.50 for hotels and lodging places means that for each $1.00 spent for lodging, an additional $0.50 is spent by the lodging establishment and supporting industries (wages, goods and services, capital improvements). The $1.00 is the direct expenditure, the $0.50 is the indirect and induced expenditure and $1.50 is the total economic impact. Similar multipliers are used to estimate impacts on earnings and the number of jobs supported.[21]

The regional multiplier analysis conducted for the proposed project is complicated by five factors. First, the project is much larger than the ten counties crossed by the pipeline in South Dakota and much of the work would be completed by companies from outside the region. The regional multiplier analysis should evaluate only that part of the project that is associated with purchases from firms located within South Dakota, mainly the counties crossed by the pipeline. Keystone estimated that purchases from within South Dakota, including labor, would be about $65.0 million.[22]

Second, the proposed project would involve construction of 63 miles of electric transmission lines in the project area. Even though the electric transmission lines are being reviewed independently of the proposed project, they should be evaluated as part of the regional multiplier analysis. Keystone estimated that the cost of the new electric transmission lines would be about $28.2 million.[22]

Third, a large part of the construction work force working in South Dakota would be comprised of non-local workers. The regional multiplier analysis should adjust for differences in spending between local and non-local workers. Propensity to consume locally is lower for non-local workers than local workers. For example, the analysis should account for non-local workers sending a portion of the earnings to family members outside the project area. Also non-local workers are more likely to contribute a larger share of their earnings toward travel accommodations and food service. Differentiating between local and non-local workers was beyond the scope of this assessment, and local and non-local workers were treated identically, with a clear understanding of the limitations of doing so.

Fourth, a detailed analysis depends on accurate and complete data regarding initial changes. For example, using a "bill-of-goods" breakdown can better identify good and services to be purchased locally and how those purchases would affect the regional economy. Additionally, a bill-of-goods breakdown allows final-demand changes to be separated into producers' prices which can account for production costs, transportation costs, and trade margins. A bill-of-goods was not available for the Keystone Pipeline Project; therefore, this assessment provides only a general final-demand analysis.

Fifth, the proposed project would involve two phases with different economic impacts associated with each phase. The regional multiplier analysis evaluated the construction and operation phases separately.

The total cost of purchases from the South Dakota counties affected by the project would be about $93.2 million (see Table 4). The construction costs include goods and services, including labor, for building the proposed pipeline, pump stations, and mainline valves, as well as the associated electric transmission lines. The annual cost of purchases from within the counties affected by the project for operating the pipeline would be about initially $11.0 million. The annual operating costs include the cost of electricity to run the pump stations and mainline valves as well as the cost of maintaining and repairing the pipeline (see Table 4).[22]

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Based on RIMS II multipliers for the counties affected by construction, for every $1.00 spent by TransCanada in the project area for construction of the pipeline, an additional $0.70 of indirect and induced output would be expected from other industries. TransCanada is planning to spend about $93.2 million in the project area for construction of the pipeline. Therefore, an additional $65.2 million of indirect and induced output would be expected in the construction and other industries. The largest total outputs would be felt by the construction, retail trade, and health care industries, as well as possibly the accommodations and food services industries (see the

Table 4: Estimated Cost of the Keystone Pipeline Project

Project Component	Regional Cost
CONSTRUCTION (one-time)	
Pipeline, Pump Stations, Mainline Valves	$65,000,000
Electric Transmission Lines	$28,200,000
	$93,200,000
OPERATION (annual)	
Electricity	$10,100,000
System Maintenance & Repair	$880,000
	$10,980,000

Source: 18

Tourism section). When comparing the total project output to the gross state product for 2005, the economic impacts of the proposed project seem inconsequential (only about 0.5%). On a countywide basis, however, the impacts would seem more appreciable. Expected total output, earnings, and number of jobs created during construction are listed by industry in Table 5.

During operation of the pipeline, for every $1.00 spent by TransCanada in the project area, an additional $0.33 of indirect and induced output would be expected from other industries. TransCanada is planning on spending about $11.0 million annually in the project area for operation of the pipeline. Therefore, an additional $3.6 million of indirect and induced output would be expected in other industries. The largest total outputs would be felt by the utilities, construction, and transportation and warehousing industries. When comparing the total project output to the gross state product for 2005, the operation of the pipeline would have minimal impact (less than 0.05%). Again, however, the impacts would be more appreciable on a countywide basis. The expected total output, earnings, and number of jobs created during operation are listed by industry in Table 5.

In general, additional economic output is considered a beneficial impact because it results in additional jobs and wages. However, as demand for labor rises, so can labor costs. For economic output to be considered beneficial, increases in revenues must exceed increases in costs. As previously discussed, the labor supply in the area appears to be sufficient to accommodate the additional jobs. Furthermore, labor costs in the industries most affected by the project are less than one-third of revenues, suggesting that the net economic impact of the project would be beneficial.

Experience and common sense suggest that certain businesses and industries may be affected differently than indicated by the regional input-output model. In the case of agriculture, construction of the pipeline would remove standing crops from the project area and potentially disrupt farming operations, thereby reducing the actual output predicted for the agricultural

Table 5: Economic Impact of the Keystone Pipeline Project

Industry	Construction (one-time)			Operation (annual)		
	Output ($)	Earnings ($)	Empl. (jobs)	Output ($)	Earnings ($)	Empl. (jobs)
Agriculture, Forestry, Fishing, and Hunting	605,800	111,840	4	29,960	6,106	0
Mining	745,600	195,720	4	11,080	2,858	0
Utilities*	1,621,680	251,640	3	10,205,202	1,575,956	20
Construction	93,610,080	34,484,000	1,013**	1,108,092	406,420	12
Manufacturing	8,621,000	1,770,600	45	226,840	45,000	1
Wholesale Trade	5,880,920	1,854,680	40	247,428	78,112	2
Retail Trade	12,386,280	4,063,520	194	423,992	139,368	7
Transportation and Warehousing*	2,889,200	932,000	24	618,130	133,030	3
Information	1,910,600	316,880	7	89,750	15,112	0
Finance and Insurance	4,753,200	1,276,840	32	286,270	76,696	2
Real estate and Rental and Leasing	6,719,720	242,320	8	372,508	13,398	0
Professional, Scientific, and Technical Services	2,889,200	1,053,160	27	126,260	46,304	1
Management of Companies and Enterprises	335,520	139,800	2	12,258	5,360	0
Administrative and Waste Mgmt. Services	1,656,960	587,160	28	66,364	30,794	1
Educational Services	820,160	419,400	20	49,154	25,170	1
Health Care and Social Assistance	7,716,960	3,355,200	94	418,284	181,160	5
Arts, Entertainment, and Recreation	391,440	130,480	7	20,866	7,292	0
Accommodation and Food Services	2,721,440	764,240	60	152,956	42,566	3
Other Services*	2,162,240	820,160	38	104,246	39,054	2
Households	52,835,080	65,240	4	2,874,392	3,646	0
	158,440,000	52,835,080	1,655	14,569,640	2,875,402	61

*Includes government
**The number of direct construction jobs estimated by TransCanada was 1,200, which is higher than the number of total jobs estimated through the RIMS II analysis. The construction jobs estimated through RIMS II analysis would be about 1,009 direct construction jobs and 4 indirect and induced construction jobs for a total of 1,013 construction jobs. The TransCanada estimate is expected to be more accurate.
Source: 16

industry. In the case of accommodations and food services, the influx of non-local workers to the area would likely cause a much greater impact on the accommodations and food services industries than predicted by the model. Specific impacts on agriculture, tourism, development, housing, utilities, education, law enforcement, emergency response, health care, roads, and taxes are discussed in more detail in the following sections.

Agriculture

The proposed pipeline would affect approximately 2,169 acres of cropland.[24] Short-term impacts associated with construction would include loss of standing crops within the construction work area and disruption of farming operations in the vicinity of project activities during construction. Installation of the proposed pipeline would take row crops out of production for one growing season. After

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construction, agricultural areas, including the permanent right-of-way, would be allowed to revert to former agricultural use.

A variety of field crops are produced in the ten counties crossed by the proposed pipeline. Soybeans and corn account for more than two-thirds of all acres harvested. Other common field crops include wheat, hay, oats, sunflowers, barley, and flaxseed. Based on 2006 harvest acreages, yields, and prices, the proposed project would result in the loss of about $550,000 of field crops during construction. This loss would offset a large portion of the $605,800 gain in the sector predicted by the regional input-output model. However, compared to the 2.7 million acres of cropland in the ten counties crossed by the pipeline that were harvested in 2006, the acreage of cropland land taken out of production would be insignificant (less than 0.1%).[25, 26]

To mitigate impacts on farmers, TransCanada would compensate farmers for crop loss and other associated damages. Farmers would be compensated 100% of the value of the crop lost when the crops are taken out of production during the year of construction. With the understanding that the land could take several years to return to previous production levels, TransCanada would compensate farmers 75% the value of the crop lost the year after construction, and 50% the year after that.[27]

In reality, some agricultural land and hay fields may experience reduced yields greater than those anticipated by TransCanada's compensation package. Also, yields of some fields could take longer than two years to return to previous production levels. TransCanada has indicated that it would monitor the yield of land impacted by construction with the help of agricultural specialists when requested by the landowner. If alterations are indicated from that of adjacent lands, it would compensate the landowner for reduced yields and implement procedures to return the land to equivalent capability. We believe that landowners may not be aware that they can request yield monitoring, especially two or more years after construction. Therefore, we recommend that:

- **TransCanada monitor the yield of agricultural lands and hay fields impacted by construction, except where monitoring is waived by the landowner in writing. Monitoring shall be conducted until the area is successfully restored to yields which are similar to adjacent portions of the same field that were not disturbed by construction. TransCanada shall compensate the landowner for reduced yields at market rates until the area is successfully restored.**

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Tourism

Many of the tourist attractions that South Dakota is traditionally known for, such as Mount Rushmore, the Black Hills, Sturgis Motorcycle Rally, Wall Drug, occur in the western part of the state. However, the eastern part of the state is well known for hunting, fishing, and other types of outdoor recreation, such as hiking, biking, camping, birding, and snowmobiling. There are numerous state parks, local museums, fairs, and special events in the eastern part of the state and the counties crossed by the project.

During construction, non-local workers would demand many of the same goods and services as tourists. For example, construction workers would utilize hotels, motels, restaurants, and drinking establishments that are also commonly used by tourists. The influx of non-local workers to the area would likely cause a much greater impact on output from the accommodations and food services industries than the $2.7 million predicted by the RIMS II model. Based on the construction schedule, number of non-local workers, and 2007 *per diem* rates ($109 per day), the accommodations and food services industries could see output of up to $23.0 million, or about 8.5 times the output predicted by RIMS II.[28] Even if only half of that amount is spent on food and lodging by non-local workers, it is still significantly greater.

The increase in demand for accommodations and food services would normally be considered positive economic impact, but also could be considered negative if non-local construction workers crowd out or displace traditional users. For example, construction workers could fully occupy hotels and motels in an area and displace hunters during hunting season, thereby negatively impacting tourism. An evaluation of hotel and motel occupancy rates suggests that the project area has adequate hotel and motel availability to serve both traditional users and the influx of non-local workers (see the Housing section below).

Perhaps the most important tourist activity in the counties crossed by the proposed pipeline is hunting. Beadle County is known by many visitors as the pheasant capital of the world. Each year thousands of hunters from out of state go to Beadle and surrounding counties for pheasant hunting from late October to early January.[29] Hunting in the immediate vicinity of the project would be affected during construction. Construction noise and activity would encourage most wildlife to move out of the project area and would result in a diminished hunting experience. Additionally, hunting would be prohibited within the project right-of-way for safety reasons. Three factors would mitigate impacts on hunting.

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First, there is an abundance of hunting territory adjacent to the proposed pipeline. Second, construction would be winding down as the hunting season is starting. Third, hunting would only be prohibited in those areas where construction is active. No impacts on hunting would be expected after construction.

The only designated recreational area directly affected by the proposed pipeline would be the Missouri River, which has been designated a National Recreational River. Rivers with this designation are preserved because of their remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. TransCanada is proposing to drill a hole under the river and install the pipe through the hole without affecting the bed, banks, or water quality of the river or areas within the National Recreational River administrative boundary.[1] Therefore, the project would not result in significant adverse impacts on the river or associated recreation.

County commissioners were contacted to determine if there were any special events in the project area that could be affected by construction, such as marathon routes or other events that would require coordination during construction. The county commissioners did not identify any special events that would require special coordination as of the date of this assessment. However, we note that Beadle County hosts the state fair in early September each year. In recent years, the fair has seen attendance dwindle and the fair has risked cancellation. However, in 2007, the fair saw a rebound. Attendance was up around 151,000 and camping in the main campground was sold out prior to opening day. The influx of non-local workers could result in increased fair attendance and revenue, but could also increase competition for limited fair resources, such as campsites. Because the future of the fair is still somewhat uncertain and the influx of workers has potential to both positively and negatively impact the fair, we recommend that:

- **TransCanada coordinate project activities with fair administrators so as to best make use of fair resources for traditional users as well as construction workers.**

Development

The proposed project does not cross commercially or industrially developed land in South Dakota, although it also passes within about 2,000 feet the Spencer Quarry, a quartzite quarry and asphalt plant, in McCook County. It also crosses

a few farmsteads and approach a few areas of suburban residential development along it route, particularly on the south end of the project near Yankton. Impacts of construction on residences could be significant on a site-specific basis, and might include noise and dust generated by construction equipment, limited access to property, increased traffic and congestion on nearby roads, and loss of valuable trees and landscaping. Communicating information about project schedules, employing appropriate safety procedures, and restoring affected areas can mitigate these impacts. Therefore, we recommend that:

- **TransCanada prepare and submit to the South Dakota Public Utilities Commission for review and approval a residential mitigation plan to:**
  a. **coordinate construction work schedules with affected residential landowners prior to the start of construction;**
  b. **maintain access to all residences, except for brief periods essential to pipe-laying as coordinated with affected residential landowners;**
  c. **installing temporary safety fencing to control access and minimize hazards associated with an open trench in residential areas;**
  d. **notifying affected residents in advance of any scheduled disruption of utilities and limit the duration of any interruption to the smallest time possible;**
  e. **repairing any damages to property that result from construction activities; and**
  f. **restoring all areas disturbed by construction to preconstruction conditions or better.**

After construction, certain structures and uses would be prohibited on the permanent pipeline right-of-way, including construction of aboveground structures, construction of septic systems, planting or cultivation of trees, quarry/mining, or any other activity that could affect TransCanada's ability to safely operate, access, maintain, or repair its pipeline. These restrictions would not necessarily restrict future development of a particular parcel of land, but could affect the physical layout of how the particular parcel is developed and the manner in which it is developed.

Frequently, property owners affected by pipeline projects are concerned about property devaluation caused by damage from construction and a permanent pipeline easement. An easement would be used to convey both temporary (for construction) and permanent rights-of-way to TransCanada. The easement would give TransCanada the right to construct, operate, and maintain the

pipeline, and establish a permanent right-of-way. In return, TransCanada would compensate the landowner for use of the land.

TransCanada would utilize temporary and permanent easements with landowners as well as construction restriction agreements. The temporary and permanent easement agreements between TransCanada and the landowners would specify compensation for damages to property during construction, loss of use during construction, loss of renewable and nonrenewable or other resources, and, in the case of permanent easements, allowable uses of the permanent right-of-way after construction. Construction restriction agreements would address avoidance or mitigation measures for a particular piece of property to be implemented during construction, such as topsoil stripping or grazing deferments.[30]

According to TransCanada, it would compensate landowners for a permanent easement at the full market value of the land affected by the pipeline just as if it were purchasing the land in fee. TransCanada would compensate at half market value for areas that would be temporarily disturbed during construction but would not be retained permanently for operation of the pipeline.[22] If an easement cannot be negotiated with the landowner, TransCanada may be able to obtain an easement by the use of eminent domain. In this case, the landowner would still be compensated by TransCanada, but the amount of compensation would be determined by the courts.

The effect that a pipeline easement may have on property values is a damage-related issue that would be negotiated between the parties during the easement acquisition process. The easement acquisition process is designed to provide fair compensation to the landowner for the right to use the property for pipeline construction and operation. Appraisal methods used to value land are based on objective characteristics of the property and any improvements. If an easement cannot be negotiated with the landowner and the project is approved by the South Dakota Public Utilities Commission, state law would allow TransCanada to obtain an easement by use of eminent domain. In this case, the property owner would still be compensated by TransCanada, but the amount of compensation would be determined by the courts.

The impact a pipeline may have on the value of a tract of land depends on many factors, including the size of the tract, the values of adjacent properties, the presence of other utilities, the current value of the land, and the current land use. Subjective valuation is generally not considered in appraisals. This is not to say that the pipeline would not affect resale values. A potential purchaser of

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property may make a decision to purchase land based on his or her planned use. An industrial user might find the pipeline (*i.e.*, a potential source of energy for an industrial plant) preferable, whereas a farmer or resident might find it objectionable. If the presence of a pipeline renders the planned use infeasible, it is possible that a potential purchaser would decide not to purchase the property. However, each potential purchaser has different criteria and differing capabilities to purchase land.

Fears about pipeline safety and diminished market value of property due to such fears can also be a concern. In 1996, the Fifth Circuit Court of Appeals upheld the idea that it is proper to consider diminished market value due to general public fears, though as a separate item of damage, it might be too speculative and conjectural. The court acknowledged that the value in any given condemnation case will always be a matter of opinion for competing appraisal experts to set forth and for a fact finder to ultimately decide.[31] In 2001, a study of four communities around the United States funded by the Interstate Natural Gas Association of America provided evidence suggesting that fears about pipeline safety and encumbrances from easements had no significant impact on the sale price or demand for properties located along pipeline rights-of-way.[32]

Property taxes for a piece of property are generally based on the actual use of the land. If a landowner feels that the presence of a pipeline easement reduces the use or value of his or her land, resulting in an overpayment of property taxes, he or she may appeal the issue of the assessment and subsequent property taxation to the local property tax agency.

Housing

Although the proposed pipeline would be constructed in a mostly rural environment, housing is thoroughly developed in the project area. Permanent housing in the ten counties crossed by the proposed pipeline consists of over 36,000 houses and apartments, nearly 5,000 of which are vacant. Of the 5,000 vacant houses and apartments, an estimated 1,634 are available for short-term or seasonal rental. There are also at least 24 hotels and motels and 3 recreation vehicle parks and campgrounds available for short-term rent in the counties crossed by the pipeline. The 24 hotels and motels have about 1,059 rooms. [33, 34, 35]

Hotel and motel occupancy varies by location and season. Summer months typically see the highest occupancy, while winter months see the lowest. The

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highest average occupancy rate in 2006 was 67% and occurred in July. The lowest average occupancy rate was 37% and occurred in December. Assuming that short-term house and apartment occupancy rates are similar to hotel and motel occupancy rates, between 845 and 1,353 total units (houses, apartments, hotel rooms, and motel rooms) would be expected to be available for construction workers depending on time of year.[33, 34, 35]

Although not necessarily within the counties crossed by the project, several larger communities are within a reasonable commuting distance (50 miles) of the project. These larger communities include Aberdeen, Mitchell, Sioux Falls, Watertown, and Yankton (which are in a county crossed by the pipeline). These communities have an estimated 304 short-term house and apartment units; 91 hotels and motels; and 6 recreation vehicle parks or campgrounds available for short-term rent.[33, 34, 36]

The 91 hotels and motels have about 6,945 total rooms. The highest average occupancy rate last year was 73% and occurred in July and August. The lowest average occupancy rate was 44% and occurred in January. Assuming that short-term house and apartment occupancy rates are similar to hotel and motel occupancy rates, between 1,963 and 3,121 total units (houses, apartments, hotel rooms, and motel rooms) would be expected to be available for construction workers depending on time of year.[33, 34, 36]

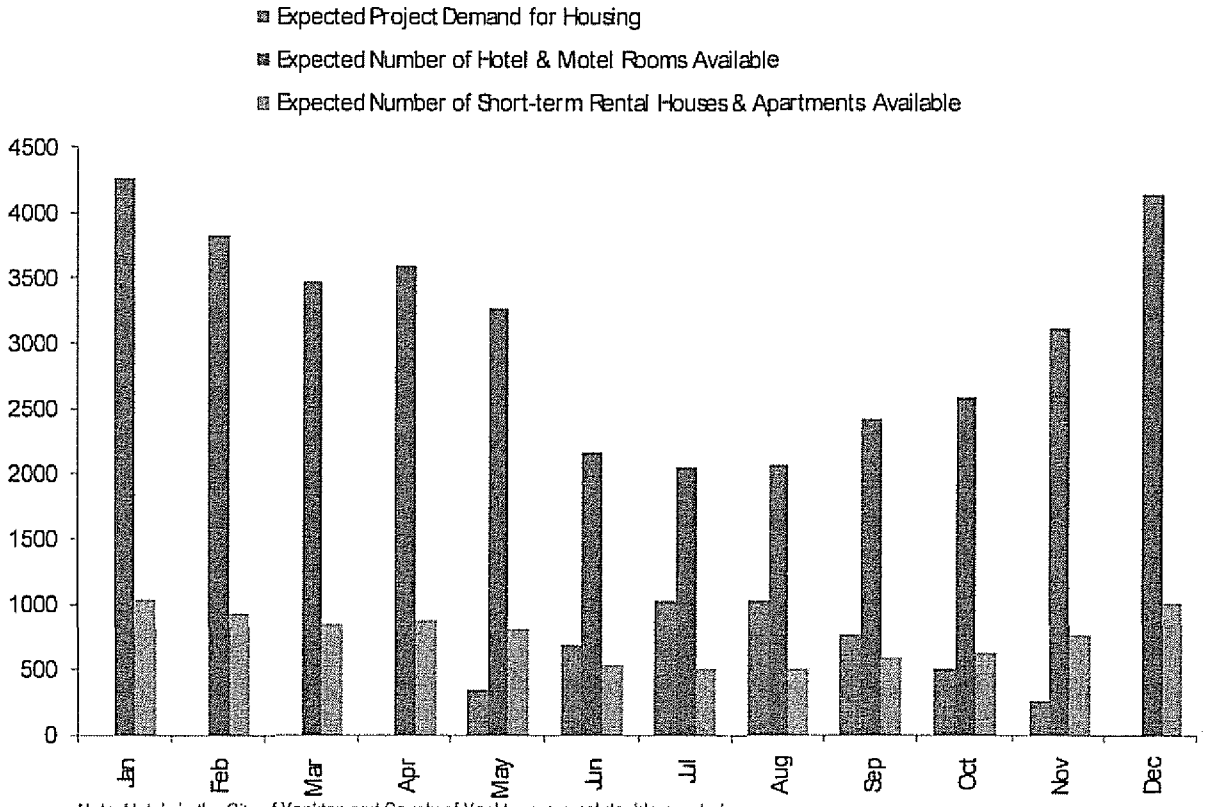
Most non-local project workers would use temporary housing, such as rental units, hotels, motels, and possibly campgrounds and recreational vehicle parks during their stay. Demand for temporary housing would go up during construction as a result of non-local workers moving into the area and would be expected to peak in the summer months of July and August, which incidentally coincides with peak occupancy for hotels and motels. An estimated 510 housing units would be needed for the expected influx of non-local workers and their family members at the peak of construction in 2008, and 1,020 housing units would be needed at the peak of construction in 2009 (assuming that accompanying family members occupy the same housing unit as the non-local worker).

The expected worker influx compared to housing availability indicates that the project area would have adequate housing available to serve the influx of non-local workers during construction, especially considering the fact that some larger nearby communities, such as Huron and Brookings, were not even evaluated for housing availability. Further, if workers were to only occupy hotels and motels, it appears that there would be sufficient vacancy for the workers.

Figure 4 illustrates the demand for temporary housing compared to the expected available temporary housing within the project area during the peak of construction.

Despite an adequate supply of hotel rooms, supply and demand suggest that the influx of workers would create upward pressure on the cost of hotel and motel labor as well as the price of hotel and motel rooms. It is also likely that some hotels and motels would experience full occupancy and traditional leisure or business travelers that frequent those particular establishments could be displaced to other establishments. These impacts would be temporary and would last for the duration of construction only. After construction, there would be no long-term impacts on housing as TransCanada would employee only three local workers to support operation of its pipeline.

Figure 4: Housing Supply and Demand for the Keystone Pipeline Project During the Peak of Construction



Note: Hotels in the City of Yankton and County of Yankton were not double counted.
(30, 31)

Utilities

Most houses, apartments, hotels, and motels that would be utilized by construction workers are already serviced by existing utilities, such as gas, electric, water, sewer, solid waste disposal, and telephone. Recent rural flight has left the area with a more robust infrastructure than is needed by the current population. Just a few years ago, the ten counties crossed by the proposed pipeline supported a population greater than that expected after the influx of non- local workers and their family members.[5] Although project personnel renting houses or apartments may need to sign up for new utility services, construction of new utility infrastructure (other than the electric transmission lines to serve the four new pump stations) would not be required.

Construction of the proposed project would result in increased utilization of solid and hazardous waste facilities in South Dakota. Waste from pipeline construction typically includes tree stumps, rocks, spacer ropes, welding rods, end caps, pipe shavings, paper, cardboard, oil, grease, paint, solvents, office waste, and other miscellaneous trash and debris. No highly toxic or unusual wastes would be generated by the project. According to TransCanada, the amount of waste generated by construction should be able to be handled and disposed of at local licensed waste disposal sites.[7]

After construction, minimal waste would be generated by operation of the pipeline in South Dakota. TransCanada would likely subscribe to local waste and sanitary services for its pump stations.

Education

Impacts on the existing school system are expected to be minimal. Due to the transitory nature of construction, most workers do not travel with their families or school-age children. Nonetheless, we assumed that about 5% of non-local workers may travel with 2 school-age children, for a total of 102 children during the peak of construction. Assuming that school-age children are evenly distributed between all grade levels (kindergarten through 12th grade) only about 8 children in each grade level would move into the project area. Because the peak of construction occurs during the summer months when school is not in session, the educational system would need to accommodate at most 6 children in each grade level during the beginning of the school year. Figure 5 illustrates the number of children per grade level that could potentially move into South Dakota. The existing educational system should be able to

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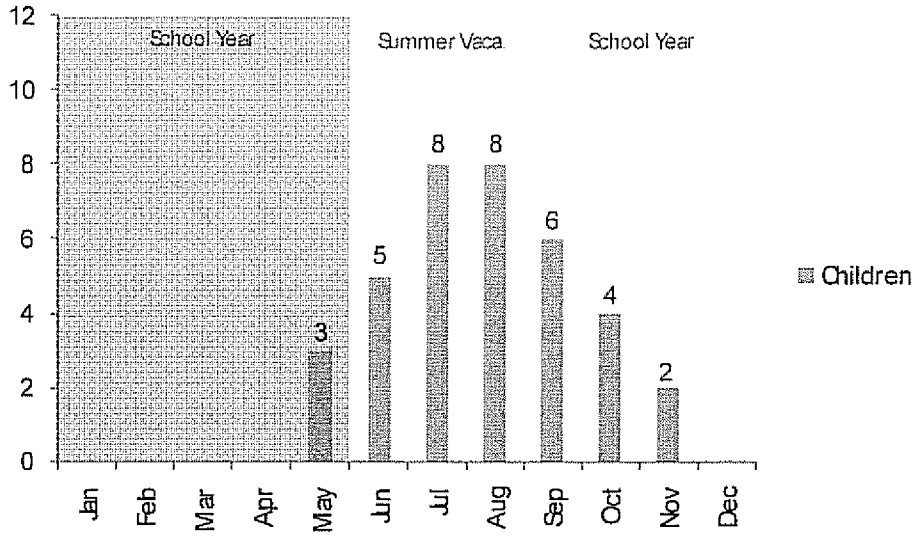
accommodate this small influx of students. Further, this estimate is probably high because, more likely than not, school age children would return to their permanent residence outside of South Dakota at the start of the school year.

Law Enforcement & Emergency Services

Public safety and law enforcement in South Dakota is provided by a variety of federal, state, and local agencies. Most law enforcement is provided on a local level by city police departments or county sheriff departments. According to the United States Department of Justice, the ten counties crossed by the proposed pipeline employed 130 full-time law enforcement officers in local sheriff and police departments in 2006. This equates to a ratio of 1 local law enforcement officer per 587 people, or 1:587.[37, 38] During the peak of construction, the ratio would be

Figure 5: Possible Number of School-Age Children in Each Grade Level



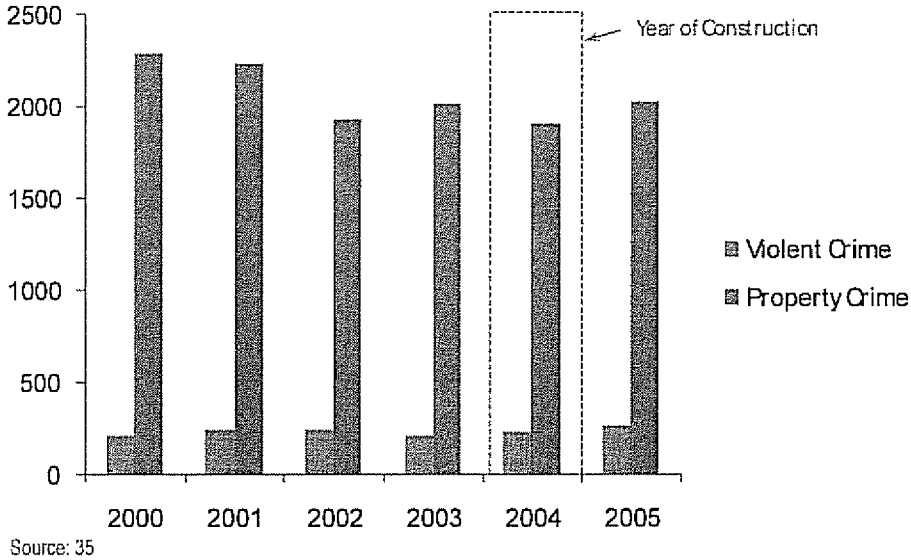
reduced slightly to about 1:597. To maintain the ratio of law enforcement officers per person, 2 additional officers would be required during the peak of construction.

All ten counties crossed by the proposed pipeline have lower rates of violent crime and property crime than the statewide average.[37] Historical data suggests that the influx of non-local workers on pipeline projects does not affect local crime rates. In the summer of 2004, a 380-mile-long pipeline was constructed across Colorado and Kansas. The project crossed nine rural counties in Kansas and five rural counties in Colorado. The project employed a workforce similar in size to the workforce proposed on the Keystone Pipeline Project.[39] The Department of Justice crime data for sheriff offices in the counties crossed by the project in Kansas and Colorado showed no discernable crime bump in 2004 attributable to construction. In fact, property crime reported by the sheriffs' offices was at its lowest rate compared to the four years preceding and one year following construction and violent crime was slightly lower than average (see Figure 6).[40]

As with local law enforcement, demand for firefighting or other emergency services would not be expected to increase dramatically during construction. The community infrastructure just a few years ago accommodated a larger population than the increase expected from the influx of workers with the project. With crude oil pipelines, however, there is always a concern that a leak or incident during operation of the pipeline could require emergency response. Federal regulations prescribe minimum standards for operating and maintaining

pipeline facilities, and each pipeline operator must establish an emergency response plan that includes procedures to minimize the hazards in a pipeline emergency and for establishing and maintaining communications with local fire, police, and public officials, and for coordinating emergency response. TransCanada has developed a draft emergency response plan that is being reviewed by the Public Utilities Commission.

Figure 6: Crimes per 100,000 People for the Kansas and Colorado Pipeline Project



Source: 35

In addition to an emergency response plan, federal regulations also require pipeline operators to establish public awareness programs to enable customers, the public, government officials, emergency responders, and those engaged in excavation activities to recognize a pipeline emergency and respond appropriately. One of the main benefits of a public awareness program is the enhanced safety and security of pipeline. A more informed public will reduce the likelihood and consequences of a pipeline emergency. According to TransCanada, it would implement a comprehensive integrated public awareness program consistent with that employed by TransCanada on all its pipelines in the United States.

As part of its integrated public awareness program, TransCanada would educate emergency response officials on the company's emergency response procedures and how the company would work with emergency responders during an emergency. TransCanada would also involve local emergency responders in its training exercises, which are designed to meet the requirements of the National Preparedness for Response Exercise Program Guidelines developed by the United States Coast Guard and adopted by the United State

Department of Transportation, Pipeline and Hazardous Materials Safety Administration, United States Environmental Protection Agency, and Minerals Management Service. The primary types of training exercises in TransCanada's program are: notification; tabletop; Keystone-owned equipment deployment; contractor; unannounced exercises by government agencies; and area-wide exercises up to and including actual field drills conducted by industry and the government agencies.[41]

The economic impact of a pipeline incident is impossible to predict and would depend on many factors, such as the volume of the spill, the particular type of crude oil spilled, the location of the spill, and the resources affected by the spill. Some incidents may be small or occur in safe locations with little impact, while others may be large or occur in unusually sensitive areas.

Regardless of size location, almost any pipeline incident would result in additional economic output. Since economic output records every monetary transaction as positive, the cost of spending to mitigate a pipeline incident would be tallied as economic output. However, economic output does not necessarily mean economic progress. In fact, such situations have been described by the "broken window" fallacy. The broken window fallacy is the idea that destruction (as in breaking a window) is somehow positive because it provides economic activity for the person replacing the window. Of course, the person whose window was broken and has it fixed will spend money that he or she could have spent on something else (and would have spent on something else).[42] In any case, TransCanada indicated that it would be responsible for commercial losses that arise from a leak on the Keystone Pipeline, including the clean-up expense and payment for property damages as a result of the leak.[30] If the leak were caused by a third party, it seems plausible that TransCanada might seek damages from the third party.

Pipeline incidents may also have social and political consequences that affect their economics. Consider the Bellingham and Carlsbad natural gas pipeline incidents (we emphasize that both incidents were natural gas pipeline incidents, not crude oil pipeline incidents). In 1999 and 2000, the nation experienced two highly publicized natural gas pipeline incidents. The first was in Bellingham, Washington where three people were killed due to a natural gas pipeline explosion, and the second was in Carlsbad, New Mexico where 12 people were killed. These two incidents caused Congress to pass the Pipeline Safety Improvement Act of 2002, which mandated significant changes in the way that the natural gas pipeline industry ensured the safety and integrity of its pipelines. The cost of the legislation's new requirements to pipeline companies was

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estimated at between $5 billion and $11 billion over 20 years.[43] Not only did the two pipeline incidents result in losses to the victims and the pipeline companies, but they also resulted in large costs for the entire industry.

Health Care

Health care is readily available in the counties crossed by the proposed pipeline. There are 8 hospitals in the counties crossed by the proposed pipeline with 233 beds and an additional 21 hospitals in nearby counties with an additional 1,381 beds (see Table 6).[44] Some of the hospitals, such as Sanford USD Medical Center, are world renowned and offer comprehensive medical services. Sanford was named "One of America's Best" by US News & World Report in 2006, chosen one of the "Nation's Top Hospitals" for 2006 by National Research Corporation, recognized as one of the "Top 100 Hospitals" by Thomson, provides emergency transportation by helicopter and fixed-wing aircrafts, has over 24,000 annual admissions with over 32,000 emergency room responses a year. In addition to the hospitals, there are numerous medical and dental clinics in the area to serve the routine needs of the population.

Table 6: Hospitals Near the Keystone Pipeline Project

County	Medical Facility Name	City	Routine Service Beds*	Special Care Beds**	Total Beds
Beadle†	Huron Regional Medical Center	Huron	19	6	25
Day†	Lake Area Hospital	Webster	25	0	25
Hutchinson†	Avera St. Benedict Health Center	Parkston	25	0	25
Hutchinson†	Freeman Regional Health Services	Freeman	25	0	25
Kingsbury†	De Smet Memorial Hospital	De Smet	17	0	17
Marshall†	Marshall County Healthcare Center	Britton	20	0	20
Yankton†	Avera Sacred Heart Hospital	Yankton	78	12	90
Yankton†	Lewis and Clark Specialty Hospital	Yankton	6	0	6
			215	18	233
Bon Homme	St. Michael's Hospital	Tyndall	25	0	25
Brookings	Brookings Hospital	Brookings	49	0	49
Brown	Avera St. Luke's Hospital	Aberdeen	103	10	113
Brown	Dakota Plains Surgery Center	Aberdeen	8	0	8
Charles Mix	Community Memorial Hospital	Wagner	20	0	20
Clay	Sanford Vermillion Medical Center	Vermillion	25	0	25
Codington	Prairie Lakes Healthcare Systems	Watertown	76	5	81
Davison	Avera Queen of Peace Hospital	Mitchell	80	8	88
Douglas	Douglas County Memorial Hospital	Armour	11	0	11
Jerauld	Avera Weskota Memorial Med. Center	Wessington Spr.	18	0	18

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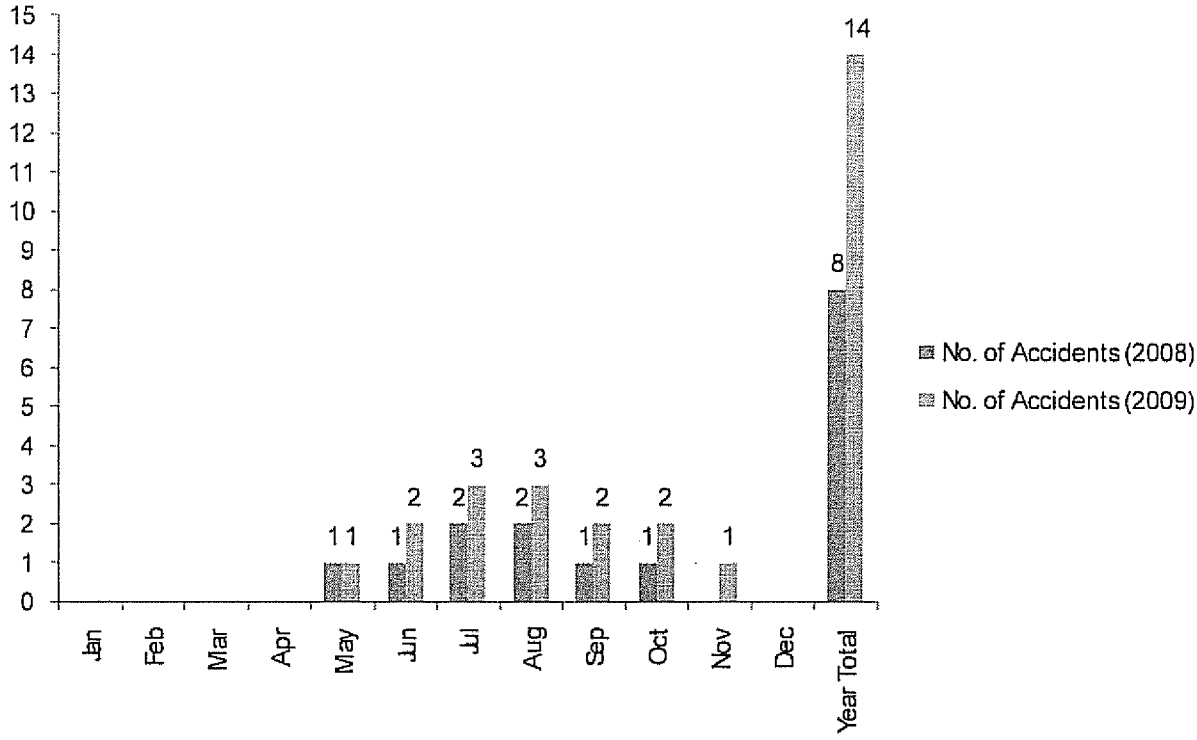
Lake	Madison Community Hospital	Madison	25	0	25
Lincoln	Canton-Inwood Memorial Hospital	Canton	22	0	22
Minnehaha	Avera Dell Area Helth Center	Dell Rapids	21	0	21
Minnehaha	Avera Heart Hospital of South Dakota	Sioux Falls	55	0	55
Minnehaha	Avera McKennan Hospital	Sioux Falls	242	60	302
Minnehaha	Sanford USD Medical Center	Sioux Falls	324	89	413
Minnehaha	Select Specialty Hospital	Sioux Falls	24	0	24
Minnehaha	Sioux Falls Surgery Center	Sioux Falls	13	0	13
Roberts	Coteau Des Prairies Hospital	Sisseton	31	0	31
Spink	Community Memorial Hospital	Redfield	25	0	25
Turner	Pioneer Memorial Hospital	Viborg	12	0	12
			1,209	172	1,381

* Routine service bed are general medical/surgical beds are the beds used for routine care.
** Special care beds include intensive care units, coronary care units, etc.
† County is crossed by proposed pipeline project.
Source: 36

One especially important concern associated with the proposed project is that construction could lead to increased demand for emergency medical services to treat injuries from construction-related accidents. According to the United States Department of Labor, the rate of occupational injuries in the construction industry was 239.5 incidents per 10,000 full-time workers in 2005. This rate was about 76% higher than the average of all industries, which was 135.7 incidents per 10,000 full-time workers.[45]

The actual number of construction-related incidents as a result pipeline construction and the degree of impact on the surrounding communities is impossible to predict. However, based on Department of Labor rates and workforce estimates from 2006, about 8 construction-related incidents might be expected in 2008 and 14 construction-related incidents might be expected in 2009 (see Figure 7). Not all incidents would necessarily require medical attention. The counties and cities in the vicinity of the project appear to have adequate health care services to meet the emergency as well as routine health care needs of the community during construction. After construction, TransCanada would hire three local employees, which would result in no impact on community health care needs.

Figure 7: Number of Construction Accidents that Might be Expected on the Keystone Pipeline Project



Roads & Transportation

South Dakota's road system serves as the backbone of the state's transportation system and carries the bulk of the state's commercial goods as well as personal travel. The road system in the South Dakota has evolved over time to a sophisticated network of federal, state, and local roads, bridges, and overpasses, all designed to carry a large amount of traffic. Most of the roads in the state system are moderately traveled and have average daily traffic counts of less than 1,500 vehicles. However, some of the more heavily traveled highways exceed 2,500 vehicles per day. County system roads are much less traveled and typically have average daily traffic counts under 100 vehicles. Traffic counts tend to be highest along interstates and in urban centers and easily exceed 5,000 or 10,000 vehicles per day in some areas. For the ten counties crossed by the proposed pipeline, the 2006 average daily vehicle count for state system roads was 1,698 vehicles. The average daily vehicle count for county system roads was 50 vehicles.[46]

The movement of construction equipment, materials, and crew members to the project area would result in additional traffic on the roads in the counties crossed by the pipeline and in adjacent counties. The actual capacity of each road is

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dependent on the number of factors, such as number of travel lanes, intersections, traffic signals, speed limits, *etc*. Based on construction vehicle estimates provided by TransCanada, daily traffic counts would not be expected to increase by more than 200 vehicles per day for most roads, although traffic counts could be higher near contractor yards where workers would meet in the morning to share rides to the construction right-of-way. According to county commissioners polled as of the date of this assessment, the existing road infrastructure would be sufficient to accommodate construction traffic, although heavier traffic and slower moving vehicles could be encountered by road users at various times. No new roads would be constructed in South Dakota as part of the proposed project.

In addition to congestion, traffic could be disrupted from pipeline construction across roads. According to TransCanada, the pipeline would be installed across most major paved roads, primary gravel roads, and railroads using the bore technique. The bore technique involves excavating a pit on each side of the road then boring a straight-line hole under the road large enough to install the pipeline. Boring would result in little or no disruption to traffic or damage to the roads. Each bored crossing would be expected to take 1 to 2 days for most roads and railroads and up to 10 days for long crossings such as interstates or four-lane highways.[24]

Most smaller unpaved roads and driveways would be crossed using the open-cut method. The open-cut method would require temporary closure of the road to traffic and establishment of detours. If no reasonable detour is feasible for public roads, at least one lane of traffic would be kept open, except during brief periods when it is necessary to close the road to install the pipeline. Most open-cut road crossings would be completed and the road resurfaced in 1 or 2 days. TransCanada would take measures, such as posting signs at open-cut road crossings, to ensure public safety and minimize disruption to traffic.[24] According to TransCanada, only eight gravel roads and no paved roads (of more than 175 road crossings) would be closed and detoured for up to 48 hours each during the two years of construction.[47]

Impacts associated with constructing the pipeline across roads would be temporary and minor and would not be expected to create significant disruptions to traffic. TransCanada would be required to obtain all state and local permits necessary to cross roads with the pipeline. It would be the responsibility of the state or local permitting authority to ensure that traffic flow would not be significantly impacted by road closures and that affected roads

are restored to preconstruction conditions or better after construction. However, in the interest of public safety, we recommend that:

- **TransCanada coordinate road closures with state and local emergency responders (law enforcement, fire, and medical) and provide sufficient advance notice of road closures to appropriate response agencies.**

In addition to disrupting traffic flow, the movement of construction equipment, materials, and crew members to the project area could result in deteriorated roadbed conditions. During construction, trucks and buses hauling heavy equipment, materials, and personnel to the project site could damage the roadbeds. Every axle passing over a highway consumes a portion of the pavement's life. With each application of load, the pavement experiences compression and bending that eventually lead to rutting and cracking. Road tests over the past 50 years have shown that the amount of pavement life consumed by heavy axles greatly exceeds the amount of life consumed by light axles. For example, a 20,000-pound truck axle consumes 1,000 times as much pavement life as a 2,000-pound automobile axle even though the axle weight is only 10 times as large.[48]

Because of the importance of trucking to South Dakota's economy, the South Dakota legislature and other branches of state government have historically adopted rules and procedures that help the trucking industry to operate competitively. Unlike most states, South Dakota does not impose absolute gross weight limits on trucks. Instead, it allows essentially unlimited gross weight, provided the load is supported by enough tires and axles to prevent road and bridge damage. The Department of Transportation has also developed an automated permitting system that allows truckers to obtain permits online and quickly identifies safe routes for movement of oversize and overweight vehicles.[46]

Paved roads are the most durable and stand up well to periodic surges in traffic and heavy use. Paved roads may or may not require periodic maintenance as a result of construction traffic. Gravel roads, on the other hand, are much less durable and almost certainly would require repair. TransCanada estimates that up to 350 miles of gravel roads may need grading or gravel replenishment during construction at a cost of up to $1.4 million.[47] We recommend that:

- **TransCanada implement a regular program of road maintenance and repair throughout active construction to keep paved and gravel roads in an acceptable condition for travel by the public. Following construction, TransCanada would be responsible for restoring deterioration caused by**

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construction traffic such that the road is returned to its preconstruction condition or better. Repairs during and after construction would be consistent with federal, state, and local requirements.

The project also could result in other types of damage to roads. For example, roads could be damaged by tracked vehicles crossing the roads as they move down the construction right-of-way. Heavy equipment also could track dirt and mud on roads, which may cause slippery and dangerous road conditions to road users. To minimize these potential problems, we recommend that:

- **TransCanada use rubber mats, tires, plywood sheets, steel plates or similar material to prevent damage to the road surface where tracked vehicles cross paved roads, and TransCanada install a combination of matting, culverts, and/or 50-foot-long crushed stone access pads at road crossings and other ingress and egress points to construction work areas to allow mud to fall off construction-related vehicles prior to leaving the work area. If excess soil or mud is tracked onto roadways, it should be shoveled or swept off immediately.**

Nearly all funds to repair state and county roads in South Dakota come from road users in the form of motor fuel taxes, motor vehicle registration fees, and compensatory fees paid by commercial carriers. Commercial carriers need registrations to operate in the state and may need special permits for oversize and overweight vehicles, temporary trip permits within the state, or to haul hazardous materials. In theory, the fuel taxes, registrations, and permits required to operate trucks hauling heavy equipment and materials to and from the project area would pay for maintenance of the roads. South Dakota law, however, requires and indemnity bond for projects such as this to insure that any damage beyond normal wear to public roads, highways, bridges, or other related facilities would be adequately compensated.[49] TransCanada has proposed a $3 million bond in 2008 when one construction spread is active, and a $12 million bond in 2009 when two spreads are active.[47] The cumulative bond amount is about 12 times the estimated cost of repairs/maintenance. We recommend that:

- **TransCanada obtain a bond in the amount of $3 million in 2008 and $12 million in 2009 to insure that any damage beyond normal wear to public roads, highways, bridges, or other related facilities would be adequately compensated. If project plans change such that a different bonding amount is warranted (*e.g.*, the construction schedule or spread lengths change), TransCanada would be required to inform the South Dakota**

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Public Utilities Commission of such changes and propose a different bonding amount for commission review and approval.

Taxes

As of 2005, South Dakota had the lowest per capita total state tax rate in the United States. The state does not levy inheritance tax, personal or corporate income tax, or tax on intangible personal property. However, sales tax is applied to the gross receipts of all retail sales in South Dakota, including the selling, leasing, and renting of tangible personal property or the sale of services. A use tax of the same rate as the sales tax applies to all goods and services that are used, stored, or consumed in South Dakota on which South Dakota sales tax was not paid. The purchaser or consumer of the goods or services is responsible for reporting and remitting the use tax in the filing period in which they receive the goods or services. The state sales and use tax rate is 4%.[50]

In addition to state sales and use tax, municipalities may impose sales and use tax of up to 2% and gross receipts tax of up to 1%.[50] Within the project area, the proposed project avoids municipalities (except perhaps for a small corner of Yankton), which is consistent with the general pipeline routing goal of avoiding populated areas. South Dakota also imposes a contractors' excise tax on the gross receipts resulting from construction services or realty improvements. The contractors' excise tax is 2%.[51]

The proposed project would be subject to 4% sales and use tax and 2% contractors' excise tax, for a total of 6% tax. TransCanada estimates the taxable value of the project in South Dakota at $300 million.[30] The taxable value of the project is higher than the total cost of purchases from firms located within the region. This is due to the fact that items purchased outside of South Dakota, but used in South Dakota (*e.g.*, pipe, pump motors, *etc.*) are subject to use tax. Based on the taxable value of the project in South Dakota, the state would collect about $18 million from construction. Compared to statewide sales and use tax and contractors' excise tax collected in 2006 of about $926 million, the proposed project would have a modest benefit on state tax revenues of about 2%.[52] Spread over two years, the benefits would be less noticeable.

New and expanded business facilities (with the exception of retail, housing, and health care facilities and any facility that is exempt from property tax) may be eligible for partial sales and use tax and contractors' excise tax refund if project

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costs are greater than $10 million. Refunds are based on the following project cost scale:[53]

- $0 to $10 million = 0%
- $10 to $15 million = 25%
- $15 to $20 million = 33%
- $20 to $40 million = 50%
- $40 to $60 million = 67%
- $60 to $600 million = 75%
- $600 million and up = 90%

In accordance with the value of the project in South Dakota, TransCanada may be eligible for up to a 75% refund, thereby effectively dropping the cumulative sales and use tax and contractors' excise tax rate to 1.5%, or $4.5 million. Compared to the statewide taxes collected in 2006 of about $926 million, the proposed project would have a minor benefit on tax revenues of about 0.5%.[52] Spread over two years, the benefit would appear still less significant.

During operation, crude oil shipped in the pipeline would not be retailed within the state; therefore, no sales or use tax would be generated by the product in the pipeline. However, the electricity (as well as other goods and services) purchased by TransCanada would be subject to a 4% sales and use tax. TransCanada estimates that it would purchase about $10.1 million in local electricity annually to operate its pump stations in South Dakota.[22] This equates to $404,000 of annual tax revenue. Other goods and services purchased locally might exceed $500,000 annually and could add more than $20,000 to annual tax revenue.[20, 22]

The state also taxes the operation of pipelines (as well as railroads, airlines, and public utilities). Pipelines are taxed via *ad valorem* property tax, which is a tax based on the assessed value of the pipeline. The phrase *ad valorem* is Latin for "according to value." *Ad valorem* taxes such as this are incurred through ownership of an asset, and contrast to transactional taxes such as sales taxes, which are incurred only at the time of transaction.[54, 55]

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The South Dakota Department of Revenue and Regulation is responsible for assessing the property of pipeline companies operating as a common carrier in South Dakota. The operating property is assessed by the Department and sent to the counties for collection at the county tax rate. Property taxes are the primary source of funding for school systems, counties, municipalities and other units of local government. The state does not collect or spend any property tax money. Each county administers its own property tax system; the state's authority is limited to assisting local governments in making property tax assessments that are fair and in compliance with the law.[52]

The property tax rate charged in South Dakota varies by property type, by county, and by year. The rate for a county is established each year by dividing the value of all the property in the county into the annual budget that is unfunded from other sources. The average county property tax rate applied to pipelines in South Dakota in 2006 was around 2.1%.[52, 56]

Assuming that the value of the pipeline system would be roughly equivalent to the cost of construction, the proposed pipeline would have a total taxable value of about $300 million. The construction cost initially provides the basis for the pipeline valuation. With time, the assessment would focus onto the line's contribution to system-wide income and depreciated value. Generally, the assessment would decrease over time. As a rule, counties where the pipeline occupies more land would account for a proportionally larger part of the total taxable value. Also, counties with the pump stations would account for a larger part of the total taxable value. *Ad valorem* property taxes associated with the proposed project would increase countywide tax revenue between 2.6% and 13.7%. This additional revenue would be a noticeable tax benefit associated with operation of the pipeline. Table 7 provides the estimated initial taxable value of the pipeline system by county and anticipated annual tax revenues.

The electric transmission lines associated with the proposed project also would be assessed *ad valorem* property tax. Electric transmission lines, however, only pay *ad valorem* property tax on real property (*i.e.*, land and buildings). Personal property, which includes all wires, lines transformers, meters, machinery, fixtures, and all attachments and appurtenances, is subject to a 2% gross receipts tax in lieu of property tax.[57] For the purpose of this assessment, it was assumed that no additional real property would be required for the electric transmission lines and all taxes would be gross receipts taxes. Assuming gross receipts make up 50% of the total construction costs, gross receipts tax revenue of $282,000 would be shared among the six counties where the electric transmission lines would be

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installed (Beadle, Day, Hanson, Miner, and Yankton counties, and Brown County, which is not crossed by the pipeline).

Table 7: Annual Property Tax Impacts associated with the Keystone Pipeline Project

County Name	Total Taxable Property in County in 2006 ($)	Estimated Pipeline Taxable Value ($)	Estimated Total Tax Revenue of Pipeline ($)*	Estimated Tax Revenue Increase**
Beadle	917,499,593	34,767,548	730,119	3.8%
Clark	369,149,435	43,609,845	915,807	11.8%
Day	423,534,569	46,262,534	971,513	10.9%
Hanson	285,151,454	16,590,702	348,405	5.8%
Hutchinson	652,266,928	38,322,698	804,777	5.9%
Kingsbury	383,199,888	12,324,521	258,815	3.2%
Marshall	380,666,752	29,152,233	612,197	7.7%
McCook	527,090,155	13,509,572	283,701	2.6%
Miner	287,141,204	39,270,738	824,686	13.7%
Yankton	1,027,001,569	26,189,608	549,982	2.6%
Statewide	47,602,363,296	300,000,000	6,300,000	0.6%

*Based on a 2.1% property tax rate.
**Based on taxable property values for both the pipeline and electric transmission line.
Source: 56

Indirect and induced spending associated with construction and operation also would generate tax revenue for the state and local governments, primarily through sales and use tax. A comparison between gross sales and taxable sales in South Dakota over the past five years suggests that about 33% of all sales are taxable. Besides sales and use tax, numerous other types of state taxation would be levied, such as a 1% tourism tax on hotels where non-local workers would stay. As a simple approach to estimating indirect and induced tax revenues, a 4% sales tax was applied to 33% of the indirect and induced expenditures associated with construction and operation. Additionally, a 1% tourism tax was added to those expenditures associated with the accommodation and food services industries. Based on this approach, indirect and induced spending would generate about an additional $2.6 million in tax revenue during construction and $146,000 in annual tax revenue during operation. Again, we note that the accommodation and food services industries taxes may be impacted to a greater extent than predicted here due to targeted demands from the influx of non-local workers during construction.

Conclusion

The proposed project would have both beneficial and adverse impacts on the socioeconomic conditions of the counties crossed by the pipeline as well as South Dakota in general. Most of the impacts would be insignificant. Those

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adverse impacts that have potential to be significant could be mitigated by following the recommendations identified in this assessment. With the recommended mitigation, the proposed project would not, from a socioeconomic standpoint:

1. pose a threat of serious injury to the socioeconomic conditions in the project area,
2. substantially impair the health, safety, or welfare of the inhabitants in the project area, or
3. unduly interfere with the orderly development of the region.

TransCanada would be required to comply with all applicable laws and rules during construction and operation of the pipeline.

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BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Direct Testimony of Bryan Murdock on Behalf of the

Staff of the South Dakota Public Utilities Commission

October 31, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF BRYAN MURDOCK

Q: Please state your name and address for the record.

A: Bryan Murdock, 26723 Halite Court, Wyoming, Minnesota

Q: What is your position and responsibilities at Bay West?

A: My title is Environmental and Industrial Services Manager. Since joining Bay West in July of 2007, I have been responsible for managing four service divisions of Bay West, including the Emergency Response Division, the Household Hazardous Waste Division, the Commercial Environmental Consulting Division, and the Industrial Services/Waste Disposal Division.

Q: Please state your professional qualifications.

A: I have a B.S. degree in Biology with a Minor in Chemistry from Mankato State University. I have worked in the environmental consulting industry for 19 years. Project experiences include many environmental assessment and remediation projects, emergency response projects, large livestock, power, and grain industry facility siting and permitting projects, post construction environmental natural gas pipeline inspection, and analytical chemistry extraction and analysis projects.

Q: Have you provided your resume?

A: Yes

Q: In what capacity are you involved in the TransCanada Keystone Pipeline, LP (Keystone) project?

A: The Staff of the South Dakota Public Utilities Commission (Staff) has hired Bay West to review certain application documents. The results of Bay West's review are presented in the attached Limited Application Review Report dated October 31, 2007. Specifically, my involvement includes the performance of Task 3 and Task 9 below.

Task 3 - Identify Unusually Sensitive Areas (USAs) and High Consequence Areas (HCAs) and determine the adequacy of the mitigation measures for all such areas.

Task 9 - Search for any other environmental impact issues of consequence not previously identified and shall propose mitigation measure for any found.

Q: Please describe the objectives of Task 3?

A: The objective of Task 3 was to identify if HCAs/USAs had been accurately identified in the proposed Keystone Pipeline application filings and assess the adequacy of the mitigation measures proposed for the identified HCAs/USAs.

Q: Where there limiting factors that made it difficult meet the objectives of Task #3?

A: Bay West requested specific shape file HCA/USA data from the United States Department of Transportation and TransCanada, however it was not provided. The lack of available data made it difficult to understand if the HCA/USA data used by TransCanada to prepare their documents was inclusive of all available data and if it had been updated in recent years. The absence of this HCA/USA shape file data was limiting and resulted in more general recommendations and additional requires additional regulatory follow up.

Q: Please Explain the Findings, Conclusions and Recommendations associated with the performance of Task #3?

For the HCA/USAs identified by TransCanada, it appears they have appropriately identified the contributory pipeline segments and have a good start in planning mitigation measures for these identified HCA/USAs. More specific planning and mitigation assessment is necessary and will be part of the Integrity Management Plan that is required to be completed within one year of pipeline start up. However, the following recommendations are necessary based on the findings of Task 3.

Variance in the number and location of Community Drinking Water (CWS) Source Water Protection Areas (SWPA) provided by the South Dakota Department of Environment and Natural Resources (SD DENR) and the drinking water HCAs identified by TransCanada create a concern that TransCanada may not have all of the relevant data needed to identify drinking water HCAs. TransCanada and the SD DENR shall collaborate and review the SWPA data that is not presented in TransCanada's HCA maps and make a determination if there is any additional drinking water SWPAs that meet the definition of a Drinking Water HCA and/or require specific protective measures.

TransCanada has corresponded with the South Dakota Department of Game, Fish, and Parks (SD GFP) and the United States Fish and Wildlife Service (USFWS) regarding sensitive ecological resources located near the proposed pipeline route in South Dakota. TransCanada has identified the location of certain sensitive ecological resources that meet the definition of an USA in their HCA maps. In significant detail,

TransCanada has identified sensitive ecological resources and proposed detailed protective and restoration mitigation measures in the Draft Environmental Impact Statement. In order to provide the most appropriate protection/mitigation for the identified ecological resources, the SD GFP (in cooperation with other related agencies) should begin actively collaborating to finalize TransCanada's proposed mitigation activities associated with each ecologically sensitive population.

TransCanada does not appear to give sufficient consideration to how the presence of field drain tile systems could affect subsurface transport. Due to the ability of field drain tile systems to be direct conduits for transport away from the spill site, the presence of these drain tile systems shall be specifically accounted for in the development of the Integrity Management Plan.

TransCanada states that contributing pipe segments (CPS) were identified through the review of topographic maps and information. This level of review may not capture the subtle changes in topography that may influence flow patterns away from the pipeline. HCA maps provided by TransCanada indicate that the pipeline is located in areas that are relatively flat and sometimes atop topographic peaks or divides between watershed areas. Field verification of topographic changes near the pipeline should be performed to more accurately identify CPS and adequately protect HCAs.

TransCanada provides the following text regarding downstream transport; "the assumption is made that transport is to be constant and a spill would be intercepted within five miles downstream of the release location." That assumption does not appear be considerate of a catastrophic release or a release that occurs during a simultaneous event that significantly complicates the release interception/response. The description of a worst case discharge, contained within the pending Pipeline Oil Spill Response Plan, calls for planning for a very large release, probably near or into a very sensitive area (HCA) during inclement weather conditions. With stream/river flow velocities of five miles per hour or more during rain storm events; it is very unlikely that all or even some of the oil would be contained within five miles down stream of the release point. As a point of reference, planning requirements for fixed facilities under the Oil Pollution Act of 1990 (OPA 90), must calculate downstream planning distances for worst case discharges. In most instances, these distances are 15-20 miles or more. This calculation formula takes into account the dynamics of water body, travel time, properties of the oil product and others. The staging of limited response resources, finite access and recovery locations and other logistical issues make complete

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containment (interception) to a moving water release within five miles downstream an unlikely occurrence. To improve upon response success, the development of HCA-specific response strategies, including planning for more significant downstream transport is highly recommended. This topic is also discussed as part of Task 4.

Q: With respect to Task 9, can you please summarize the objective of the task and explain your findings?

A: The purpose of this task was to call attention to and proposes mitigation for other environmental impact issues of consequence not previously identified. The ability to identify environmental issues of consequence were somewhat limited by the documents reviewed as part of Bay West's scope of work. During the review of project documents, environmental issues of consequence, other than what were already identified by others or by Bay West (in other Tasks), have not been identified.

Q: With respect to Tasks 3 and 9, can you please state whether the project will: pose a threat of serious injury to the environment or the inhabitants within the siting area; substantially impair the health, safety or welfare of the inhabitants in the siting area; comply with all applicable laws and rules; or interfere with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

A: The construction of the proposed Keystone Pipeline presents both significant and insignificant risk to the environment and inhabitants of South Dakota. The proper implementation of the regulatory design requirements, construction and operational requirements, TransCanada's proposed mitigation measures, and the recommendations provided within this document, reduces, to currently recognized industry standards, the:

- threat (risk) of serious injury to the environment or the inhabitants within the siting area;
- impairment of the health, safety or welfare of the inhabitants in the siting area; and,
- complies with all applicable laws and rules (as they pertain to the Tasks 3 through 9 of this document);

- interference with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

TransCanada would be required to comply with all applicable laws and rules during construction.

BRYAN MURDOCK
Project Manager/Scientist

Education
- BS Biology (Chemistry Minor), Mankato State University, 1988

Training and Certifications
- 40-hr OSHA training w/current refresher
- Minnesota Pollution Control Agency Hazardous Waste Compliance Training
- CPR and First Aid Training

Professional Activities
- National Association of Industrial and Office Properties (NAIOP)
- International Council of Shopping Centers (ICSC)

Years Experience: 19

Years with Bay West: <1

Mr. Murdock is a program and project manager, and heads up Bay West's Environmental and Industrial Service Group. He has 19 years of experience in the environmental assessment, remediation, and chemistry fields. His technical experience includes real estate due diligence assessments for commercial and agricultural properties; management of large agricultural chemical assessment and remediation projects, emergency response projects, petroleum assessment and remediation, Brownfield redevelopment, groundwater and surface water assessment programs, pre-demolition surveys, and asbestos/mold assessments.

Mr. Murdock also has experience in livestock facility site selection, management and permitting; preparation of environmental review documents; organic chemistry analysis; biological toxicity testing; fish collection studies; and petroleum and agrichemical emergency responses.

PROJECT EXPERIENCE:

- *Project Manager, Real Estate Due Diligence Assessments, Various Customers, throughout US* - Directed/reviewed hundreds of due diligence assessments at commercial, agricultural and industrial sites throughout the country. Services included Phase I / II assessments, Property Condition Assessments, mold, asbestos, and radon assessments. Customers included owners, buyers, sellers, developers, and financial institutions. Work included numerous pre-disposition assessments that assist seasoned real estate professionals in understanding the potential environmental risks that may be associated with a potential property sale. Customers use pre-disposition assessment data to; 1) speed the transaction by identifying and mitigating environmental conditions before a sale, 2) disclose the findings within the real estate listing, 3) identify the appropriate sale price, and 4) decide if the identified environmental conditions would prohibit the sale of the property.
- *Project Manager, Environmental Services, Speedway Super America, MN* - Coordinated/performed a wide range of environmental services related to operation, purchase, sale, and re-development of retail petroleum service stations. Work included assessment and remediation of a former dry cleaner site as part of a store redevelopment, Phase II assessments performed as part of pre-purchase due diligence, and emergency response coordination/reporting.
- *Project Scientist, Site Restoration of Pipeline Right-of-Way, Great Lakes Gas, MI* - Responsible for monitoring restoration of a large natural gas pipeline right-of-way following its construction. Surveyed the restoration areas for instances of non-compliance with environmental regulations.
- *Project Scientist, Permitting for Proposed Alfalfa Power Generation Facility, Granite Falls, MN* - Identified permitting requirements for construction of a proposed 75-megawatt biomass energy production facility.
- *Project Scientist Feedlot Permitting, Golden Oval Eggs-Churchill Coop, Renville, MN* - Prepared permits and environmental submittals for a 2M-bird egg laying facility and swine producer. Gathered and prepared information for environmental assessments, reports, feedlot permits, contingency plans and engineering design.
- *Project Scientist, NPDES Characterization, International Paper, Little Falls, MN* - Performed extensive toxicity reduction evaluation on NPDES discharge to characterize the toxic components of the waste stream.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Direct Testimony of Dan Hannan on behalf of the
Staff of the South Dakota Public Utilities Commission
October 31, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF DAN HANNAN

Q: Please state your name and address for the record.

A: Dan Hannan, 1087 100th St., Roberts, WI 54023

Q: What is your position at Bay West?

A: My title is Corporate Health and Safety Manager. In that capacity I am responsible for ensuring compliance with and administration of employee health and safety programs. I also provide support for emergency response operations including our on-call program. I was formerly the Emergency Response Manager for Bay West from 2000-2006.

Q: Please state your professional qualifications.

A: I have a B.S. degree in Biology from the University of Minnesota. I also hold the accredited titles of Certified Safety Professional (CSP) and Certified Hazardous Materials Manager (CHMM). From 1990 until 2000 I was employed by the State of Minnesota environmental regulatory agency, Minnesota Pollution Control Agency (MPCA). For the ten years at the MPCA I severed as an Emergency Response Specialist and managed small and large hazardous material emergency incidents including pipeline releases. Duties there included enforcement of state regulations, oversight of responsible party cleanup activities and environmental impact assessment. While at Bay West as the Emergency Response Manager from 2000 to 2006 I was responsible for managing contracted cleanup services following releases of hazardous materials from train derailments, pipeline breaks, tanker truck accidents and on-water oil spills. Principle duties included assessing project needs and resources, dispatching personnel and equipment and reporting to regulatory officials.

Q: Have you provided your resume?

A: Yes

Q: In what capacity are you involved in the TransCanada Keystone Pipeline, LP (Keystone) project?

A: The Staff of the South Dakota Public Utilities Commission (Staff) has hired Bay West to review certain application documents. The results of Bay West's review are presented in

the attached Limited Application Review Report dated October 31, 2007. The purpose of the Bay West review was to:

Task 1 - Assess spill risk based on the spill frequency volume study.

Task 2 - Evaluate the pipeline risk assessment and environmental consequences filings.

Task 3 - Identify unusually sensitive areas (USAs) and High Consequence Areas (HCAs) and determine the adequacy of the mitigation measures for all such areas.

Task 4 - Determine the adequacy of the emergency response plan.

Task 5 - Determine the adequacy of the proposed construction, mitigation and reclamation plan to restore affected areas back to full productivity in a reasonable timeframe.

Task 6 - Determine the adequacy of the proposed remediation efforts related to spills.

Task 7 - Identify hydrogeological and geological sensitive areas vulnerable to crude oil spills and evaluate proposed mitigation measures.

Task 8 - Review the application, the draft environmental impact statement and associated docket filings for compliance with the applicable sections of ARSD 20:10:22 and all applicable environmental regulations in regards to all environmental issues.

Task 9 - Search for any other environmental impact issues of consequence not previously identified and shall propose mitigation measure for any found.

Task 10 - Make a determination as to whether the proposed project will pose a safety risk, particularly for spill damage, above the norm for a crude oil pipeline due to both pipeline risk factors and environmental vulnerability of the land crossed.

In completing the evaluation of the tasks described above, the overall objectives identified by the PUC included a determination of whether the project will: pose a threat of serious injury to the environment or the inhabitants within the siting area; substantially impair the health, safety or welfare of the inhabitants in the siting area; comply with all applicable laws and rules; interfere with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

Q: With respect to Task #1, can you please summarize the objective of the task and explain your findings?

A: This task addresses the evaluation of the document entitled Appendix A—Frequency / Volume Study of Keystone Pipeline. The document was prepared by DNV Consulting, a risk management company, and is dated May 2006. The study evaluates the risk of a

release (spill) from the pipeline in terms of frequency and volume. In completing this task Bay West obtained input from pipeline engineering and safety professionals. My findings and recommendations from completing this task include:

Keystone has assumed that a pipeline response crew could be dispatched to plug small- and medium- sized holes in a reasonable amount of time. No timeframe was provided and such repair work would require considerable coordination and time to shut the line down, locate the release, uncover the line and then make the repair. The statement implies a fairly quick fix to such an occurrence. This assumption underestimates the level of effort and time necessary to make the required repairs to the pipeline.

The study should be revised to better account for the likelihood of damage to the pipeline caused by the following excavation activities:

- Agricultural activity where practices include plowing, tiling, etc. over the line,
- Land development, both commercial and residential, where sub-grade activities would be necessary,
- Utility maintenance—necessary repairs to utilities near or adjoining the pipeline right-of-way (ROW); and
- Emergency conditions requiring immediate excavation activities, such as following a hazardous material spill incident.

Q: With respect to Task #2, can you please summarize the objective of the task and explain your findings?

A: This task involves the evaluation of the document entitled Pipeline Risk Assessment and Environmental Consequence Analysis prepared by ENSR, June 2006. The purpose of the document is to evaluate the risk resulting from a pipeline release event and the associated consequences to public safety, public health or the environment.

With respect to Section 4.2.2.1 of the document, Soil Impacts, the statement regarding the accumulation of oil in the backfill of the pipeline trench. In several notable cases the presence of farm field drain tile systems or judicial ditches have allowed surface oil to flow some distance from the release site—impacting surface water. The report should be amended to reflect this potential and in those cases where such structures exist in HCA or USA locations, strategies should be developed to address that eventuality.

With respect to Section 4.2.2.2 of the document, Water Resources, the statement made regarding the notification of municipal drinking water supplies where surface water supplies the water. The risk assessment filings indicate that notification of downstream users is essential upon discovery of a contamination event. The assessment mentions that such a notification would enable the closure of water intakes to allow floating or dissolved phases of the oil to bypass. However, such action may only be sustained for a short duration, several hours to days depending upon the design of the municipal system, as reserves of water may be limited. A large oil release event may sustain the fouling of a drinking water source for an extended period of time up to several days. This would require an alternate source of drinking to be supplied to the community during that time frame.

Q: With respect to Task #3, can you please summarize the objective of the task and explain your findings?

A: Task #3 is being addressed by Mr. Bryan Murdock of Bay West

Q: With respect to Task #4, can you please summarize the objective of the task and explain your findings?

A: This task involves the evaluation of regulatory required response plans prepared by TransCanada and to a greater extent the adequacy of their overall level of preparedness with respect to a pipeline release incident.

Q: Which regulatory documents are required to be prepared and which ones were reviewed?

A: There are three primary documents that contain information about how TransCanada is preparing for and will respond to a release during construction and operation of the pipeline. Those federal requirements include the preparation of a Spill Prevention Control and Countermeasures (SPCC) plan (40 CFR part 112); a Oil Spill Response Plan (49 CFR 194.107) and an Integrity Management Plan (49 CFR part 195.452).

Q: Were any of those planning documents complete and could they be reviewed for adequacy?

A: No. Data requests received regarding that issue indicated that those documents will be prepared at a later date nearer to the start of line construction. In the case of the SPCC

plan a corporate template document was provided as an example but lacked much of the information needed to complete a review.

Q: What statements and recommendations can you provide regarding those planning documents?

A: An SPCC plan is required to be completed and then approved by a professional engineer prior to tank facility operation. Submittal to the federal EPA or the state for approval is not required. At this time Keystone has not prepared such plans pending determination of the exact location of the contractor yards. It is recommended that all such prepared plans be submitted for review 30 days prior to operation.

The Oil Spill Response Plan referenced in Appendix C of the draft EIS has been submitted in template form and is incomplete at this time. The Oil Spill Response Plan, when completed, is required to be submitted to the federal DOT (Pipeline and Hazardous Material Safety Administration) prior to operation for review and comment. Approval of the plan is not required to allow pipeline operation but noted deficiencies must be addressed within a specific time frame. It is recommended that this plan be by the SD PUC or their designee for adequacy 30 days prior to operation of the pipeline.

An Integrity Management Plan is required to be submitted to the federal DOT within one year following the start of operation of the pipeline. Certain plan content regarding emergency response planning is believed to be vital to for preparing for effective response to a release incident. It is recommended that the following information be collected prior to pipeline operation and contained in detail in the Oil Spill Response Plan. This information should be reviewed by the SD PUC or their designee 30 days prior to pipeline operation. With respect to identified HCA and USA locations, at a minimum, the following should be completed:

- Identification of access locations for water and land based emergency response equipment. Detailed site-specific access information should include: land ownership and agreements, after-hour access requirements and other pertinent logistical information.

The following site-specific information should be required to be collected and contained in the Oil Spill Response Plan and otherwise be readily available during an emergency.

- Terrain surrounding the pipeline segment, including drainage systems such as small streams and other smaller waterways that could act as a conduit to the high consequence area,
- Elevation profile
- Characteristics of the product transported
- Amount of product that could be released
- Possibility of a spillage in a farm field following the drain tile into a waterway
- Ditches along side a roadway the pipeline crosses
- For releases potentially entering moving water bodies, identify downstream at-risk resource(s), pre-determine booming locations and response resources and pre-plan to evaluate priorities and objectives. Based upon available response equipment location(s), mobilization time, river current and other factors, the assumption of a 5 mile downstream planning distance does not appear be considerate of a catastrophic release or a release that occurs during a simultaneous event that significantly complicates the release interception/response. It is recommended that downstream planning distances on the order of 20 miles be evaluated. This information should be contained in the Oil Spill Response Plan.
- Identification of site-specific acceptable and unacceptable response tactics/countermeasures and techniques based upon effectiveness, intrusiveness (subsequent damage caused by the cleanup effort) and other considerations as determined relevant. It is recommended that such activity be completed with input from the South Dakota DENR and other local environmental trustees. This information should be contained in the Oil Spill Response Plan.

A model for response planning activity has been completed for the Minneapolis/St. Paul Sub-Area through the efforts of state and federal agencies and industry. Coordination of response strategy planning activities on the Mississippi River can be found at the following link: http://www.umrba.org/isa.htm. It is recommended that such sources be reviewed when preparing response planning activities.

Page 24 of the draft Oil Pipeline Response Plan references that response actions will be directed by the responding FOSC. It is recommended that this statement be modified to indicate that during the public safety phase of an incident, the most senior

public safety official (usually the local fire chief), is in charge and has full authority over the hazardous material incident and scene. As cleanup operations are undertaken the role of the responding FOSC (typically on scene several hours into the incident) is to monitor cleanup progress. The pipeline operator, as the responsible party, is ultimately responsible for the cleanup outcome and will likely be collaborating (via a unified command structure) with SD DENR staff to establish cleanup priorities and objectives. The intent of the FOSC is not to direct or to takeover a response, unless requested or if it is necessary.

For state agency staff responding to pipeline releases, it is recommended that at a minimum the following training be obtained:

- OSHA compliance training (40 hour HAZWOPER)—safety requirement for field personnel involved in emergency response operations,
- Incident Command System (ICS)—organizational scheme required at all hazardous material incidents,
- Tabletop/functional exercises developed with representation from pipeline officials. These activities allow for the testing of response plan, organizational function and the use of response resources, and
- Inland and on-water oil spill control tactics (including containment boom deployment). Such training allows a better understanding of logistical obstacles and limitations of response equipment.

Q: **What preparedness activities do you recommend TransCanada undertake to better their ability to respond to a land-based or water-based release from their pipeline:**

A: Recommended preparedness activities include:

- Work cooperatively with the State of South Dakota Department of Environment and Natural Resources and Department of Fish, Game and Parks, local and regional environmental trustees, first-responders and cleanup contractors to complete the following:
    - Identify at-risk resources, pre-determine response priorities and objectives and develop site-specific response tactics.

- Determine response equipment needs and stage such equipment at strategic locations to allow for an expedited deployment. For river systems, immediate deployment is critical for containing a release and minimizing environmental impact.
- Complete exercises or drills annually in identified areas to develop a clear understanding of the uniqueness and dynamics that each location presents in varying weather conditions and seasons.

Q: **With respect to Task #5, can you please summarize the objective of the task and explain your findings?**

A: This task involves the evaluation of the TransCanada Keystone Pipeline L.P. (Keystone) Construction Mitigation and Reclamation Plan (Plan) prepared by Universal Ensco, Inc. to assess its adequacy to ensure areas affected by project-related activities would be restored to original productivity within a reasonable timeframe along the proposed Keystone Pipeline Project route.

Q: **With respect to Task #6, can you please summarize the objective of the task and explain your findings?**

A: The purpose of this task is to evaluate the proposed remediation efforts related to spills. Much of this information was found to be contained in the Oil Spill Response Plan as required by (49 CFR 194.107) and relates to immediate and long-term activities that would be necessary to perform investigation, remediation and environmental restoration. The techniques and technologies cited in the plan are consistent with industry practices.

Specific applications of each are not cited as each incident requires an evaluation to determine the most effective means of achieving its goal. Following a release to the environment the rate and degree of remediation is commonly driven by the lead state environmental protection agency. The assessment of damages to and restoration of the environment, including monetary compensation for the lost natural resource, is provided through the Natural Resource Damage Assessment process (15 CFR Part 990), with the following definition.

"This goal is achieved through the return of the injured natural resources and services to baseline and compensation for interim losses of such natural resources and services from the date of the incident until recovery. The purpose of this part is to promote expeditious and cost-effective restoration of natural resources and services injured as a

result of an incident. To fulfill this purpose, this part provides a natural resource damage assessment process for developing a plan for restoration of the injured natural resources and services and pursuing implementation or funding of the plan by responsible parties. This part also provides an administrative process for involving interested parties in the assessment, a range of assessment procedures for identifying and evaluating injuries to natural resources and services, and a means for selecting restoration actions from a reasonable range of alternatives."

Q: With respect to Task #7, can you please summarize the objective of the task and explain your findings?

A: Task #7 is being addressed by Ms. Brenda Winkler of Bay West.

Q: With respect to Task #8, can you please summarize the objective of the task and explain your findings?

A: The purpose of this task is to ensure that the documents reviewed by Bay West are consistent with and in compliance with state rule ARSD 20:10:22

Documents reviewed by Bay West in association with this project were found to be in compliance with applicable sections of ARSD 20:10:22 and other regulations regarding environmental issues.

Q: With respect to Task #9, can you please summarize the objective of the task and explain your findings?

A: The purpose of this task was to call attention to and proposes mitigation for other environmental impact issues of consequence not previously identified. The ability to identify environmental issues of consequence were somewhat limited by the documents reviewed as part of Bay West's scope of work. During the review of project documents, environmental issues of consequence, other than what were already identified by others or by Bay West (in other Tasks), have not been identified.

Q: With respect to Task #10, can you please summarize the objective of the task and explain your findings?

A: The purpose of this task is to make a determination as to whether the proposed project will pose a safety risk, particularly for spill damage, above the norm for a crude oil

pipeline duet to both pipeline risk factors and environmental vulnerability of the land crossed.

During the course of its evaluation Bay West did not find any undue safety risk, or associated spill damage, not otherwise associated with normal or emergency pipeline operations. It is imperative that the first responder community be adequately trained to ensure protection of nearby populations.

Q: With respect to Tasks1,2,3,4, 6, 8, 9 & 10, can you please state whether the project will: pose a threat of serious injury to the environment or the inhabitants within the siting area; substantially impair the health, safety or welfare of the inhabitants in the siting area; comply with all applicable laws and rules; or interfere with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

A: The construction of the proposed Keystone Pipeline presents both significant and insignificant risk to the environment and inhabitants of South Dakota. The proper implementation of the regulatory design requirements, construction and operational requirements, TransCanada's proposed mitigation measures, and the recommendations provided within this document, reduces, to currently recognized industry standards, the:

- threat (risk) of serious injury to the environment or the inhabitants within the siting area;
- impairment of the health, safety or welfare of the inhabitants in the siting area; and,
- complies with all applicable laws and rules (as they pertain to the Tasks 1 through 10 of this document);
- interference with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

TransCanada would be required to comply with all applicable laws and rules during construction

Dan Hannan, CHMM, CSP
Health and Safety Manager

Education:
- BS Biology—University of Minnesota

Registrations/Certifications/Licenses:
- Certified Safety Professional (CSP)
- Certified Hazardous Materials Manager (CHMM)
- 40-hr OSHA Training
- 8-hr OSHA Supervisor Training
- OSHA Boat Handling and Boom Deployment Training/On-Water Spill Response
- Radiation Safety @ Superfund Sites, EPA, 40-hrs
- Inland Water Oil Spill Control, 56-hrs, TX A&M
- Inland Oil Spill Response, 24 hrs
- Hazardous Awareness & Remediation Associated
- with Weapons of Mass Destruction, State of MN
- Cold Weather Spill Response, 24-hr Training
- First Aid/CPR Certified

Years Relevant Experience: 17

Mr. Hannan has 17 years experience managing and performing safety and health activities on environmental remediation projects.

The first 10 years of Mr. Hannan's career was spent working for the Minnesota state environmental regulatory agency (MN Pollution Control Agency) as an emergency response specialist. His responsibilities included oversight of responsible parties during cleanup actions, including pipeline incidents. In 2000, Mr. Hannan was hired by Bay West in the capacity of Emergency Response Manager and served in that position for 6 years. It was Mr. Hannan's responsibility to coordinate personnel and equipment resources to complete emergency response projects including pipeline releases.

Presently, Mr. Hannan provides health and safety direction for corporate operations including emergency and non-emergency response projects. Duties include conducting HAZWOPER training, hazard evaluation, and developing project health and safety plans (HASPs). Mr. Hannan routinely reviews and prepares spill response plans for commercial customers to comply with SPCC and FRP requirements under OPA 90 and various state preparedness rules. Additionally, Mr. Hannan has been responsible for maintaining compliance with Bay West's Oil Spill Removal Organization (OSRO) classification with the US Coast Guard and has managed the Drug Enforcement Administration (DEA) chemical removal program for "meth lab" response sites.

RELATED PROJECT EXPERIENCE:

- **Response Manager, Lakehead Pipeline Incident, Grand Rapids, MN**—Oversaw cleanup operations for the >1M-gallon crude oil release. Operations included land recovery, tile line removal, oil recovery on an under the frozen Prairie River (ice slotting and harvesting) and subsequent soil investigations.
- **Response Manager, Enbridge Pipeline Incident, Superior, WI**—Managed cleanup of 100,000-gallon crude oil spill at the Murphy Oil Refinery. Coordinated round-the-clock resources including subcontracted services. Oil recovery included operations on the frozen Nemadji River which required ice slotting and harvesting.
- **Response Manager, Minnesota Pipeline Incident, Little Falls, MN**—Manage Bay West operations for cleanup of >100,000-gallon crude oil spill. Coordinated 24-hour operations including subcontracted services. Activities included the harvesting of oil-coated trees, on-site processing (grinding), and off-site disposal.
- **Project Manager, Hazardous Materials Threat Assessments (HMTAs), Various Sites Nationwide**—Developed HMTAs for facilities of a large national banking company in Portland, OR, Kansas City, KS, and St. Paul, MN. HMTAs identified/assessed risk that hazardous materials pose to the facilities' operations. Of particular interest are incidents that could disrupt company operations, such as an evacuation, arising from a nearby train derailment, pipeline break or toxic chemical fire.
- **Project Manager, Sensitive Area Mapping, Upper Midwest Waterways**—Managed the development and updating of sensitive area maps and spill response strategies for waterways on the Mississippi, Minnesota and St. Croix Rivers. Work was performed in conjunction with US EPA, US Fish and Wildlife, state environmental agencies, local waterway associations, and industry. Identified at-risk receptors (wildlife, populated area, drinking water sources, economic areas [marinas, beaches], tribal areas, etc.), developed location-specific response strategies, and assisted with the placement of spill response equipment "boom boxes" for quick deployment of on-water equipment to minimize risk to the at-risk resources.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Direct Testimony of Tom Janssen on Behalf of the
Staff of the South Dakota Public Utilities Commission
October 31, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF TOM JANSSEN

Q: Please state your name and business address

A: Tom Janssen, Merjent, Inc., 615 First Avenue NE, Suite 425; Minneapolis, MN 55413

Q: Describe your educational background.

A: I received my Bachelor of Arts Degree in 1996 from the University of St. Thomas in St. Paul, Minnesota with majors in Environmental Studies and Geography.

Q: **What is your employment history?**

A: From 1994 to 1997 I served as a GeoTechnical Specialist and Engineering Assistant at Braun Intertec, a Minnesota-based engineering and environmental consulting company. I was responsible for soil testing; sub-grade construction site preparation; onsite concrete inspection, installation monitoring, and strength testing; and working with drill teams on subsurface geotechnical investigations. From 1997 to 2004, I served as an Environmental Scientist at Natural Resource Group, Inc., a Minneapolis-based consulting company where I specialized in environmental permitting, surveys, and environmental inspection and monitoring services to the pipeline and power line industries.

Q: **By whom are you now employed?**

A: In 2004, I was a founding partner of Merjent, Inc., a Minneapolis-based professional consulting company specializing in the energy industry. I currently hold the position of Senior Analyst and Corporate Secretary at Merjent, Inc. providing environmental permitting, surveys, and environmental inspection and monitoring services to the pipeline and power line industries.

Q: **What work experience have you had that is relevant to your research on this project?**

A: I have over 10 years experience in the energy industry specializing in environmental project management for pipeline expansion and maintenance projects. I support various clients with project planning and scoping-related tasks, coordinating regulatory agency consultations, managing environmental field surveys, acquiring permits and approvals, preparing contract specifications for compliance with environmental requirements, providing pre-construction environmental training, and offering compliance support to

field personnel and environmental inspectors. I have been a lead environmental inspector and a post-construction restoration monitor for pipeline projects in Minnesota, Iowa, and Illinois. In November and December 2007, I will serve as an on-site environmental monitor on behalf of the Wisconsin Department of Natural Resources (DNR) for a large-scale crude oil pipeline construction project to document compliance with DNR permits and approvals issued for the project.

Q: **What is the purpose of your testimony?**

A: Evaluation of the TransCanada Keystone Pipeline L.P. (Keystone) Construction and Mitigation and Reclamation Plan (CMRP) prepared by Universal Ensco, Inc. to assess its adequacy to ensure areas affected by construction-related activities would be restored to original productivity within a reasonable timeframe along the proposed Keystone Pipeline Project route.

Q: **Which sectors did you study?**

A: I assessed standard construction, mitigation, and reclamation practices in the crude oil and natural gas industry.

Q: **What methodology did you employ?**

A: I compared the TransCanada Keystone Pipeline L.P. CMRP to assess its adequacy and consistency with standard industry practice.

Q: **Summarize your findings and how the possible negative impacts can be mitigated.**

A: Bay West, Inc. was contracted by the South Dakota Public Utilities Commission (SD PUC) to provide consulting services for the review of certain application documents for the proposed construction, operation and maintenance of a crude oil pipeline to be completed by TransCanada Keystone Pipeline, LP. I worked with Bay West, Inc. to assess adequacy of the CMRP, included as part of the application documents to the SD PUC. My findings and recommendations are included as part of Bay West's application review results submitted to the SD PUC. The results of Bay West's review are presented in the attached Limited Application Review Report dated October 31, 2007. .

Overall, I found the construction, mitigation, and reclamation practices included in the CMRP to be adequate and generally comply with pipeline industry standards. "Task 5" of the Bay West application review documents provides findings of where the CMRP

could be improved and offers recommendations for specific conditions to be included in the SD PUC permit. A general summary of the findings and recommendations to improve the CMRP are provided in the enclosed table.

Q: **Does this conclude your testimony.**

A: Yes.

010096

TransCanada Keystone Pipeline L.P.
Construction and Mitigation and Reclamation Plan
Summary of Findings and Recommendations

Mitigation Measures	Findings	Recommendations
Section 2.0 General Conditions		
Environmental Inspection	The CMRP did not stipulate the use of an environmental inspector during and after construction.	The SD PUC should consider including the following stipulation as part of its permit to Keystone: At least one environmental inspector shall be required for each construction spread during construction and restoration to help ensure compliance with the PUC's permit, other environmental agency permit conditions, and landowner requirements. Environmental inspectors shall have peer status with all other activity inspectors and authority to order appropriate corrective actions or to stop activities that violate the environmental requirements.
Noise Control	The CMRP provides general measures to mitigate noise impacts; however, the measures did not specifically address how the noise impacts would be mitigated during construction and operation of the proposed facilities.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Construction: The criterion of Ldn of 55 dBA shall be adopted for horizontal directional drilling operations near residences, or Keystone shall develop for Public Utility Commission review and approval specific measures to mitigate for noise impacts from drilling operations during non-daytime hours. Measures may include installing a temporary noise barrier system at the directional drill site. 2. Operation: Keystone shall perform a noise assessment survey during operation to confirm the level of noise at each listed noise-sensitive area. If the noise attributable to operation of any pump station exceeds 55 dBA Ldn at any noise-sensitive area, TransCanada shall implement noise mitigation measures to ensure that regulation levels are not exceeded.
Weed Control	The proposed measures in the CMRP are adequate and generally comply with pipeline industry standards; however, additional conditions are recommended to further mitigate impacts resulting from herbicide application.	The SD PUC should consider including the following stipulation as part of its permit to Keystone: Keystone shall obtain landowner consent in writing prior to herbicide application; inform landowners of the brand name/active ingredient, the application method, and application rate for each herbicide planned for use on this project; and make available a copy of the herbicide's MSDS information.
Dust Control	The proposed measures in the CMRP are adequate and generally comply with pipeline industry standards; however, additional conditions are recommended to further mitigate dust-related impacts.	The SD PUC should consider including the following stipulation as part of its permit to Keystone: Keystone shall cover all open-bodied trucks while in motion to minimize fugitive dust emissions.

Mitigation Measures	Findings	Recommendations
Road and Railroad Crossings	The proposed measures in the CMRP are adequate and generally comply with pipeline industry standards; however, additional conditions are recommended to further mitigate impacts at roads and railroad crossings.	The SD PUC should consider including the following stipulation as part of its permit to Keystone: Keystone shall coordinate with emergency responders where project-related activities occur near road and railroads and where road closures are necessary.
Section 4.0 Uplands (Agricultural, Forest, Pasture, Range/Grasslands)		
Topsoil Removal and Storage	Keystone proposes in the CMRP to place subsoil excavated from the trench directly onto undisturbed topsoil on the non-working side of the right-of-way (also referred to as the subsoil storage area or the spoil side). Doing so would increase the potential for mixing of topsoil and subsoil in these areas. Mixing subsoil with topsoil reduces soil fertility and the ability of disturbed areas to revegetate successfully.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Unless the landowner specifically approves otherwise, topsoil shall be segregated either along the full right-of-way or from the trench and subsoil storage area in actively cultivated or rotated crop lands and pastures, residential areas, hayfields, and other areas at landowner request. 2. In deep soils (more than 12 inches of topsoil), at least 12 inches of topsoil shall be segregated unless otherwise specified by the landowner. In soils with less than 12 inches of topsoil, every effort shall be made to segregate the entire topsoil layer. Segregated topsoil shall not be used to pad the pipe.
Temporary Erosion and Sediment Control	Keystone proposes in the CMRP to install temporary slope breakers and permanent slope breakers installed on slopes greater than 5 percent in non-cultivated areas with adequate spacing requirements. The proposed spacing of slope breakers is adequate. However, Keystone proposes to install the slope breakers at a gradient of 2 to 8 percent. Standard practice is to install the slope breaker at a gradient of 2 to 4 percent.	The SD PUC should consider including the following stipulation as part of its permit to Keystone: Slope breaker installed using the spacing parameters as proposed and shall be installed at 2 to 4 percent gradient.
Trenching	The proposed measures in the CMRP are adequate and generally comply with pipeline industry standards; however, additional conditions are recommended to better ensure safety during trenching operations and further minimize the effects of blasting.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Exclusion fencing shall be installed around the perimeter of the pipe trench or pit excavations in residential areas if the trench/pit would remain open during non-working hours. 2. To better ensure safety during blasting operations, Keystone shall: • post warning signs, flags, and barricades; • sound warning horns or sirens; • follow procedures for safe storage, handling, loading, firing, and disposal of explosive materials; • coordinate with emergency responders as necessary; and • blasting shall be conducted by registered blasters. 3. For blasting within 150 feet of structures, an independent contractor shall be used to inspect structures before blasting and other locations if requested by the landowner. During blasting, the independent contractor shall monitor ground vibrations at the nearest structure within 150 feet.

Mitigation Measures	Findings	Recommendations
		4. Post-blast inspections shall be performed as warranted. Damage complaints shall be evaluated. If any nearby water wells are adversely impacted, affected landowners shall be provided alternative sources of water or otherwise compensated. If buildings or structures are damaged as a result of the blasting activities, Keystone shall compensate the affected landowners and/or make arrangements to repair the damages in a timely manner.
Padding and Backfilling	The proposed measures in the CMRP for padding and backfilling are sufficiently prepared and comply with standard industry practices. However, one stipulation states if it is impossible to avoid water-related damages resulting from water discharges, Keystone would reasonably compensate the landowners for the damages or would correct the damages so as to restore the land, crops pasture, water courses, etc. to their preconstruction condition.	The SD PUC should consider including the following stipulation as part of its permit to Keystone: If it is impossible to avoid water-related damages resulting from water discharges, Keystone shall both reasonably compensate the landowners for the damages and correct the damages so as to restore the land, crops pasture, water courses, etc. to their preconstruction condition.
Clean Up	The proposed clean up measures in the CMRP are adequate and generally comply with pipeline industry standards; however, Keystone should be more specific with regard to the timing of clean-up activities.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Cleanup operations shall commence immediately following backfill operations. 2. Final grading, topsoil replacement, and installation of permanent erosion control structures shall be completed within 20 days after backfilling the trench (10 days in residential areas). 3. If seasonal or other weather conditions prevent compliance with these time frames, temporary erosion controls (temporary slope breakers and sediment barriers) shall be maintained until conditions allow completion of cleanup.

Mitigation Measures	Findings	Recommendations
Reclamation and Revegetation	The proposed measures for reclamation and revegetation are adequate and generally comply with pipeline industry standards; however, additional conditions are recommended to further ensure areas impacted by the project are restored.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Compaction relief: approval of a winterization plan shall be obtained from the SD PUC in writing if construction will continue into the winter season when temperature conditions could delay successful de-compaction, topsoil replacement, or seeding until the following spring. 2. Rock removal: rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench shall be considered construction debris, unless approved for some other use on the construction work areas by the landowner. 3. Mulching: mulch shall by applied on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. If anchoring with liquid mulch binders, rates recommended by the manufacturer shall be used. Liquid mulch binders shall not be used within 100 feet of wetlands or waterbodies. Mulch shall be applied prior to seeding only if: • final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas); or • construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions. 4. Erosion control matting: erosion control fabric shall be installed on waterbody banks at the time of final bank re-contouring, unless riprap or other bank stabilization are employed in accordance with federal, state, and local permits and approvals.
Forested Lands	The proposed measures to minimize impacts to forested areas are adequate and generally comply with pipeline industry standards; however, an additional condition is recommended to further minimize impacts to affected landowners. Keystone stipulated it would allow the landowner the right to retain ownership of the trees of commercial or other value with the disposition of the trees negotiated prior to clearing. This provision does not include requirements for reasonable compensation to landowners for the value of the timber.	The SD PUC should consider including the following stipulation as part of its permit to Keystone: If trees need to be removed that have commercial or other value to affected landowners, Keystone shall compensate the landowners fair market value of the trees to be cleared and/or allow the landowner the right to retain ownership of the felled trees.

Mitigation Measures	Findings	Recommendations
Operation and Maintenance	The proposed measures for operation and maintenance are sufficiently prepared and generally comply with standard industry practices, with exception to the following: • Keystone stated is would conduct post-construction monitoring after the first growing season. It is standard industry practice to perform post-construction monitoring after the first and second growing seasons. • Keystone stated it would monitor yield of cultivated lands impacted with the help of an agricultural specialist, when requested by landowners. Yield monitoring is typically offered in all cases, unless specifically declined by specific landowners.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Follow-up inspections shall be conducted of all disturbed areas after the first and second growing seasons to determine the success of revegetation. If after the first growing season, revegetation is successful, no additional monitoring would be required. 2. In cultivated areas, Keystone shall monitor for at least two years the yield of land impacted by construction using agricultural specialists in all cases, unless specifically declined by specific landowners.
Section 5.0 Drain Tile Systems		
Drain Tile Systems	The proposed measures for minimizing impacts to drain tile systems are adequate and generally comply with pipeline industry standards; however, additional conditions are recommended with regard to collecting location information of drain tile crossed during the project. Future availability of this information would be essential to relocate drain tiles in the event a pipeline leak/spill occurs during the operation of the facility and would help in a spill recovery effort to contain transport of pipeline liquids via drain tiles.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Location information of drain tiles exposed during the project shall be collected by a craft inspector, environmental inspector, or its equivalent, using a sub-meter accuracy global positioning system, or at a minimum, by accurately documenting the pipeline station numbers of each exposed drain tile. 2. Keystone shall maintain on file the drain tile location information and tile specifications (*e.g.*, diameter, type, depth, *etc.*).
Section 6.0 Wetland Crossings		
Easement and Workspace	Keystone stipulated that the width of the construction right-of-way should be reduced to 85 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width. Standard industry practice is to reduce the width to 75 feet in standard wetlands. Keystone also stipulated that it would locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet away from wetland boundaries. Standard industry practice is to locate extra work areas at least 50 feet away from wetland boundaries, except where the adjacent upland is actively cultivated or rotated cropland or other disturbed land.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Unless a wetland is actively cultivated or rotated cropland, the width of the construction right-of-way shall be limited to 75 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width. 2. Unless a wetland is actively cultivated or rotated cropland, extra work areas (such as staging areas and additional spoil storage areas) shall be located at least 50 feet away from wetland boundaries. 3. Vegetation clearing shall be limited between extra work areas and the edge of the wetland to the construction right-of-way. 4. Wetland boundaries and buffers shall be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.
Operation and Maintenance	To facilitate periodic pipeline corrosion/leak surveys during the operation of the facilities in wetland areas, Keystone proposed to maintain a corridor centered on the pipeline and up to 30 feet wide in an herbaceous state. Trees within 30 feet of the pipeline greater than 15 feet in height would be selectively cut and removed from the permanent right-of-way. Standard industry practice is to maintain a corridor centered on the pipeline up to 15 feet wide and to selectively cut trees greater than 15 feet in height within 15 feet of the pipeline.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. To facilitate periodic pipeline corrosion/leak surveys during the operation of the facilities in wetland areas, a corridor centered on the pipeline and up to 15 feet wide can be maintained in an herbaceous state. 2. Trees within 15 feet of the pipeline greater than 15 feet in height can be selectively cut and removed from the permanent right-of-way.

Mitigation Measures	Findings	Recommendations
Section 7.0 Waterbodies and Riparian Lands		
Easement and Workspace	Keystone stipulated it would locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet away from the water's edge. Standard industry practice is to locate extra work areas at least 50 feet away from water's edge, except where the adjacent upland is actively cultivated or rotated cropland or other disturbed land.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Extra work areas (e.g., staging areas, additional spoil storage areas, etc.) shall be located at least 50 feet away from water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way. 2. Work area boundaries and buffers shall be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete. 3. Spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings shall be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas.
Operation and Maintenance	Keystone did not include a section in its CMRP that addresses post-construction operation and maintenance activities.	The SD PUC should consider including the following stipulations as part of its permit to Keystone: 1. Limit vegetation maintenance adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire construction right-of-way. 2. To facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be maintained in an herbaceous state. 3. Trees that are located within 15 feet of the pipeline that are greater than 15 feet in height may be cut and removed from the permanent right-of-way. 4. Herbicides or pesticides shall not be used in or within 100 feet of a waterbody except as allowed by the riparian landowner, and appropriate land management or state agency.
Section 8.0 Hydrostatic Testing		
Hydrostatic Testing	Water from up to five streams in South Dakota would be used to hydrostatically test the pipe during the final phases of the project. Provided Keystone obtains and complies with the necessary permits and approvals for the appropriation and discharge of hydrostatic test water, the measures included in the CMRP for hydrostatic testing are sufficiently prepared and comply with standard industry practices.	No recommendations provided Keystone obtains the necessary permits and approvals for the appropriation and discharge of hydrostatic test water.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Direct Testimony of Brenda Winkler on behalf of the
Staff of the South Dakota Public Utilities Commission
October 31, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF BRENDA WINKLER

Q: Please state your name and address for the record.

A: Brenda L. Winkler, 953 Colorado Avenue, Whitefish, MT 59937

Q: What is your position at Bay West?

A: My title is Project Manager/Geologist. I have been employed at Bay West as a Project Manager/Geologist since 2000. In that capacity I have performed hydrogeologic and geologic investigation and remediation activities for State and Federal agencies.

Q: Please state your professional qualifications.

A: I have a BA in Geology from the University of Minnesota. I am a registered Professional Geologist in the states of Minnesota and Wisconsin. I have 21 years experience in the environmental industry, including 11 years working for engineering/consulting firms as a project manager/geologist performing hydrogeologic and geologic investigations for State and Federal agencies. From 1990 to 2000 I was employed by the Minnesota Pollution Control Agency (MPCA) where I served as a Project Manager/Geologist. At the MPCA I performed oversight of responsible parties and managed contractors in the investigation and remediation of groundwater, surface water, soil, and sediment in accordance with State and Federal Superfund statutes.

Q: Have you provided your resume?

A: Yes

Q: In what capacity are you involved in the TransCanada Keystone Pipeline, LP (Keystone) project?

A: The Staff of the South Dakota Public Utilities Commission (Staff) has hired Bay West to review certain application documents. The results of Bay West's review are presented in the attached Limited Application Review Report dated October 31, 2007. Bay West has been assigned 10 tasks to perform, of which, I am assigned to perform Task 7 and assist with Task 9:

Task 7 - Identify hydrogeological and geological sensitive areas vulnerable to crude oil.
Task 9 - Search for any other environmental impact issues of consequence not previously identified and shall propose mitigation measures for any found.

Q: Please summarize the objective of Task #7.

A: The purpose of Task #7 was to review the applicant's filings and available hydrogeological publications for the pipeline area and identify areas where the geology would be highly susceptible to a crude oil release from the pipeline. The hydrogeologic evaluation, focusing particularly on drinking water source area protections, was addressed as part of Task 3. Therefore this assessment focuses on geologically sensitive areas.

Q: Where there limiting factors that made it difficult to meet the objectives of Task #7?

A: Bay West's review was limited by time and to available published geologic maps in conjunction with the summaries provided in the Draft Environmental Impact Statement (DEIS). In addition, several attempts were made to contact representatives of the South Dakota Geologic Survey (SDGS) to discuss conclusions and summaries of the hydrogeologic and geologic data. However, the SDGS was not available during the time of the review.

Q: Please Explain the Findings, Conclusions and Recommendations associated with the performance of Task #7?

The DEIS presents a general overview of potentially sensitive geologic and hydrogeologic areas. The DEIS geologic summary generally coincides with SDGS geologic maps reviewed. In general an analysis of sensitive geologic and hydrogeologic areas is based on the potential due to geologic characteristics for surface contamination to reach ground-water resources. The type of geologic material present at the surface determines the vertical travel time for water-soluble, geologically inert contaminants released at the surface to reach the uppermost aquifer. Travel times are controlled by the permeability, and thickness of the geologic materials through which contaminants would move. The sensitivity of an aquifer is inversely proportional to the time of travel. Longer travel times are associated with both a greater degree of geologic protection and

reduced sensitivity to ground-water pollution. Shorter travel times represent an increased sensitivity and an inability to protect ground water from vertical contaminant movement. However, high sensitivity does not indicate that water quality has or will be degraded. Low sensitivity does not guarantee that ground water will remain pristine. In general the current published geologic maps available for the pipeline route do not contain enough detail information about distribution of surficial geologic materials and bedrock outcrops to allow for a complete evaluation of hydrogeologically and geologically sensitive areas. One potential highly susceptible geologic feature is the Niobrara Formation, a carbonate rock that can form fissures up to 1,000 feet long and 100 feet deep. Carbonate bedrock are typified hydrogeologically by very high flow rates along interconnected, solution-enlarged fractures and cavities, which may result in a very high sensitivity area where present, typically regardless of the depth to the water table.

The DEIS indicates the Niobrara Formation may be present in the southern half of the state from mile post (MP) 353 to 436 (Nebraska border). It also states that karst features are found in southern portions of Miner County, northern Hanson County, southern Hutchinson County, and all of Yankton County (ENSR 2006a). However, it does not describe what these features are. The SDGS First Occurrence Aquifer Maps indicate the Niobrara Formation is the first aquifer present in Beadle County, although it is greater than 100 feet below the ground surface and as you move south it can be between 50 to 100 feet below the ground surface. The aquifer maps suggest that the Niobrara Formation may cover a larger area than summarized in the DEIS. The Geologic Map of South Dakota indicates that the surfical Quaternary deposits can be as thick as 300 feet. However, depth to bedrock was not provided on the maps reviewed.

In concurrence with the DEIS, I recommend that additional measures be performed to assess the thickness of overburden and distribution of bedrock outcrops in the karst areas. Additionally, a detailed review of depth to bedrock maps, boring logs, and well logs should be completed to confirm the thickness of overburden and bedrock type along the pipeline ROW. This review could be supplemented through meetings with the SDGS and a field walking survey in areas where available information is limited and areas that have a potential for landslides and/or flooding where topography can change rapidly. Also, it is recommended that the karst features in Miner County, northern Hanson County, southern Hutchinson County, in the DEIS be further described and an analysis

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of their potential impacts to the study area be completed. We would recommend that TransCanada report identified karst outcroppings within 0.5 miles of the pipeline ROW or areas of shallow overburden that could potentially be impacted by a crude oil release to the SDGS, SD PUC and United States Department of Transportation (USDOT). In addition to the karst areas, the Environmental Analysis section of the DEIS summarized other potential impacts and mitigation measures which in some instances included recommendations for further evaluation in the study area. These recommendations could best be addressed as conditions of the PUC issuing a construction permit for the project. Findings associated with this more detailed review should be provided to the USDOT, the SD PUC and the Geological Survey. The USDOT may use the findings to assess if this new information would cause some areas to be defined as geologically sensitive High Consequence Areas.

Q: With respect to Task #9, can you please summarize the objective of the task and explain your findings?

A: The purpose of this task was to call attention to and propose mitigation for other environmental impact issues of consequence not previously identified. The ability to identify environmental issues of consequence were somewhat limited by the documents reviewed as part of Bay West's scope of work. During the review of project documents, environmental issues of consequence, other than what were already identified by others or by Bay West (in other Tasks), have not been identified.

Q: With respect to Tasks 7, can you please state whether the project will: pose a threat of serious injury to the environment or the inhabitants within the siting area; substantially impair the health, safety or welfare of the inhabitants in the siting area; comply with all applicable laws and rules; or interfere with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

A: It is Bay West's opinion that the construction of the proposed Keystone Pipeline presents both significant and insignificant risk to the environment and inhabitants of South Dakota. The proper implementation of the regulatory design requirements, construction and operational requirements, TransCanada's proposed mitigation measures, and the

recommendations provided within this document, reduces, to currently recognized industry standards, the:

- threat (risk) of serious injury to the environment or the inhabitants within the siting area;
- complies with all applicable laws and rules (as they pertain to Tasks 7 and 9 of this document); and
- interference with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

TransCanada would be required to comply with all applicable laws and rules during construction and operation.

BRENDA WINKLER, PG
Project Manager

Education:
- BA Geology

Training/Registrations/Certifications/Licenses:
- Registered Professional Geologist (PG)
- 40-Hour OSHA Training
- CPR/First Aid Certification

Years Experience: 21
Years with Bay West: 7

Ms. Winkler has 21 years experience in the environmental industry, including 11 years as project manager for HTRW site investigation and cleanup for governmental customers, including the USACE and State Regulatory Agencies. She has managed USACE projects for the Omaha District, including the current Feasibility Study Lead for the Black Hills Army Depot; and the Lead Remedial Investigation/Feasibility Study for the Charles Melvin Price Support Center.

As a project manager/geologist for the Minnesota Pollution Control Agency, she managed responsible parties and contractors for remediation of groundwater, surface water, soil and sediment sites according to State and Federal Superfund statutes. She also coordinated development of the State's Risk-Based Site Evaluation Manual for Site Investigations and Remedy Selection on Superfund, Brownfield, and petroleum release sites; co-authored section on 'Incorporation of Planned Property Use Into Site Decisions.'

Relevant Projects:

- *Project Geologist, Former Waverly Radar Station Remediation/Restoration, IA, USACE Omaha*—Prepared Tier I Report and Tier II Workplan for a Task Order under Bay West's current ERS Contract at this FUDS site. Project consisted of an asbestos survey, asbestos abatement, building demolition, UST removal, and an Iowa DNR Tier 1 site assessment.
- *Project Manager, St. Louis River/Interlake/ Duluth Tar State Superfund Site, Duluth, MN Pollution Control Agency*—Prepared a SAP and QAPP to define sediment contamination and ecological impacts. Managed sampling activities. Assisting in development of ARARs. Prepared the Record of Decision for contaminated sediments. Prepared a CERCL Five-Year Review for the soil. The Site is largest contaminated sediment site in the State.
- *Project Manager, Reserve Mining Superfund Site, Two Harbors, MN Pollution Control Agency*—In conjunction with MPCA staff, developed and was awarded a $100,000 grant from Great Lakes Coastal Recreation group for investigation of ground water contamination at the site. Prepared and implemented SAP and QAPP for ground water investigation. Prepared the ground water investigation report. Prepared a Feasibility Study, Decision Document, and Response Action Plan for barrel removal.
- *Project Manager, Feasibility Study Development/Implementation, Milltown Reservoir Sediments Site, Bozeman, MT*—Assisted in development of the Feasibility Study for one of the largest contaminated sediment sites in the country. Developed standard operating procedures for the field investigation activities and environmental sampling procedures.
- *Project Manager, Perham Arsenic Superfund Site, Perham, MN Pollution Control Agency*—Compiled all historical site data into a comprehensive database for preparation of a CERCLA Five-Year Review. Completed the Five-Year Review Report.
- *Project Manager, Minnesota Slip Site, Duluth, MN Pollution Control Agency*—Prepared a Focused Feasibility Study for remediation of contaminated sediments.
- *Project Manager, Duluth Air Force Base FUDs Site Investigation, Remediation, O&M, MN Pollution Control Agency*—Managed investigation and cleanup of multiple operable units contaminated with various hazardous and petroleum contaminants (solvents, PAHs, and petroleum-related compounds).
- *Project Manger, Finland Air Force Base FUDS Site Groundwater Investigation and Remediation, Finland, MN Pollution Control Agency*—Managed cleanup (via pump-and-treat system) of groundwater, drinking water supply, and landfill contaminated with chlorinated solvents.

- Project Manager, St. Louis River/Interlake/ Duluth Superfund Site, MN – Because this site was partially located in WI, she worked with the WDNR during development of groundwater/surface water cleanup goals.

LIMITED APPLICATION REVIEW REPORT

Applicants Filings for the Construction and Operation of a Crude Oil Pipeline Proposed by

TransCanada Keystone Pipeline, LP
Eastern South Dakota

October 31, 2007

Application Review Completed by:

Bay West, Inc.

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1.0 OVERVIEW OF BAY WEST AND CONTRACTED SERVICES

Bay West, Inc. (Bay West), a Small Business Enterprise under NAICS 562910, is a leading environmental remediation and engineering company in the Upper Midwest. Founded in 1974, Bay West entered the environmental marketplace as an emergency response contractor, responding to emergency calls regarding hazardous materials spills. Over the years, Bay West gained a reputation as one of the few companies with the capability to rapidly mobilize and implement cost-effective solutions for its customers. Now in its 33rd year of service, Bay West provides environmental consulting, industrial cleaning, and emergency services to state and federal agencies and commercial customers throughout the US. Bay West's corporate headquarters is located in St. Paul, MN.

Bay West has built a reputation of providing premier emergency response services and annually answers 150+ spill response calls of varying complexity and size. Bay West team members include engineers, hydro-geologists, safety professionals, hazardous material managers, and field technicians. Bay West possesses one of the largest caches of on-water spill response equipment in the region and is registered with the US Coast Guard as an Oil Spill Removal Organization (OSRO).

The South Dakota Public Utilities Commission (PUC) contracted Bay West to review application documents for the proposed construction, operation and maintenance of the proposed crude oil pipeline. The proposed pipeline would be completed by TransCanada under the name of Keystone Pipeline, LP, (herein after referred to as either Keystone or TransCanada). During construction and operation of a crude oil pipeline, there exists a potential for oil releases which could pose an immediate or latent threat to the public's safety, the public's health, and the environment. It is the intent of the PUC to ensure that these threats have been adequately addressed. Bay West has provided professional opinion as to the accuracy and adequacy of certain related documents prepared by Keystone for this project.

Specifically, Bay West has prepared this document to address the following assigned PUC tasks for Keystone's pipeline operation in South Dakota:

Task 1 Assess spill risk based on the spill frequency volume study.

Task 2 Evaluate the pipeline risk assessment and environmental consequences filings.

Task 3 Identify High Consequence Areas (HCAs) and Unusually Sensitive Areas (USAs) and determine the adequacy of the mitigation measures for all such areas.

Task 4 Determine the adequacy of the emergency response plan.

Task 5 Determine the adequacy of the proposed construction, mitigation, and reclamation plan to restore affected areas back to full productivity in a reasonable timeframe.

Task 6 Determine the adequacy of the proposed remediation efforts related to spills.

Task 7 Identify hydrogeologic and geologic sensitive areas vulnerable to crude oil spills and

evaluate proposed mitigation measures.

Task 8 Review the application, the draft environmental impact statement and associated docket filings for compliance with the applicable sections of ARSD 20:10:22 and all applicable environmental regulations in regard to all environmental issues.

Task 9 The contractor shall search for any other environmental impact issues of consequence not previously identified and shall propose mitigation measure for any found.

Task 10 The contractor shall make a determination as to whether the proposed project will pose a safety risk, particularly for spill damage, above the norm for a crude oil pipeline due to both pipeline risk factors and environmental vulnerability of the land crossed.

In completing the evaluation of the tasks described above, the overall objectives identified by the PUC included a determination of whether the project will

- pose a threat of serious injury to the environment or the inhabitants within the siting area;
- substantially impair the health, safety or welfare of the inhabitants in the siting area;
- comply with all applicable laws and rules; interfere with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

Evaluation of the above aspects of the project was completed chiefly by desktop review of the application, draft environmental impact statement, and associated docket filings. Upon review of the docket filings, a series of data requests were submitted to the PUC and forwarded on to TransCanada to address. The purpose of the data requests was to obtain additional information on specific issues in order to complete an appropriate evaluation of their prepared documents.

2.0 SUMMARY OF BAY WEST RECOMMENDATIONS AND CONCLUSIONS

TASK 1 ASSESS SPILL RISK BASED ON THE SPILL FREQUENCY VOLUME STUDY

The study should be revised to better account for the likelihood of damage to the pipeline caused by the following excavation activities:

- *Agricultural activity where practices include plowing, tiling, etc. over the line.*
- *Land development, both commercial and residential, where sub-grade activities would be necessary.*
- *Utility maintenance—necessary repairs to utilities near or adjoining the pipeline right-of-way (ROW).*
- *Emergency conditions requiring immediate excavation activities, such as following a hazardous material spill incident.*

TASK 2 EVALUATE PIPELINE RISK ASSESSMENT & ENVIRONMENTAL CONSEQUENCE FILINGS

- *With respect to Section 4.2.2.1, Soil Impacts, the statement regarding the accumulation of oil in the backfill of the pipeline trench. In several notable cases the presence of farm field drain tile systems or judicial ditches have allowed surface oil to flow some distance from the release site—impacting surface water. The report should be amended to reflect this potential and in those cases where such structures exist in HCA or USA locations, strategies should be developed to address that eventuality.*

- *With respect to Section 4.2.2.2, Water Resources, the statement made regarding the notification of municipal drinking water supplies where surface water supplies the water. The risk assessment filings indicate that notification of downstream users is essential upon discovery of a contamination event. The assessment mentions that such a notification would enable the closure of water intakes to allow floating or dissolved phases of the oil to bypass. However, such action may only be sustained for a short duration, several hours to days depending upon the design of the municipal system, as reserves of water may be limited. A large oil release event may sustain the fouling of a drinking water source for an extended period of time up to several days.*

TASK 3 IDENTIFY HCAs and USAs and DETERMINE THE ADEQUACY OF THE MITIGATION MEASURES FOR ALL SUCH AREAS

- *Variance in the SWPAs provided by the SD DENR and the drinking water HCAs identified by TransCanada create a concern that TransCanada may not have all of the relevant data needed to identify drinking water HCAs. TransCanada and the SD DENR need to collaborate and review the SWPA data that is not presented in TransCanada's HCA maps and make a determination if additional drinking water SWPA data should be incorporated.*

- *TransCanada does not appear to give sufficient consideration to how the presence of field drain tile systems could affect subsurface transport. Due to the ability of field drain tile systems to be direct conduits for transport away from the spill site, the presence of these drain tile systems should be specifically accounted for in the development of the Integrity Management Plan.*

- *TransCanada states that CPSs were identified through the review of topographic maps and information. Maps provided by TransCanada indicate that the pipeline is located in areas that are relatively flat and sometimes atop topographic peaks or divides between watershed areas. Ground-truthing of topographic changes near the pipeline should be performed to more accurately identify CPS and adequately protect HCAs.*

- *TransCanada provides the following text regarding downstream transport; "the assumption is made that transport is to be constant and a spill would be intercepted within five miles downstream of the release location." That assumption does not appear be considerate of a catastrophic release or a release that occurs during a simultaneous event that significantly complicates the release interception/response. The description of a worst case discharge, contained within the pending Pipeline Oil Spill Response Plan, calls for planning for a very large release, probably near or into a very sensitive area (HCA) during inclement weather conditions. With stream/river flow velocities of five miles per hour or more during rain storm events; it is very unlikely that all or even some of the oil would be contained within five miles down stream of the release point. As a point of reference, planning requirements for fixed facilities under the Oil Pollution Act of 1990 (OPA 90), must calculate down stream planning distances for worst case discharges. In most instances, these distances are 15-20 miles or more. This calculation formula takes into account the dynamics of water body, travel time, properties of the oil product and others. The staging of limited response resources, finite access and recovery locations and other logistical issues make complete containment (interception) to a moving water release within five miles downstream an unlikely occurrence. To improve upon response success, the development of HCA-specific response strategies, including planning for more significant downstream transport is highly recommended. This topic is also discussed as part of Task 4.*

TASK 4 DETERMINE THE ADEQUACY OF THE EMERGENCY RESPONSE PLAN [AND OTHER ASPECTS OF EMERGENCY RESPONSE PLANNING AND PREPAREDNESS]

- *An SPCC plan is required to be completed and then approved by a professional engineer prior to tank facility operation. Submittal to the federal EPA or the state for approval is not required. At this time TransCanada has not prepared such plans pending determination of the exact location of the contractor yards. It is recommended that all such prepared plans be submitted for review 30 days prior to operation.*

- *The Oil Spill Response Plan referenced in Appendix C of the draft EIS has been submitted in template form and is incomplete at this time. The Oil Spill Response Plan, when completed, is required to be submitted to the federal DOT (Pipeline and Hazardous Material Safety Administration) prior to operation for review and comment. Approval of the plan is not required to allow pipeline operation but noted deficiencies must be addressed within a specific time frame. It is recommended that this plan be reviewed for adequacy 30 days prior to operation of the pipeline.*

- *An Integrity Management Plan is required to be submitted to the federal DOT within one year following the start of operation of the pipeline. Certain plan content regarding emergency response planning is believed to be vital to for preparing for effective response to a release incident. It is recommended that the following information be collected prior to pipeline operation and contained in detail in the Oil Spill Response Plan. This information should be reviewed 30 days prior to pipeline operation. With respect to identified HCA and USA locations, at a minimum, the following should be completed:*

    - *Identify access locations for water and land based emergency response equipment. Detailed site-specific access information should include: land ownership and agreements, after-hour access requirements and other pertinent logistical information.*
    - *The following site-specific information should be required to be collected and contained in the Oil Spill Response Plan and otherwise be readily available during and emergency.*
        - *Terrain surrounding the pipeline segment, including drainage systems such as small streams and other smaller waterways that could act as a conduit to the high consequence area*
        - *Elevation profile*
        - *Characteristics of the product transported*
        - *Amount of product that could be released*
        - *Possibility of a spillage in a farm field following the drain tile into a waterway*
        - *Ditches along side a roadway the pipeline crosses*
    - *For releases potentially entering moving water bodies, identify downstream at-risk resource(s), pre-determine booming locations and response resources and pre-plan to evaluate priorities and objectives. Based upon available response equipment location(s), mobilization time, river current and other factors, the assumption of a 5 mile downstream planning distance does not appear be considerate of a catastrophic release or a release that occurs during a simultaneous event that significantly complicates the release interception/response. Bay West recommends that downstream planning distances on the order of 20 miles be evaluated. This information should be contained in the Oil Spill Response Plan.*
    - *Identification of site-specific acceptable and unacceptable response tactics/countermeasures and techniques based upon effectiveness, intrusiveness (subsequent damage caused by the cleanup effort) and other considerations as determined relevant. It is recommended that such activity be completed with input from the South Dakota DENR and other local environmental trustees. This information should be contained in the Oil Spill Response Plan.*
    - *A model for response planning activity has been completed for the Minneapolis/St. Paul Sub-Area through the efforts of state and federal agencies and industry. Coordination of response strategy planning activities on the Mississippi River can be found at the following link: http://www.umrba.org/isa.htm. It is recommended that such sources be reviewed when preparing response planning activities.*

- *Page 24 of the Keystone Pipeline Response Plan references that response actions will be directed by the responding FOSC. It is recommended that this statement be modified to indicate that during the public safety phase of an incident, the most senior public safety official (usually the local fire chief), is in charge and has full authority over the hazardous material incident and scene. As cleanup operations are undertaken the role of the responding FOSC (typically on scene several hours into the incident) is to monitor cleanup progress. The pipeline operator, as the responsible party, is ultimately responsible for the cleanup outcome and will likely be collaborating (via a unified command structure) with SD DENR staff to establish cleanup priorities and objectives. The intent of the FOSC is not direct or takeover a response, unless requested or if it is necessary.*
- *For state agency staff responding to pipeline releases, it is recommended that at a minimum the following training be obtained:*
  - *OSHA compliance training (40 hour HAZWOPER)—safety requirement for field personnel involved in emergency response operations.*
  - *Incident Command System (ICS)—organizational scheme required at all hazardous material incidents*
  - *Tabletop/functional exercises developed with representation from pipeline officials. These activities allow for the testing of response plan, organizational function and the use of response resources.*
  - *Inland and on-water oil spill control tactics (including containment boom deployment). Such training allows a better understanding of logistical obstacles and limitations of response equipment.*

TASK 5 DETERMINE THE ADEQUACY OF THE PROPOSED CONSTRUCTION, MITIGATION, AND RECLAMATION PLAN TO RESTORE AFFECTED AREAS BACK TO FULL PRODUCTIVITY IN A REASONABLE TIMEFRAME

SECTION 2.0 - GENERAL CONDITIONS

Environmental Inspection

At least one environmental inspector is required for each construction spread during construction and restoration to help ensure compliance with the PUC's permit, other environmental agency permit conditions, and landowner requirements. Environmental inspectors shall have peer status with all other activity inspectors and shall have the authority to order appropriate corrective actions or to stop activities that violate the environmental requirements.

The environmental inspector shall keep records of compliance with regard to environmental conditions of the SD PUC Permit, and the mitigation measures proposed by TransCanada, and other Federal or state environmental permits during the construction and restoration phases of the project.

Noise Control

Keystone shall perform a noise assessment survey during operation to confirm the level of noise at each listed noise-sensitive area. If the noise attributable to operation of any pump station exceeds 55 dBA Ldn at any noise-sensitive area, Keystone shall implement noise mitigation measures to ensure that regulation levels are not exceeded.

The criterion of L_{dn} of 55 dBA shall be adopted for horizontal directional drilling operations near residences, or Keystone shall develop a plan for South Dakota Public Utilities Commission review and approval that includes specific measures to mitigate for noise impacts from drilling operations during non-daytime hours. Measures may include the installation of a temporary noise barrier system at the directional drill site.

Weed Control

Keystone shall obtain landowner consent in writing prior to herbicide application.

Keystone shall inform landowners of the brand name/active ingredient, the application method, and application rate for each herbicide planned for use on this project.

Keystone shall make available a copy of the herbicide's MSDS information.

Dust Control

Keystone shall cover all open-bodied trucks while in motion to minimize fugitive dust emissions.

Road and Railroad Crossings

Keystone shall coordinate with emergency responders where project-related activities occur near road and railroads and where road closures are necessary.

SECTION 4.0 UPLANDS (AGRICULTURAL, FOREST, PASTURE, RANGE / GRASSLANDS)

Topsoil Removal and Storage

Unless the landowner specifically approves otherwise, topsoil shall be segregated either along the full right-of-way or from the trench and subsoil storage area in actively cultivated or rotated crop lands and pastures, residential areas, hayfields, and other areas at landowner request.

In deep soils (more than 12 inches of topsoil), segregate at least 12 inches of topsoil unless otherwise specified by the landowner. In soils with less than 12 inches of topsoil make every effort to segregate the entire topsoil layer. Where topsoil segregation is required, maintain separation of salvaged topsoil and subsoil throughout all construction activities. Segregated topsoil may not be used for padding the pipe.

Temporary Erosion and Sediment Control

Install temporary slope breakers on slopes greater than 5 percent on non-cultivated lands where the base of the slope is less than 50 feet from a waterbody, wetland and road crossings at the following spacing (closer spacing may be used if necessary):

Slope (%)	Spacing (feet)
5 – 15	300
>15 – 30	200
>30	100

The gradient of each slope breaker shall be 2 to 4 percent.

Trenching

In addition to provisions provided in the Construction and Mitigation and Reclamation Plan, Keystone shall install exclusion fencing around the perimeter of the pipe trench or pit excavations in residential areas if the trench/pit would remain open during non-working hours.

Keystone shall also comply with the following to further minimize the effects of blasting and to better ensure safety during blasting operations:

1) *post warning signs, flags, and barricades;*
2) *sound warning horns or sirens;*
3) *follow procedures for safe storage, handling, loading, firing, and disposal of explosive materials;*
4) *coordinate with emergency responders as necessary; and*
5) *blasting shall be conducted by registered blasters.*

If blasting will occur within 150 feet of structures, Keystone shall use an independent contractor to inspect structures before blasting and other locations if requested by the landowner. Post-blast inspections would be performed as warranted. During blasting, the independent contractor shall monitor ground vibrations at the nearest structure within 150 feet.

Keystone shall evaluate any damage complaints associated with blasting activities. In the unlikely event that blasting would affect nearby water wells, Keystone shall provide alternative sources of water or otherwise compensate affected landowners. Keystone shall also compensate landowners if buildings or structures are damaged as a result of the blasting activities.

Padding and Backfilling

If it is impossible to avoid water-related damages, Keystone shall reasonably compensate the landowners for the damages and shall correct the damages so as to restore the land, crops pasture, water courses, etc. to their preconstruction condition.

Clean Up

Keystone shall commence cleanup operations immediately following backfill operations. Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary slope breakers and sediment barriers) until conditions allow completion of cleanup.

Reclamation and Revegetation

In addition to provisions provided in the Construction and Mitigation and Reclamation Plan, Keystone shall comply with the following provisions when implementing measures included in Section 4.11, Reclamation and Revegetation*:*

1) *Relieving compaction: submit and obtain written approval from the SD PUC on a winterization plan if construction will continue into the winter season when conditions could delay successful de-compaction, topsoil replacement, or seeding until the following spring.*
2) *Rock removal: rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench should be considered construction debris, unless approved for use as mulch or for some other use on the construction work areas by the landowner.*
3) *Mulching: Apply mulch on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. If anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies. Mulch before seeding if:*
    a. *final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas); or*
    b. *construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.*
4) *Erosion Control Matting: Install erosion control fabric on waterbody banks at the time of final bank re-contouring as shown in Detail 4 in the Plan, unless riprap or other bank stabilization are employed in accordance with federal, state, and local permits and approvals.*

Forested Lands

If trees need to be removed that have commercial or other value to affected landowners, Keystone shall compensate the landowners fair market value of the trees to be cleared and/or allow the landowner the right to retain ownership of the felled trees.

Operation and Maintenance

Conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation. If after the first growing season, revegetation is successful, no additional monitoring would be required.

In cultivated areas, Keystone shall monitor for at least two years the yield of land impacted by construction using agricultural specialists in all cases, unless specifically declined by specific landowners.

SECTION 5.0 DRAIN TILE SYSTEMS

Location information of drain tiles exposed during the project shall be collected by a craft inspector, environmental inspector, or its equivalent, using a sub-meter accuracy Global Positioning System, or at a minimum, by accurately documenting the pipeline station numbers of

each exposed drain tile. Keystone shall maintain on file the drain tile location information and tile specifications (e.g., diameter, type, depth, etc.). Future availability of this information would be essential to relocate drain tiles in the event a pipeline leak/spill occurs during the operation of the facility and would help in a spill recovery effort to contain transport of pipeline liquids via drain tiles.

SECTION 6.0 WETLAND CROSSINGS

Easement and Workspace

Unless a wetland is actively cultivated or rotated cropland, limit the width of the construction right-of-way to 75 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width.

Unless a wetland is actively cultivated or rotated cropland, locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries. Limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

Operation and Maintenance

Do not conduct vegetation maintenance over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 15 feet wide may be maintained in an herbaceous state. In addition, trees within 15 feet of the pipeline that are greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.

SECTION 7.0 WATERBODIES AND RIPARIAN LANDS

Easement and Workspace

Locate all extra work areas (e.g., staging areas, additional spoil storage areas, etc.) at least 50 feet away from water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way. Work area boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas.

Operation and Maintenance

Limit vegetation maintenance adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with

native plant species across the entire construction right-of-way. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be maintained in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline that are greater than 15 feet in height may be cut and removed from the permanent right-of-way.

Pesticides and herbicides should be used in accordance with their label instructions and should be used in or within 100 feet of a waterbody except as allowed by the riparian landowner, and appropriate land management or state agency.

TASK 6 DETERMINE THE ADEQUACY OF THE PROPOSED REMEDIATION EFFORTS RELATED TO SPILLS

Bay West find that the proposed remediation efforts related to spills to be adequate and consistent with industry practice. To allow for a more expedient decision process and a more favorable cleanup outcome, it is encouraged that specific cleanup techniques be evaluated in advance for at least all identified HCA and USA locations, to be consistent with the findings outlined in Task 4 of this report. No other recommendations are offered.

TASK 7 HYDROGEOLOGIC AND GEOLOGIC VULNERABILITY

In concurrence with the DEIS, Bay West recommends that additional measures be performed to assess the thickness of overburden and distribution of bedrock outcrops in the karst areas. Additionally, a detailed review of depth to bedrock maps, boring logs, and well logs should be completed to confirm the thickness of overburden and bedrock type along the pipeline ROW. This review could be supplemented through meetings with the SDGS and a field walking survey in areas where available information is limited and areas that have a potential for landslides, sinkholes, and/or flooding where topography can change rapidly. Also, it is recommended that the karst features in Miner County, northern Hanson County, southern Hutchinson County, in the DEIS be further described and an analysis of their potential impacts to the study area be completed.

We recommend that TransCanada report each identified karst outcropping and areas of shallow overburden (less than 50 feet in depth) that they are aware of or identify in the future that exist within 0.5 miles of the pipeline ROW to the SDGS, SD PUC and United States Department of Transportation (USDOT). In addition to the karst areas, the Environmental Analysis section of the DEIS summarized other potential impacts and mitigation measures which in some instances included recommendations for further evaluation in the study area. These recommendations could best be addressed as conditions of the PUC issuing a construction permit for the project. Findings associated with this more detailed review should be provided to the USDOT, the SD PUC and the Geological Survey. The USDOT may use the findings to assess if this new information would cause some areas to be defined as geologically sensitive High Consequence Areas.

TASK 8 DOCUMENT REVIEW AND COMPLIANCE

No recommendations were provided for this section.

TASK 9 UNIDENTIFIED IMPACT ISSUES OF CONSEQUENCE

No recommendations were provided for this section.

TASK 10 SAFETY RISK DETERMINATION

No recommendations were provided for this section.

CONCLUSION

The construction of the proposed Keystone Pipeline presents both significant and insignificant risk to the environment and inhabitants of South Dakota. The proper implementation of the regulatory design requirements, construction and operational requirements, TransCanada's proposed mitigation measures, and the recommendations provided within this document, reduces, to currently recognized industry standards, the:

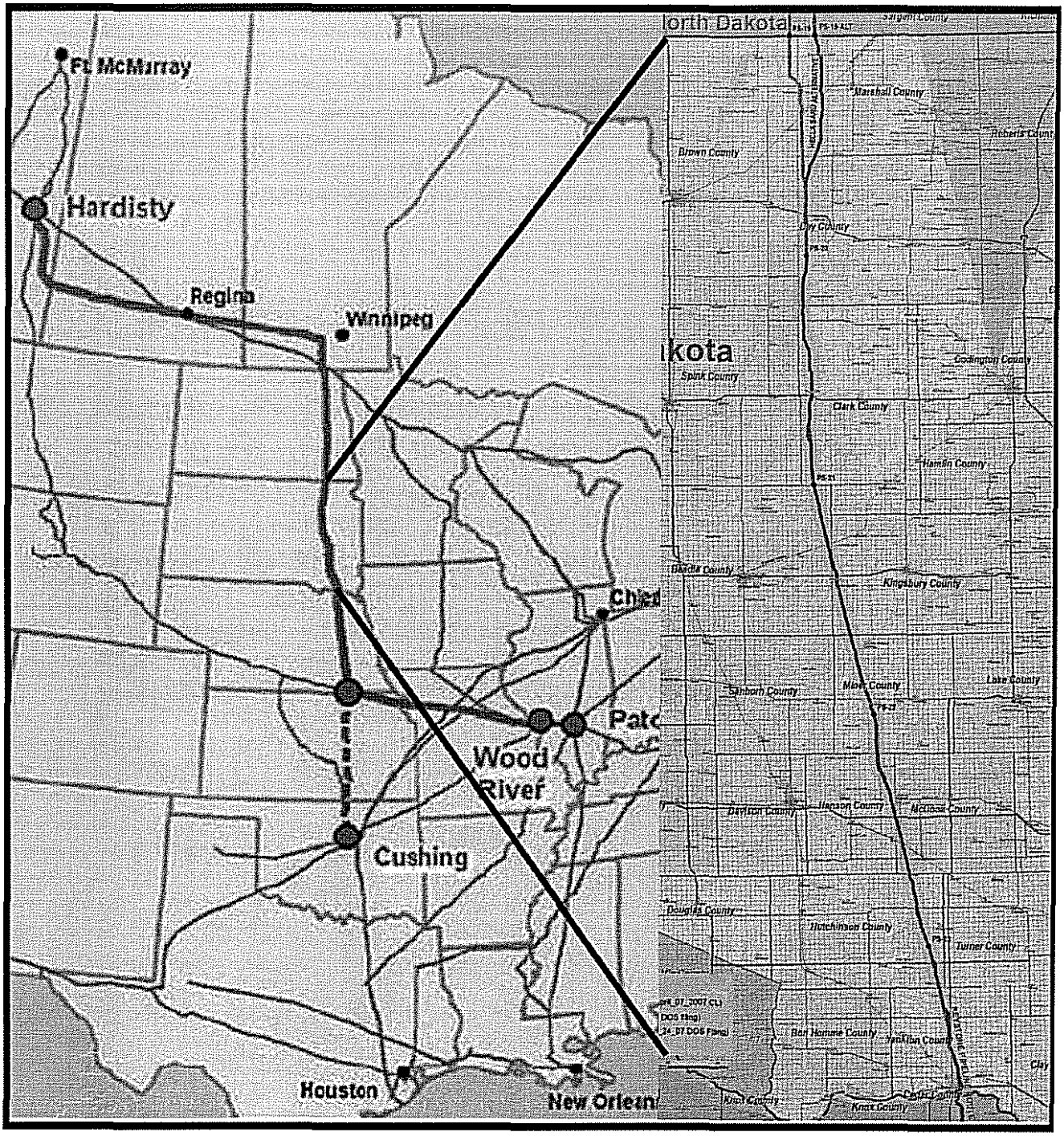
- threat (risk) of serious injury to the environment or the inhabitants within the siting area;
- impairment of the health, safety or welfare of the inhabitants in the siting area; and,
- complies with all applicable laws and rules (as they pertain to the Tasks 1 through 6 of this document);
- interference with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

TransCanada would be required to comply with all applicable laws and rules during construction

3.0 PROPOSED PIPELINE CONSTRUCTION BACKGROUND

Due to the increased demand for crude oil in the United States, uncertain supply of crude oil from other world supplies, availability of Canadian crude oil, and lack of existing pipeline capacity in the United States, TransCanada is proposing to construct the Keystone Pipeline Project. The Keystone Pipeline Project would extend from an existing oil supply hub in Alberta, Canada to terminals in the Midwestern United States. In total, the Keystone Pipeline Project would consist of a single 30 inch pipeline, about 2,148 miles long with 38 pump stations, and numerous mainline valves and other aboveground facilities constructed in Canada and the United States (see Figure 1). The proposed facilities would have the capacity to deliver approximately 435,000 barrels of heavy crude oil per day.

Figure 1: Keystone Pipeline Project Overview Map

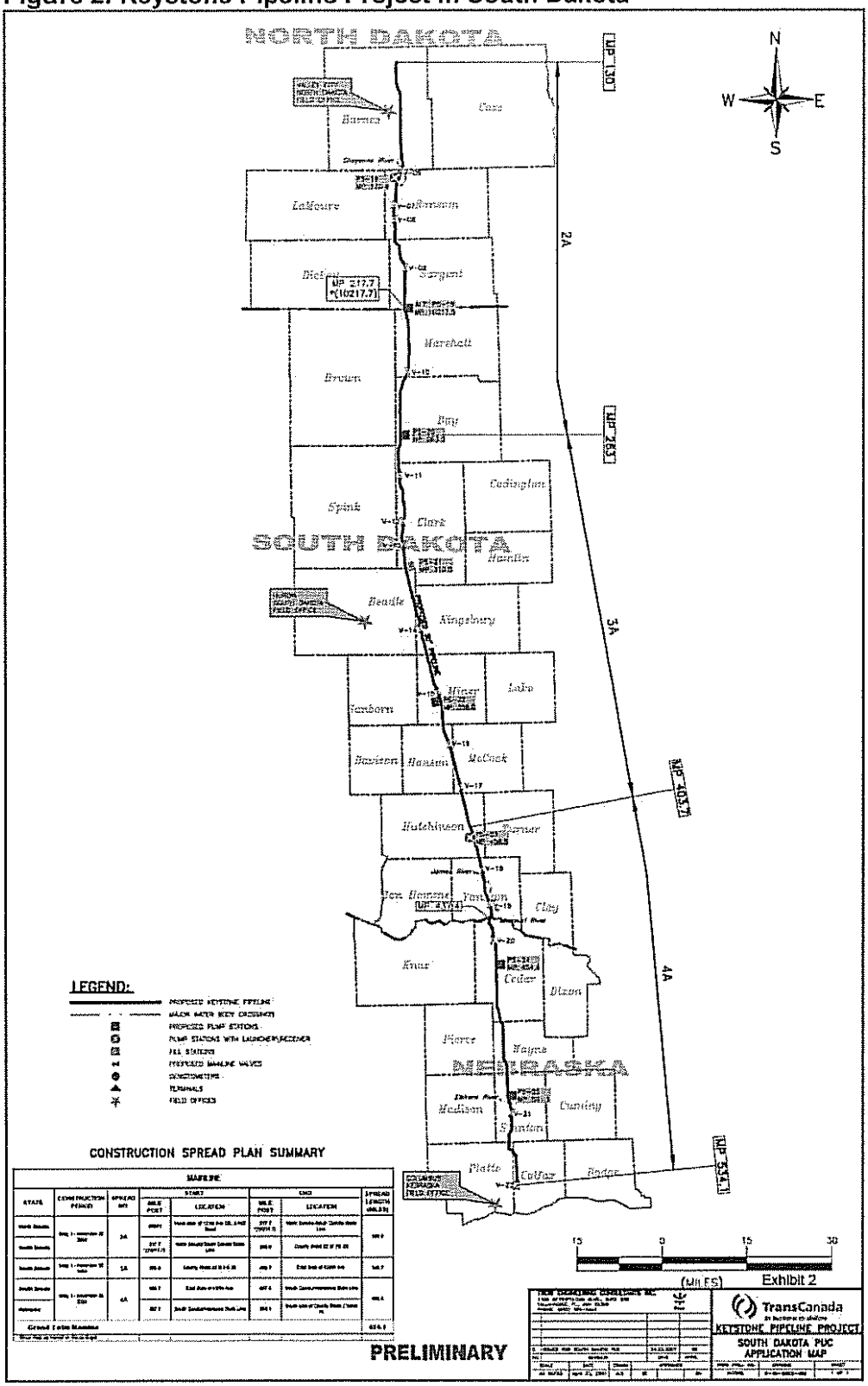


The United States portion of the project would cross North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Missouri, and Illinois. The project would consist of about 1,379 miles of pipeline, 23 pump stations, 52 mainline valves, and other various other aboveground facilities.

In South Dakota, the Keystone Project would consist of about 219 miles of pipeline, four pump stations, and 10 mainline valves (see Figure 2). Keystone proposes to begin construction in January 2008. Construction is expected to last 18 months and be completed in September 2009. The in-service date of the proposed facilities is November 30, 2009.

In addition to pipeline facilities, Keystone estimates that 21 new electric transmission lines would be required to provide electrical power to the proposed pump stations. According to Keystone, approximately 149 miles of new electric transmission lines would be constructed in the United States, including about 63 miles in South Dakota. Electric transmission lines would be either 69-kilovolt, or 115-kilovolt and would be constructed by local utilities.

Figure 2: Keystone Pipeline Project in South Dakota



4.0 PUBLIC UTILITIES COMMISSION REVIEW TASKS

TASK 1 ASSESS SPILL RISK BASED ON THE SPILL FREQUENCY VOLUME STUDY

Source Document Reviewed: Frequency-Volume Study of Keystone Pipeline, DNV Consulting.

Introduction

This task addresses the evaluation of the document entitled *Appendix A—Frequency / Volume Study of Keystone Pipeline*. The document was prepared by DNV Consulting, a risk management company, and is dated May 2006. The study evaluates the risk of a release (spill) from the pipeline in terms of frequency and volume. Data from nationally gathered pipeline statistics, mainly the DOT Pipeline and Hazardous Materials Safety Administration, were used to derive a base frequency of occurrence (spill) by cause type. Modifiers, reducing or increasing the base frequency, were then applied depending upon the type of maintenance and operation programs, engineering design, construction materials, detection technologies, etc. that will be utilized to construct and operate the pipeline. Six different causes of a pipeline release were considered including natural and man-made events. The study document is not intended to evaluate consequence and threat to public safety, public health or the environment.

In reviewing the study document for accuracy, the following aspects were assessed:

- The correct use of national statistics for comparison purposes and derived base frequency values for adjusted probability calculations
- Validation of the assumptions made including the use of the term "engineering judgment"
- The appropriateness of assigned modifier values
- Validation of referenced "industry accepted practice"
- Validation of construction materials and operation technologies

Findings and Recommendations

Bay West find that the spill frequency-volume study, prepared by DNV Consulting for this project, fairly calculates release occurrences and is generally adequate and complies with pipeline industry standards. The following discussion provides information supporting this conclusion and presents elements where the study could be improved including recommendations for specific conditions to be included in the South Dakota Public Utilities Commission (SD PUC) permit.

The additional requirements of operating at 80% of the SMYS offer greater preventative and protective measures compared to the standard operating allowance of 72% SMYS. Those measures include the following:

- *An increased depth of cover to four feet. This feature makes the pipe harder to reach and decreases the likelihood of a strike during excavation.*
- *A fracture control plan for pipe steel that must demonstrate the ability to resist crack initiation and propagation through toughness testing. The steel quality must be demonstrated and is monitored at the steel mill before shipment to the pipe mill. Quality checks include ultrasonic*

testing for laminations and macro-etch testing to detect centerline segregation in the steel slabs prior to reducing the slab thickness by rolling. These practices are above and beyond those typically required or performed when purchasing API 5L PSL 2 pipe. This feature makes the pipe more difficult to puncture due to the metallurgical specifications of the pipe.

- *Keystone has assumed that a pipeline response crew could be dispatched to plug small- and medium- sized holes in a reasonable amount of time. No timeframe was provided and such repair work would require considerable coordination and time to shut the line down, locate the release, uncover the line and then make the repair. The statement implies a fairly quick fix to such an occurrence. This assumption underestimates the level of effort and time necessary to make the required repairs to the pipeline.*

The study should be revised to better account for the likelihood of damage to the pipeline caused by the following excavation activities:

- *Agricultural activity where practices include plowing, tiling, etc. over the line.*
- *Land development, both commercial and residential, where sub-grade activities would be necessary.*
- *Utility maintenance—necessary repairs to utilities near or adjoining the pipeline right-of-way (ROW).*
- *Emergency conditions requiring immediate excavation activities, such as following a hazardous material spill incident.*

TASK 2 EVALUATE PIPELINE RISK ASSESSMENT & ENVIRONMENTAL CONSEQUENCE FILINGS

Source Document Reviewed: Pipeline Risk Assessment and Environmental Consequence Filings, ENSR.

Introduction

This task involves the evaluation of the document entitled *Pipeline Risk Assessment and Environmental Consequence Analysis* (ENSR, June 2006). Note that Appendix A of that document is addressed in Task 1 and Appendix B of that document is addressed in Task 3 of this analysis. The purpose of the document is to evaluate the risk resulting from a pipeline release event and the associated consequences to public safety, public health or the environment. The document references data cited in the Spill Volume-Frequency Study completed by DNV, LLC.

Section 4 of the document evaluates the consequences of a release or spill from the pipeline. A release event can range from a slow rate of loss occurring over an extended period of time or a large catastrophic "blow-out" event resulting in a large volume lost in a very short period of time. Both can create conditions that can cause immediate threats to public safety, health and the environment.

Where emergency conditions exist, the accepted hierarchy of protection referenced by the first-responder community is commonly life/safety, public health, personal property and environmental protection. Discussion following the Findings and Recommendations section provides information on possible threats for each of those elements with respect to a crude oil pipeline release. The environmental narrative section was supported by conversation with wildlife specialists of the Minnesota Department of Natural Resources and the US Fish and Wildlife Service having direct experience with crude oil spills.

Findings and Recommendations

Bay West find that the Pipeline Risk Assessment and Environmental Consequence Filings, prepared by ENSR for this project, adequately calculates and accounts for the risk and consequences associated with pipeline operations and release occurrences. The following discussion provides information supporting this conclusion and presents elements where the study could be improved including recommendations for specific conditions to be included in the South Dakota Public Utilities Commission (SD PUC) permit.

- *With respect to Section 4.2.2.1, Soil Impacts, the statement regarding the accumulation of oil in the backfill of the pipeline trench. In several notable cases the presence of farm field drain tile systems or judicial ditches have allowed surface oil to flow some distance from the release site—impacting surface water. The report should be amended to reflect this potential and in those cases where such structures exist in HCA or USA locations, strategies should be developed to address that eventuality.*

- *With respect to Section 4.2.2.2, Water Resources, the statement made regarding the notification of municipal drinking water supplies where surface water supplies the water. The risk*

assessment filings indicate that notification of downstream users is essential upon discovery of a contamination event. The assessment mentions that such a notification would enable the closure of water intakes to allow floating or dissolved phases of the oil to bypass. However, such action may only be sustained for a short duration, several hours to days depending upon the design of the municipal system, as reserves of water may be limited. A large oil release event may sustain the fouling of a drinking water source for an extended period of time up to several days.

Background

Life/Safety

National statistics indicate that the operation of crude oil pipeline is a relatively safe activity in terms of lives lost per unit of hazardous material transported. Crude oil, pumped directly from the earth, is refined to produce many refined petroleum products including gasoline, diesel fuel, jet fuel and others. Crude oil contains certain gases and vapors such as benzene and hydrogen sulfide. The composition of crude oil (percentage of individual compounds) determines its chemical properties and varies according to the type (i.e. "sweet or sour") of oil transported. The type of crude therefore establishes the limits of the oil's ability to burn, cause immediate inhalation hazards and other life-safety concerns. A release may present an immediate fire control concern depending upon the quantity involved and circumstances of the incident (i.e. contained, geography, air temperature, etc.). The placement or location of the pipeline relative to populated areas in large establishes the threat to the general public. Crude oil and refined product pipelines can occasionally be found running through the back yards of homes or through school yards. In most of these cases the pipeline pre-existed the development of the land above it. Where people and hazardous material pipelines co-exist there will always be an immediate life-safety threat.

With respect to incidents involving hazardous materials, the Occupational Health and Safety (OSHA) regulations specify that the most senior public safety official is in charge where a life/safety hazard exists. Organization of personnel and equipment, and life/safety response actions, are carried-out by this official—typically the local fire department fire chief. As long as life/safety threats exist, actions deemed necessary to mitigate the imminent hazard will be carried-out by the senior safety official. In theory, the principles of the incident command system (ICS) would be used to organize resources and develop priorities and objectives related to life/safety, public health and environmental protection. Given the response hierarchy described above, actions taken by local first-responders may have a bearing on the impacts to public health, property or the environment. It is therefore of great importance that pipeline officials provide sufficient training to local first-responders to prepare them for a pipeline emergency event.

Public Health

To realize an effect to human health as a result of exposure a contaminant must enter the body and then cause some harm. The route of entry, concentration of the contaminant and the resulting effect on the human body, as well as many other chemical and physiological aspects, are all considered when risk from exposure is evaluated. It is not the intent of this evaluation to form a toxicological exposure opinion for proposed hypothetical release scenarios.

Immediate and latent public health effects can arise from a small volume/slow release event or sudden large volume release. These immediate effects can include:

- Air quality—breathing/inhalation of vapors or gases (primarily volatile organic chemicals [VOC's] and hydrogen sulfide) can cause immediate health effects. Evacuation of nearby downwind populated areas often occurs with large releases due to the presence of such gases. This hazard is mitigated when source material (pooled crude oil) is recovered. In rare instances, underground releases of flammable liquids can cause liquid and vapor hazards that can migrate through the soil into sewer systems and homes. In very rare instances such a situation can create an immediate risk of explosion.

- Ingestion of drinking water laden with dissolved oil compounds is possible. Private and municipal drinking water systems can be impacted due to surface and/or ground water supply sources becoming contaminated. A survey of historical crude oil pipeline releases from the State of Minnesota Pollution Control Agency has indicated no impact to municipal drinking water supplies for known release sites. The same pipeline survey information noted several release instances where contamination to private wells resulted from refined petroleum pipeline incidents. In most of those cases the determining factor was whether the release was promptly detected and the rate at which the ensuing investigation and cleanup were preformed. In many cases the remote location of the pipeline kept chronic or acute releases from impacting nearby surface or ground water drinking resources.

- Consumption of contaminated food following the uptake of contaminants by plants and animals. For plants this threat is considered minimal due to the demonstrated fact that the organic nature of crude oil makes it very amenable to the microbial degredation process. To be absorbed by a plant the oil must be in a usable "broken-down" organic state. The controlled application of petroleum contaminated soil to agricultural farm land, and subsequent planting of crops, is readily accepted as a form of treatment by many state environmental regulatory agencies.

- The consumption of dead fish or animals by humans, as a result of succumbing to the effects of a crude oil spill, is possible but unlikely. It is possible that affected land-based wildlife coated with oil could leave the area and then be captured or killed and consumed by a human. It is unlikely however, that upon examination of a killed animal a person would eat it based upon its physical appearance (oil coated). It is possible that a person could consume a fish that has been exposed to dissolved portions of oil compounds. If there is a concern for consumption of fish following a crude oil pipeline release, the state environmental agency or health department could issue a consumption advisory and/or collect a sample of fish to perform toxicological necropsies for evaluation of consumption exposure. It is also possible that a person could consume and animal that has consumed an oiled animal. This likelihood is remote but possible.

- Direct contact exposure is considered to be negligible due primarily to the ability to recognize and control contact with the proper use of personal protective clothing.

Personal Property

For catastrophic pipeline events where a geyser of oil is created, the spraying or coating of objects in the immediate area will occur. In instances where high winds are present the distance traveled can be several hundred feet. Items or objects coming into direct contact with crude oil will become coated. For objects that are fairly impervious (not readily absorbing oil) like metal or plastic, these items may be cleaned or decontaminated with the use of a petroleum solvent or soap and water. For those objects where absorption of oil has occurred it is likely that the item will require disposal.

Environmental Impact

The most significant immediate environmental threat following a large crude oil release is presented to wildlife coming into direct contact and surface water contamination. Subsequent long-term environmental effects can include soil contamination, degraded ground water quality and restoration activities to affected natural resources. The area of land impact following a release is chiefly a function of the area topography, rate of release, volume lost and the ability to rapidly contain the spill. In most instances for large releases (>100,000 gallons) the area of land affected can be two football fields in size or more. For waterways, the principle mechanisms that effect the spread or impact area of a release include the total volume lost, rate of loss, water current speed, temperature and wind.

- Wildlife - Direct contact of oil by an animal can cause mortality due to one or more of the following reasons: preening (ingestion of oil causing toxicity), succumb due to the physical coating of oil to the animal, interference with the insulating properties of the animal (hypothermia death) or consumption of animals already deceased due to the oil (subsequent toxicity). Depending upon the affected land area size, mortality can occur due to a loss of habitat including food/shelter and succumbing to the elements. Survival rates of oil-coated animals, with or without human intervention, are commonly minimal. For waterfowl, raptures or song-birds, hazing techniques (machines used to produce loud sounds to scare-off a bird from landing), have been used with some success.

  Some animals will have the instinct and ability to seek shelter in areas outside of the oil spill that has caused a loss of habitat. Others, such as mice, rabbits and other rodents will only be able to seek shelter underground which may be in the path of the oil spill. Depending upon the cleanup site activity, opportunistic animals such as fox, coyote and raccoon may forage on dead or distressed animals in the extended area from the spill site.

- Surface Water -Releases to lakes, rivers, wetlands and other forms of surface waters present unique challenges for response personnel. Generally speaking, rates of recovery for water-borne spills are poor but could be as much as 50% or more, depending upon such factors as: the rate of evaporation, weather conditions, available equipment, pre-planning activities, etc. The dynamics of the water body (moving or still, season of year, etc.) and the logistical needs for using response equipment must be planned for on a location-specific basis. The physical recovery of oil from surface water is commonly performed with the use of floating containment barriers (booms), vacuum equipment and skimming devices. Where the success of physical removal is limited or not possible due to logistical obstacles (remote location with no access), alternate methods of removal must be considered. The use of chemical countermeasures, chemicals used to gather/heard or disperse the oil, can be used but requires the permission of state and/or federal environmental authorities. Burning the oil is also an industry tactic used in removing gross quantities of oil but does not completely remediate the impact. Physical, chemical and other such alternate methods of mitigating a crude oil spill have pluses and minuses in terms of their effect on the environment. The pluses and minuses must be weighed given the circumstances of the situation. Evaluating such options requires input from regulatory authorities, wildlife managers and others who have a vested interest in the outcome.

  The toxicity of an oil spill to water is dependant upon many factors including, but not limited to, the size and type of water body, type of waterborne organism (fish, invertebrate), type of oil, etc. Certain fractions of oil will dissolve into the water column and may or may not reach toxic

concentrations to all or some organisms. Also, the organic nature of the oil (hydrocarbon) can cause a decrease of the available dissolved oxygen in the water creating an oxygen deficient (asphyxiating) environment for fish and other water-based organisms. The evaluation of water quality conditions following a release is often directed by state environmental officials. Upstream unaffected water quality is commonly referenced against downstream water chemistry conditions.

- Soil and Ground Water - In many instances following the discovery of a release to soil, the objective is to remove the "gross" contamination first by pumping and then by excavation. The extent of excavation is often established by deriving an acceptable amount of risk to the resources in the area that may be threatened (ground water, surface water, tile lines, sewer systems, drinking water wells, etc.). The natural processes (natural attenuation or bioremediation) is allowed to occur for remaining residual levels of oil in the soil or ground water. In those cases remaining soil and ground water contamination is monitored via the use of periodic subsurface soil sampling and/or ground water monitoring wells. Monitoring activities allow for the assessment of changing soil/ground water contamination conditions (extent, direction, etc.). The extent of soil and ground water cleanup and the developed monitoring program is commonly imposed by state environmental regulatory authorities. Such actions are typically enforceable by state law and are completed by the submittal of detailed investigation or monitoring work plans prepared by private environmental consultants working for the pipeline company.

TASK 3 IDENTIFY HCAs and USAs and DETERMINE THE ADEQUACY OF THE MITIGATION MEASURES FOR ALL SUCH AREAS

Source Documents Reviewed: Bay West reviewed the applicants submittal information relating to High Consequence Areas (HCAs), including the HCA maps, the Spill Frequency Volume Study, the Risk Assessment and Environmental Consequences filings (Appendices A and B), the Keystone Draft Environmental Impact Statement, and confidential sensitive receptor data provided by the SD DENR and TransCanada that were not released publicly.

Introduction

The purpose of this task was to confirm that the applicant has accounted for the United States Department of Transportation identified HCAs and outlined adequate mitigation measures to protect the HCAs.

Findings and Recommendations

A complete determination regarding the appropriate identification of HCAs and the adequacy of the proposed mitigation measures was not able to be made based on the information currently available and the project's "proposed" status. HCA maps appear to adequately identify "High Population Areas" and the lack of "Commercially Navigable Waters". However, due to a difference in data available from the SD DENR and TransCanada, TransCanada should further assess drinking water HCAs and their associated contributory pipeline segments. Additionally, TransCanada and the SD DENR and the Department of Fish, Game and Parks (SD GFP) need to begin actively collaborating on both drinking water and ecologically sensitive HCAs and their appropriate mitigation measures. The following discussion provides findings and offers recommendations for specific conditions to be included in the South Dakota Public Utilities Commission (SD PUC) permit.

Background

The United States Department of Transportation (USDOT) maintains the regulatory authority to ensure that crude oil pipelines are maintained and operated such that they are protective of human health and the environment.

On December 1, 2000, the Office of Pipeline Safety (OPS) published a final rule (65 FR 75378) that imposed pipeline integrity management program requirements on hazardous liquid operators that own or operate 500 or more miles of pipeline. The requirements apply to those hazardous liquid pipeline owners and operators with pipelines that could affect areas defined as high consequence areas (HCAs), generally defined as populated areas, areas unusually sensitive to environmental damage, and commercially navigable waterways. As defined in 49 CFR Ch. I (10-1-02 Edition) **defines an HCA as**:

(1) A **commercially navigable waterway**, which means a waterway where a substantial likelihood of commercial navigation exists;

(2) A high population area, which means an urbanized area, as defined and delineated by the Census Bureau, that contains 50,000 or more people and has a population density of at least 1,000 people per square mile;

(3) An other populated area, which means a place, as defined and delineated by the Census Bureau, that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area;

(4) An unusually sensitive area (USA), as defined in § 195.6. 49 CFR provides the following definition of an USA. "USA means a drinking water or ecological resource area that is unusually sensitive to environmental damage from a hazardous liquid pipeline release.

(a) An **USA drinking water resource** is:

- The water intake for a Community Water System (CWS) or a Nontransient Non-community Water System (NTNCWS) that obtains its water supply primarily from a surface water source and does not have an adequate alternative drinking water source;
- The Source Water Protection Area (SWPA) for a CWS or a NTNCWS that obtains its water supply from a Class I or Class IIA aquifer and does not have an adequate alternative drinking water source. Where a state has not yet identified the SWPA, the Wellhead Protection Area (WHPA) will be used until the state has identified the SWPA; or
- The sole source aquifer recharge area where the sole source aquifer is a karst aquifer in nature.

(b) An **USA ecological resource** is:

- An area containing a critically imperiled species or ecological community;
- A multi-species assemblage area;
- A migratory waterbird concentration area;
- An area containing an imperiled species, threatened or endangered species, depleted marine mammal species, or an imperiled ecological community where the species or community is aquatic, aquatic dependent, or terrestrial with a limited range; or
- An area containing an imperiled species, threatened or endangered species, depleted marine mammal species, or imperiled ecological community where the species or community occurrence is considered to be one of the most viable, highest quality, or in the best condition, as identified by an element occurrence ranking (EORANK) of A (excellent quality) or B (good quality).

Integrity Management Plan HCA Requirements

The Federal pipeline regulatory requirements contained under 49 CFR part 195.452 stipulate the preparation of an Integrity Management Plan (IMP) which has the purpose of describing measures the pipeline company will be taking to prevent and detect releases from the line and specific planning activities related to identified HCA locations within a line segment. The development of the IMP is not required to be completed until no later that one year after the start of operation of the line. Of particular importance, the IMP is the required to identify preventative and mitigative measures to protect HCA's. For those segments where an HCA resource has been identified the pipeline operator must complete a risk analysis to identify additional actions to enhance public safety or environmental protection. Specifically with respect to preventive, planning and mitigative activities, the operator's risk analysis must include:

"...evaluate the likelihood of a pipeline release occurring and how a release could affect the high consequence area. This determination must consider all relevant risk factors, including, but not limited to:

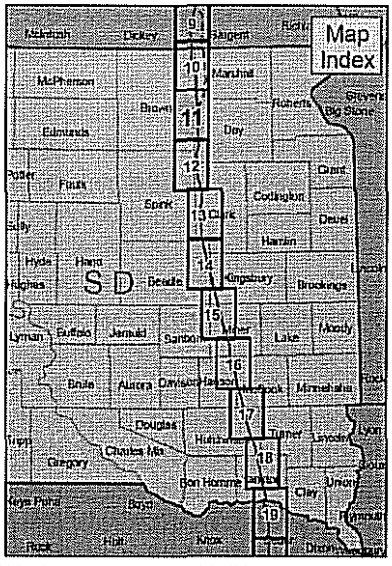
(i) Terrain surrounding the pipeline segment, including drainage systems such as small streams and other smaller waterways that could act as a conduit to the high consequence area;
(ii) Elevation profile;
(iii) Characteristics of the product transported;
(iv) Amount of product that could be released;
(v) Possibility of a spillage in a farm field following the drain tile into a waterway;
(vi) Ditches along side a roadway the pipeline crosses;
(vii) Physical support of the pipeline segment such as by a cable suspension bridge;
(viii) Exposure of the pipeline to operating pressure exceeding established maximum operating pressure".

Appendix B of the Pipeline Risk Assessment and Environmental Consequence Analysis (ENSR, May 2007), was prepared to "summarize the methodology and results of the preliminary evaluation of risk at HCA's along the Keystone Pipeline system". The proposed pipeline location was reviewed and an analysis of risk, with respect to oil reaching an HCA, and an assigned risk ranking system was developed based upon the following criteria:

- Length of contributory pipeline segment or CPS (only that segment of pipeline with contributory affect should a release occur);
- Proximity of the CPS to an HCA;
- Presence of multiple HCA's;
- Ease of impediments to spill transport (overland, underground, stream flow);
- Predicted spill frequency – spill volume for the CPS (from Appendix A)

HCA Identification and Mitigation

As part of the Pipeline Risk Assessment and Environmental Consequence Analysis (ENSR, May 2007), TransCanada provided maps #10 through #19 that depicted HCAs and their associated CPS. These maps contained environmentally sensitive information deemed "confidential", therefore, they are not contained in this report. The following graphic, which contains the map index and the map key is provided to show how the data was presented.



Pipeline Segments
KEYSTONE Proposed Pipeline
Contributory Pipeline Segments
USDOT-Designated High Consequence Areas
Valves - March 2007
Drinking Water Areas
Pump station
Ecologically Sensitive Areas
Populated Areas
Note: Based on November and December 2006 DOS filing centerline

Bay West contacted the USDOT through the South Dakota PUC in an attempt to obtain the HCA Geographic Information System (GIS) data in a shape file format for the segment of Keystone Pipeline in South Dakota. The South Dakota PUC also requested the same electronic shape files from Transcanda. Neither the USDOT nor TransCanada provided the shape files. Shape file detail commonly includes such site specific information such as: origin and date of data, name/location of threatened, endangered or rare species, drinking water well construction specifications and animal populations and critical habitat information. The review of shape files would have assisted in confirming that the TransCanada maps appropriately depicted each of the HCAs.

Bay West also corresponded with the South Dakota Department of Environment and Natural Resources SD DENR and SD GFP. Bay West obtained the copies of Source Water Protection Areas (SWPA) along the pipeline route from the SD DENR and compared them to the drinking water HCAs presented by TransCanada. *Variance in the SWPAs provided by the SD DENR and the drinking water HCAs identified by TransCanada create a concern that TransCanada may not have all of the relevant data needed to identify drinking water HCAs. TransCanada and the SD DENR need to*

collaborate and review the SWPA data that is not presented in TransCanada's HCA maps and make a determination if additional drinking water SWPA data should be incorporated.

Bay West spoke by telephone with the SD GFP on October 19, 2007. The SD GFP reported that TransCanada representatives visited the department offices on two occasions and obtained ecological data for incorporation into the pipeline studies that were underway at that time. The SD GFP indicated that they were in receipt of approximately five reports from TransCanada. At the time of Bay West's telephone call, the SD GFP had not yet reviewed and formerly commented on the TransCanada reports. TransCanada indicates in the Draft Environmental Impact Statement that they will work with the SD GFP to design mitigation activities for each ecologically sensitive population identified along the right away. *In order to provide the most protection of the identified ecological resources, the SD GFP (in cooperation with other related agencies) need to begin actively collaborating with TransCanada on their proposed mitigation activities associated with each ecologically sensitive population.*

Estimated Risk to HCAs

The methodology developed by ENSR for the calculation of risk was found to be generally sound. However, the following comments are provided which may have a bearing on the calculation of risk for identified HCA locations.

- *TransCanada does not appear to give sufficient consideration to how the presence of field drain tile systems could affect subsurface transport. Due to the ability of field drain tile systems to be direct conduits for transport away from the spill site, the presence of these drain tile systems should be specifically accounted for in the development of the Integrity Management Plan.*

- *TransCanada states that CPSs were identified through the review of topographic maps and information. Maps provided by TransCanada indicate that the pipeline is located in areas that are relatively flat and sometimes atop topographic peaks or divides between watershed areas. Ground-truthing of topographic changes near the pipeline should be performed to more accurately identify CPS and adequately protect HCAs.*

- *TransCanada provides the following text regarding downstream transport; "the assumption is made that transport is to be constant and a spill would be intercepted within five miles downstream of the release location." That assumption does not appear be considerate of a catastrophic release or a release that occurs during a simultaneous event that significantly complicates the release interception/response. The description of a worst case discharge, contained within the pending Pipeline Oil Spill Response Plan, calls for planning for a very large release, probably near or into a very sensitive area (HCA) during inclement weather conditions. With stream/river flow velocities of five miles per hour or more during rain storm events; it is very unlikely that all or even some of the oil would be contained within five miles down stream of the release point. As a point of reference, planning requirements for fixed facilities under the Oil Pollution Act of 1990 (OPA 90), must calculate down stream planning distances for worst case discharges. In most instances, these distances are 15-20 miles or more. This calculation formula takes into account the dynamics of water body, travel time, properties of the oil product and others. The staging of limited response resources, finite access and recovery locations and other logistical issues make complete containment*

(interception) to a moving water release within five miles downstream an unlikely occurrence. To improve upon response success, the development of HCA-specific response strategies, including planning for more significant downstream transport is highly recommended. This topic is also discussed as part of Task 4.

TASK 4 DETERMINE THE ADEQUACY OF THE EMERGENCY RESPONSE PLAN [AND OTHER ASPECTS OF EMERGENCY RESPONSE PLANNING AND PREPAREDNESS]

Source Documents Reviewed:

- Keystone Construction Mitigation and Reclamation Plan (CMRP), Sections 3.1, 3.2.
- Pipeline Risk Assessment and Environmental Consequence Analysis, Section 5.0.
- Draft Keystone Pipeline Emergency Response Plan
- Draft Environmental Impact Statement

Introduction

The purpose of this task is to review the adequacy of the prepared Emergency Response Plan, as required by DOT, 49 CFR part 194.107, and other aspects of the TransCanada's preparedness related to a pipeline release. A detailed description of emergency response planning is provided following the Findings and Recommendations below.

Findings and Recommendations

The following recommendations are provided regarding the preparation of emergency response planning documents and activities:

- *An SPCC plan is required to be completed and then approved by a professional engineer prior to tank facility operation. Submittal to the federal EPA or the state for approval is not required. At this time TransCanada has not prepared such plans pending determination of the exact location of the contractor yards. It is recommended that all such prepared plans be submitted for review 30 days prior to operation.*

- *The Oil Spill Response Plan referenced in Appendix C of the draft EIS has been submitted in template form and is incomplete at this time. The Oil Spill Response Plan, when completed, is required to be submitted to the federal DOT (Pipeline and Hazardous Material Safety Administration) prior to operation for review and comment. Approval of the plan is not required to allow pipeline operation but noted deficiencies must be addressed within a specific time frame. It is recommended that this plan be reviewed for adequacy 30 days prior to operation of the pipeline.*

- *An Integrity Management Plan is required to be submitted to the federal DOT within one year following the start of operation of the pipeline. Certain plan content regarding emergency response planning is believed to be vital to for preparing for effective response to a release incident. It is recommended that the following information be collected prior to pipeline operation and contained in detail in the Oil Spill Response Plan. This information should be reviewed 30 days prior to pipeline operation. With respect to identified HCA and USA locations, at a minimum, the following should be completed:*

- *Identify access locations for water and land based emergency response equipment. Detailed site-specific access information should include: land ownership and agreements, after-hour access requirements and other pertinent logistical information.*
- *The following site-specific information should be required to be collected and contained in the Oil Spill Response Plan and otherwise be readily available during and emergency.*
    - *Terrain surrounding the pipeline segment, including drainage systems such as small streams and other smaller waterways that could act as a conduit to the high consequence area*
    - *Elevation profile*
    - *Characteristics of the product transported*
    - *Amount of product that could be released*
    - *Possibility of a spillage in a farm field following the drain tile into a waterway*
    - *Ditches along side a roadway the pipeline crosses*
- *For releases potentially entering moving water bodies, identify downstream at-risk resource(s), pre-determine booming locations and response resources and pre-plan to evaluate priorities and objectives. Based upon available response equipment location(s), mobilization time, river current and other factors, the assumption of a 5 mile downstream planning distance does not appear be considerate of a catastrophic release or a release that occurs during a simultaneous event that significantly complicates the release interception/response. Bay West recommends that downstream planning distances on the order of 20 miles be evaluated. This information should be contained in the Oil Spill Response Plan.*
- *Identification of site-specific acceptable and unacceptable response tactics/countermeasures and techniques based upon effectiveness, intrusiveness (subsequent damage caused by the cleanup effort) and other considerations as determined relevant. It is recommended that such activity be completed with input from the South Dakota DENR and other local environmental trustees. This information should be contained in the Oil Spill Response Plan.*
- *A model for response planning activity has been completed for the Minneapolis/St. Paul Sub-Area through the efforts of state and federal agencies and industry. Coordination of response strategy planning activities on the Mississippi River can be found at the following link: http://www.umrba.org/isa.htm. It is recommended that such sources be reviewed when preparing response planning activities.*
- *Page 24 of the Keystone Pipeline Response Plan references that response actions will be directed by the responding FOSC. It is recommended that this statement be modified to indicate that during the public safety phase of an incident, the most senior public safety official (usually the local fire chief), is in charge and has full authority over the hazardous material incident and scene. As cleanup operations are undertaken the role of the responding FOSC (typically on scene several hours into the incident) is to monitor cleanup progress. The pipeline operator, as the responsible party, is ultimately responsible for the cleanup outcome and will likely be collaborating (via a unified command structure) with SD DENR staff to establish cleanup priorities*

and objectives. The intent of the FOSC is not direct or takeover a response, unless requested or if it is necessary.

- *For state agency staff responding to pipeline releases, it is recommended that at a minimum the following training be obtained:*
  - *OSHA compliance training (40 hour HAZWOPER)—safety requirement for field personnel involved in emergency response operations.*
  - *Incident Command System (ICS)—organizational scheme required at all hazardous material incidents*
  - *Tabletop/functional exercises developed with representation from pipeline officials. These activities allow for the testing of response plan, organizational function and the use of response resources.*
  - *Inland and on-water oil spill control tactics (including containment boom deployment). Such training allows a better understanding of logistical obstacles and limitations of response equipment.*

Background

The purpose of emergency response planning is to pre-plan and prepare for expected and unexpected events causing emergency (time-critical) conditions. With that purpose, the primary concerns for this task are TransCanada's planning activities that address the public's safety, public's health and environmental impact in the event of a release from the construction and operation of the pipeline. Certain emergency or contingency planning activities are required of public and private entities by local, state or federal regulations as demonstrated by the need to plan for emergency events such as: mass casualty incidents, natural disasters, acts of terrorism and hazardous material accidents. The development of an emergency planning document contains much of the critical information to prepare for and carry-out response efforts. Sound planning will incorporate all elements of emergency response preparedness while looking holistically at anticipated (probable) as well as unexpected (usually catastrophic) events. Just as important as being prepared to respond to an emergency is the need to prevent a release. Many of the prevention aspects associated with a petroleum pipeline are related to the construction, maintenance and operation of the line which are being evaluated by an independent engineering firm and are not part of this analysis.

For the purpose of constructing and operating a crude oil pipeline, some of the more important aspects of emergency preparedness include:

- Prepare emergency response or contingency plans as required by local, state and federal regulatory authorities.
- Establish contractual relationships with qualified and capable response resources that can support response efforts along the entire length of the pipeline. Identified resources will need to be available 24/7/365 and be located within a reasonable response distance.
- Plan for responding to emergencies in all climates, weather conditions and terrains. Extreme cold or heat can limit the effectiveness of response activities. For instance, access to a pipeline due to heavy snow cover and equipment operation can be severely affected during the dead of winter.

- Ensure that information contained in planning documents is "refreshed" or updated annually and communicated to involved parties. Of particular importance are contact numbers to reach response resources and regulatory agencies.
- Assess risk (a function of the likelihood of an event and severity of consequence) by accounting for small probable and large "worst case" discharge situations with the identification of at-risk resources (natural and man-made).
- Adequately train personnel and develop specific response strategies, where possible, to enhance response preparedness.

Evaluation Of TransCanada Emergency Planning Activities

The purpose of this deliverable is to evaluate the project emergency response plan(s) to ensure that the applicant has complied with all applicable emergency planning and preparedness requirements and such prepared plans are adequate to address emergencies of varies sizes and complexities.

Emergency response planning is necessary for two principle portions of the project—construction and operation.

Construction

The construction of the pipeline will require the use of heavy equipment (trucks, backhoes, side-boom CATs, trenchers, etc.). Such equipment requires oils, fuels and other hazardous substances to support its operation and maintenance. The construction of field support centers or "contractor yards" are locales where materials and supplies will be staged for use and machinery is parked. For the State of South Dakota, Keystone Pipeline will be establishing two of these support areas (Yankton and Kingsbury). According to information contained in the project EIS, each contractor yard will be constructed with two or three 10,000 gallon above ground tanks (AST) for diesel fuel and one 10,000 gallon AST for gasoline. These tanks will support the on-site fueling of vehicles and equipment with capacities varying typically from 20-200 gallons. Other materials used for equipment maintenance purposes are typically found in smaller 1-5 gallon containers such as hydraulic fluids and lubricating oils. Contractor yards are approximately 20 acres in size and will be utilized for weeks to months over the life of the construction phase.

As temporary structures, AST construction and operation must observe the following requirements per state and federal regulatory standards.

- Be supported by and adhere to all of the requirements of a Spill Prevention Control and Countermeasure (SPCC) plan as specified by 40 CFR part 112.
- Be constructed of compatible materials and to DOT, API, ASTM and/or other applicable regulatory or industry storage tank standard.
- Adhere to and all local and national fire code requirements.
- Be properly registered, if necessary, with state and federal regulatory programs.
- Be inspected for working condition prior to installation and daily during use.

- Be assembled with adequate secondary containment, overflow prevention and leak detection systems.
- Be supported by adequate fuel transfer procedures, personnel training, on-site spill response materials and contracted local spill response resources.

For planning purposes, potential release causes that should be addressed include:

- Mechanical failure of any part of a tank system (overfill protection, piping, corrosion of the tank, etc.)
- Vandalism, theft or act of terrorism
- Sever weather—tornado or thunderstorm/lightning
- Operational accidents—overfills during transfers

The principle planning document required to address prevention, preparedness and release response measures during the construction phase of the pipeline is a Spill Prevention Control and Countermeasures (SPCC, 40 CFR part 112) plan. One SPCC plan will be necessary for each contractor yard.

Operation

Once construction is complete the pipeline will be hydrostatically tested prior to being placed into use to transport crude oil. The two principle federally required planning documents that address preparedness and response during the line's operation is an Oil Spill Response Plan (49 CFR part 194.107) and the Integrity Management Plan (49 CFR part 195.452).

Oil Spill Response Plan

The intent of this plan is to describe the operator's overall preparedness to respond to oil discharges over the entire length of its line. Information in this plan would be accessed during an emergency. Components of the plan include:

- Identification that the pipeline can cause significant and substantial harm to the environment.
- The evaluation of a "worst case discharge" event—calculation of the largest loss of oil from the line during inclement weather.
- Identification of response resources (in-house and contracted).
- Identification of environmentally and economically sensitive areas.
- Emergency notification contact numbers
- Response training provided to company employees and drills/exercises conducted to test response procedures.
- Prepare the document to be consistent with the federal National Contingency Plan and Area Contingency Plan.
- Ensure the protection of safety at a response site.

Integrity Management Plan

This plan has two primary responsibilities—detailing how the operator is preventing and detecting a release and how it will respond to a release in an identified High Consequence Area (HCA) and Unusually Sensitive Area (USA). HCA's and USA's are defined as those areas that based upon the line's proximity could cause substantial harm if a release were to occur. These areas include certain populated areas, navigable waterways, drinking water sources and state/federal designated ecological resources. This aspect of the plan is meant as a pre-planning tool to identify exceptionally vulnerable areas and propose prevention and mitigative measures to protect them.

TASK 5 DETERMINE THE ADEQUACY OF THE PROPOSED CONSTRUCTION, MITIGATION, AND RECLAMATION PLAN TO RESTORE AFFECTED AREAS BACK TO FULL PRODUCTIVITY IN A REASONABLE TIMEFRAME

Source Documents Reviewed: Construction Mitigation and Reclamation Plan

Introduction
This task involves the evaluation of the TransCanada Keystone Pipeline L.P. (Keystone) Construction Mitigation and Reclamation Plan (Plan) prepared by Universal Ensco, Inc. to assess its adequacy to ensure areas affected by project-related activities would be restored to original productivity within a reasonable timeframe along the proposed Keystone Pipeline Project route.

Findings and Recommendations
Bay West find that the construction mitigation and reclamation practices included in the Plan are generally adequate and comply with pipeline industry standards. The following discussion provides findings of where the Plan could be improved and offers recommendations for specific conditions to be included in the South Dakota Public Utilities Commission (SD PUC) permit.

SECTION 2.0 - GENERAL CONDITIONS
General conditions in Section 2.0 of the Plan provide standard measures for mitigating adverse impacts to the environment and landowners affected by the project. The following findings and recommendations should be noted to further mitigate impacts resulting from the project.

Environmental Inspection
The Plan did not specifically stipulate the use of an environmental inspector during and after construction. Environmental inspectors are commonly used by pipeline companies on large-scale construction projects. Requiring at least one environmental inspector per construction spread during the proposed project would help ensure compliance with the SD PUC's permit, other environmental agency permits and approvals, and landowner agreements. Bay West recommends the following conditions to be included in the SD PUC permit:

> *At least one environmental inspector is required for each construction spread during construction and restoration to help ensure compliance with the PUC's permit, other environmental agency permit conditions, and landowner requirements. Environmental inspectors shall have peer status with all other activity inspectors and shall have the authority to order appropriate corrective actions or to stop activities that violate the environmental requirements.*
>
> *The environmental inspector shall keep records of compliance with regard to environmental conditions of the SD PUC Permit, and the mitigation measures proposed by TransCanada, and other Federal or state environmental permits during the construction and restoration phases of the project.*

Noise Control
Noise impacts from a pipeline project are generally categorized in two ways: 1) short-term temporary impacts resulting from the use of construction-related equipment and 2) long-term permanent impacts resulting from the operation and maintenance of the facility.

The proposed project crosses areas that are sensitive to construction-related noise (*e.g.*, residential, commercial/industrial areas, active livestock areas, *etc.*). To help ensure that sensitive areas in the vicinity of construction activities would not be affected by noise levels, Keystone stipulated it would minimize noise during non-daylight hours and would attempt to abide by municipal bylaws in noise-sensitive areas and would install noise attenuation at above-ground facilities, if necessary, to ensure that noise levels comply with the applicable state or local standards.

The United States Department of State has indicated in its Environmental Impact Statement that it would require Keystone to set up a hotline to enable individuals to contact Keystone in the event that construction noise levels affect them. In those instances, Keystone should conduct noise assessment surveys at the affected area to ensure that the noise attributable to construction does not exceed Day-Night Sound Level (Ldn) of 55 decibels of the A-weighted scale (dBA). In the event that construction noise cannot meet regulated levels, Keystone should work with these individuals to develop an acceptable alternative construction work plan. In addition, Keystone should ensure that construction equipment would be operated on an as-needed basis and would be maintained to manufacturers' specifications to minimize noise impacts.

Noise from pump station operation could also result in long-term impacts on nearby residences. Keystone conducted noise studies suggesting that noise generated by the pump stations would not exceed the criterion of Ldn of 55 dBA at any nearby residences. Although noise impacts from the electrically powered pump stations are projected to be minor, Keystone should perform a noise assessment survey during operation to confirm the level of noise at each listed noise-sensitive area.

In the absence of specific measures proposed by Keystone to mitigate for noise impacts associated with noise generated by operating the pump stations and by construction-related activities, including around-the-clock horizontal directional drilling (HDD) activities proposed near residences at the Missouri River crossing near Yankton, Bay West recommends the following conditions be included in the SD PUC permit:

> *Keystone shall perform a noise assessment survey during operation to confirm the level of noise at each listed noise-sensitive area. If the noise attributable to operation of any pump station exceeds 55 dBA Ldn at any noise-sensitive area, Keystone shall implement noise mitigation measures to ensure that regulation levels are not exceeded.*
>
> *The criterion of L_{dn} of 55 dBA shall be adopted for horizontal directional drilling operations near residences, or Keystone shall develop a plan for South Dakota Public Utilities Commission review and approval that includes specific measures to mitigate for noise impacts from drilling operations during non-daytime hours. Measures may include the installation of a temporary noise barrier system at the directional drill site.*

Weed Control

The measures included in the plan for weed control are sufficiently prepared and generally comply with standard industry practices. However, Bay West recommends including the following conditions to the SD PUC permit with regard to herbicide application:

> *Keystone shall obtain landowner consent in writing prior to herbicide application.*

Keystone shall inform landowners of the brand name/active ingredient, the application method, and application rate for each herbicide planned for use on this project.

Keystone shall make available a copy of the herbicide's MSDS information.

Dust Control

The measures included in the plan for dust control are sufficiently prepared and comply with standard industry practices, with one exception. Bay West recommends including the following condition to the SD PUC permit:

Keystone shall cover all open-bodied trucks while in motion to minimize fugitive dust emissions.

Road and Railroad Crossings

The measures included in the plan for road and railroad crossings are sufficiently prepared and comply with standard industry practices, with one exception. Bay West recommends including the following condition to the SD PUC permit:

Keystone shall coordinate with emergency responders where project-related activities occur near road and railroads and where road closures are necessary.

SECTION 3.0 SPILL PREVENTION AND CONTAINMENT

A comprehensive assessment of the adequacy of the proposed remediation efforts related to spills in provided under Task 6 of this document.

SECTION 4.0 UPLANDS (AGRICULTURAL, FOREST, PASTURE, RANGE / GRASSLANDS)

Approximately 97 percent of the proposed project crosses upland areas consisting of agricultural, forest, pasture, range and grasslands. Project-related activities will cause short-term impacts to these areas during and after construction of the proposed facilities. Unavoidable short-term impacts to upland areas would include but are not limited to vegetation disturbance and clearing; soil erosion; segregation of topsoil; compaction to prime farm soils; interference with irrigation practices; and damages to drain tiles systems. Section 4.0 of the Plan outlines construction and mitigation procedures that would be implemented to minimize impacts to these areas. Keystone would also comply with conditions of landowner agreements, and any necessary federal, state, and local agency permits and approvals that may apply to the project. The measures outlined in the Plan were found to be sufficiently prepared and comply with standard industry practices, with few exceptions, to minimize construction-related impacts and to restore the affected upland areas to preconstruction use and productivity. The following findings and recommendations should be noted to further mitigate project-related impacts to upland areas.

Topsoil Removal and Storage

The Plan specifies measures to conserve the productivity of topsoil affected by project-related activities. In cultivated agricultural lands, Keystone proposed a trench line-only topsoil segregation technique. Using this technique, topsoil would be segregated from the trench line and stored on undisturbed topsoil next to the trench in the area where the pipe would be strung, welded, and stored before lowering-in and backfilling. Trench line-only topsoil segregation would minimize the quantity of topsoil disturbance, and the amount of topsoil excavated thereby reducing the potential for wind erosion of excavated topsoil. Further, it would preserve a larger amount of undisturbed existing root stock. Leaving as much of the sod and root layer intact as practical would increase the probability

that post-construction revegetation would be successful and reduce the potential for weedy plant species to become a dominant component. However, subsoil excavated from the trench would be placed directly on undisturbed topsoil on the non-working side of the right-of-way (also referred to as the subsoil storage area or the spoil side), thereby increasing the potential for mixing of topsoil and subsoil in these areas especially during backfilling. Mixing of subsoil with topsoil, particularly in agricultural lands, dilutes the superior chemical and physical properties of the topsoil and lowers soil fertility and the ability of disturbed areas to revegetate successfully. To minimize the potential for mixing of topsoil and subsoil, Bay West recommends including the following condition to the SD PUC permit:

Unless the landowner specifically approves otherwise, topsoil shall be segregated either along the full right-of-way or from the trench and subsoil storage area in actively cultivated or rotated crop lands and pastures, residential areas, hayfields, and other areas at landowner request.

In deep soils (more than 12 inches of topsoil), segregate at least 12 inches of topsoil unless otherwise specified by the landowner. In soils with less than 12 inches of topsoil make every effort to segregate the entire topsoil layer. Where topsoil segregation is required, maintain separation of salvaged topsoil and subsoil throughout all construction activities. Segregated topsoil may not be used for padding the pipe.

Temporary Erosion and Sediment Control

The measures included in the plan for temporary erosion and sediment control are sufficiently prepared and comply with standard industry practices, with one exception. The plan specifies temporary slope breakers (section 4.5.4) and permanent slope breakers (section 4.11.5.2) will be installed on slopes greater than 5 percent in non-cultivated areas with adequate spacing requirements. However, Keystone proposes to install the slope breakers at a gradient of 2 to 8 percent. Standard practice is to install the slope breaker at a gradient of 2 to 4 percent. Logically, the slope breaker should be installed at a slope less than or equal to the minimum slope threshold (*i.e.*, 5 percent). Bay West recommends including the following condition in the SD PUC permit:

Install temporary slope breakers on slopes greater than 5 percent on non-cultivated lands where the base of the slope is less than 50 feet from a waterbody, wetland and road crossings at the following spacing (closer spacing may be used if necessary):

Slope (%)	*Spacing (feet)*
5 – 15	*300*
>15 – 30	*200*
>30	*100*

The gradient of each slope breaker shall be 2 to 4 percent.

Trenching

The plan specifies measures that will be implemented during trenching activities, including safety measures if blasting becomes necessary to remove rock from the trench line. In addition to provisions provided in the Plan, Bay West recommends including the following in the SD PUC Permit to better ensure safety during trenching operations and further minimize the effects of blasting:

In addition to provisions provided in the Construction and Mitigation and Reclamation Plan, Keystone shall install exclusion fencing around the perimeter of the pipe trench or pit excavations in residential areas if the trench/pit would remain open during non-working hours.

Keystone shall also comply with the following to further minimize the effects of blasting and to better ensure safety during blasting operations:

6) *post warning signs, flags, and barricades;*
7) *sound warning horns or sirens;*
8) *follow procedures for safe storage, handling, loading, firing, and disposal of explosive materials;*
9) *coordinate with emergency responders as necessary; and*
10) *blasting shall be conducted by registered blasters.*

If blasting will occur within 150 feet of structures, Keystone shall use an independent contractor to inspect structures before blasting and other locations if requested by the landowner. Post-blast inspections would be performed as warranted. During blasting, the independent contractor shall monitor ground vibrations at the nearest structure within 150 feet.

Keystone shall evaluate any damage complaints associated with blasting activities. In the unlikely event that blasting would affect nearby water wells, Keystone shall provide alternative sources of water or otherwise compensate affected landowners. Keystone shall also compensate landowners if buildings or structures are damaged as a result of the blasting activities.

Padding and Backfilling

The measures included in the plan for padding and backfilling are sufficiently prepared and comply with standard industry practices, with one exception. One stipulation states if it is impossible to avoid water-related damages, Keystone shall reasonably compensate the landowners for the damages or shall correct the damages so as to restore the land, crops pasture, water courses, *etc.* to their preconstruction condition. Bay West recommends including the following in the SD PUC Permit:

If it is impossible to avoid water-related damages, Keystone shall reasonably compensate the landowners for the damages and shall correct the damages so as to restore the land, crops pasture, water courses, etc. to their preconstruction condition.

Clean Up

The measures included in the plan for cleanup activities are generally sufficiently prepared and comply with standard industry practices. However, some language should be more specific. Bay West recommends including the following additional measures in the SD PUC Permit:

Keystone shall commence cleanup operations immediately following backfill operations. Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary slope breakers and sediment barriers) until conditions allow completion of cleanup.

Reclamation and Revegetation

The measures included in the plan for reclamation and revegetation are generally sufficiently prepared and comply with standard industry practices. However, Bay West recommends including the following additional requirements in the SD PUC Permit:

In addition to provisions provided in the Construction and Mitigation and Reclamation Plan, Keystone shall comply with the following provisions when implementing measures included in Section 4.11, Reclamation and Revegetation*:*

5) *Relieving compaction: submit and obtain written approval from the SD PUC on a winterization plan if construction will continue into the winter season when conditions could delay successful de-compaction, topsoil replacement, or seeding until the following spring.*
6) *Rock removal: rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench should be considered construction debris, unless approved for use as mulch or for some other use on the construction work areas by the landowner.*
7) *Mulching: Apply mulch on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. If anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies. Mulch before seeding if:*
    c. *final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas); or*
    d. *construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.*
8) *Erosion Control Matting: Install erosion control fabric on waterbody banks at the time of final bank re-contouring as shown in Detail 4 in the Plan, unless riprap or other bank stabilization are employed in accordance with federal, state, and local permits and approvals.*

Forested Lands

The measures included in the plan for forested lands are generally sufficiently prepared and comply with standard industry practices. One stipulation states that if trees of commercial or other value to the landowner are to be removed, Keystone shall allow the landowner the right to retain ownership of the trees with the disposition of the trees to be negotiated prior to clearing. This provision does not include requirements for reasonable compensation to landowners for the value of the timber. Bay West recommends including the following in the SD PUC Permit:

If trees need to be removed that have commercial or other value to affected landowners, Keystone shall compensate the landowners fair market value of the trees to be cleared and/or allow the landowner the right to retain ownership of the felled trees.

Operation and Maintenance

The measures included in the plan for operation and maintenance are generally sufficiently prepared and comply with standard industry practices, with a few minor exceptions. One stipulation states that Keystone will conduct post-construction monitoring after the first growing season. It is standard industry practice to perform post-construction monitoring after the first and second growing seasons. A second stipulation states that Keystone shall monitor yield of cultivated lands impacted with the

help of an agricultural specialist, when requested by landowners. Yield monitoring should be offered in all cases, unless specifically declined by specific landowners. Bay West recommends including the following stipulations in the SD PUC Permit:

Conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation. If after the first growing season, revegetation is successful, no additional monitoring would be required.

In cultivated areas, Keystone shall monitor for at least two years the yield of land impacted by construction using agricultural specialists in all cases, unless specifically declined by specific landowners.

SECTION 5.0 DRAIN TILE SYSTEMS

Much of the proposed project crosses areas that may contain drain tile systems. Project-related activities will cause short-term impacts to these systems during and after construction of the proposed facilities. The mitigation measures included in the plan for affected drain tile systems are sufficiently prepared and comply with standard industry practices. However, Bay West recommends including the following additional requirements in the SD PUC Permit:

Location information of drain tiles exposed during the project shall be collected by a craft inspector, environmental inspector, or its equivalent, using a sub-meter accuracy Global Positioning System, or at a minimum, by accurately documenting the pipeline station numbers of each exposed drain tile. Keystone shall maintain on file the drain tile location information and tile specifications (e.g., diameter, type, depth, etc.). Future availability of this information would be essential to relocate drain tiles in the event a pipeline leak/spill occurs during the operation of the facility and would help in a spill recovery effort to contain transport of pipeline liquids via drain tiles.

SECTION 6.0 WETLAND CROSSINGS

The proposed project will cause short-term impacts to up to 98 acres of wetland/riparian areas in South Dakota. The area is less than 3 percent of the entire project area within South Dakota. Most of the wetlands crossed are palustrine emergent wetlands. Less than one percent of the wetlands affected are forested.

Section 6.0 of the Plan outlines construction and mitigation procedures that would be implemented to minimize impacts to wetlands crossed by the proposed project. Keystone would also comply with conditions of its federal, state, and local permits and approvals that must be obtained prior to beginning project activities within wetlands. Wetland mitigation measures outlined in the Plan were generally found to be sufficiently prepared and comply with standard industry practices in wetland areas. The following findings and recommendations should be noted to further mitigate impacts resulting from the project.

Easement and Workspace

Keystone stipulated that the width of the construction right-of-way shall be reduced to 85 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width. Standard industry practice is to reduce the width to 75 feet in standard wetlands. Keystone also stipulated that it would locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet away from wetland boundaries. Standard industry practice is to locate extra

work areas at least 50 feet away from wetland boundaries, except where the adjacent upland is actively cultivated or rotated cropland or other disturbed land. Bay West recommends including the following stipulations in the SD PUC Permit:

Unless a wetland is actively cultivated or rotated cropland, limit the width of the construction right-of-way to 75 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width.

Unless a wetland is actively cultivated or rotated cropland, locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries. Limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

Operation and Maintenance

Keystone stipulated that it would not conduct vegetation maintenance over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic pipeline corrosion/leak surveys, Keystone would maintain a corridor centered on the pipeline and up to 30 feet wide in an herbaceous state. In addition, trees within 30 feet of the pipeline that are greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way. Standard industry practice is to maintain a corridor centered on the pipeline up to 15 feet wide and to selectively cut trees greater than 15 feet in height within 15 feet of the pipeline. Bay West recommends including the following stipulations in the SD PUC Permit:

Do not conduct vegetation maintenance over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 15 feet wide may be maintained in an herbaceous state. In addition, trees within 15 feet of the pipeline that are greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.

SECTION 7.0 WATERBODIES AND RIPARIAN LANDS

The proposed project would cause short-term impacts to several waterbodies and riparian lands. Keystone would minimize impacts on surface waters by implementing the waterbody construction and mitigation procedures contained in Sections 7.0 of the Plan. Keystone would also comply with conditions of its federal, state, and local permits and approvals that must be obtained prior to beginning project activities that affect waterbodies and riparian areas. Waterbody crossing methods and mitigation measures outlined in the Plan were generally found to be sufficiently prepared and comply with standard industry practices for waterbodies and riparian areas. The following findings and recommendations should be noted to further mitigate impacts to waterbodies and riparian lands resulting from the project.

Easement and Workspace

Keystone stipulated it would locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet away from the water's edge. Standard industry practice is to locate extra work areas at least 50 feet away from water's edge, except where the adjacent upland is actively cultivated or rotated cropland or other disturbed land. Bay West recommends including the following stipulations in the SD PUC Permit:

Locate all extra work areas (e.g., staging areas, additional spoil storage areas, etc.) at least 50 feet away from water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way. Work area boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas.

Operation and Maintenance

Keystone did not include a section in its plan that addresses post-construction operation and maintenance activities. Bay West recommends including the following stipulations in the SD PUC Permit:

Limit vegetation maintenance adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire construction right-of-way. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be maintained in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline that are greater than 15 feet in height may be cut and removed from the permanent right-of-way.

Pesticides and herbicides should be used in accordance with their label instructions and should be used in or within 100 feet of a waterbody except as allowed by the riparian landowner, and appropriate land management or state agency.

SECTION 8.0 HYDROSTATIC TESTING

Water from up to five streams in South Dakota would be used to hydrostatically test the pipe during the final phases of the project. Provided Keystone obtains and complies with the necessary permits and approvals for the appropriation and discharge of hydrostatic test water, the measures included in the plan for hydrostatic testing are sufficiently prepared and comply with standard industry practices.

TASK 6 DETERMINE THE ADEQUACY OF THE PROPOSED REMEDIATION EFFORTS RELATED TO SPILLS

Source Documents Reviewed: Keystone Pipeline Emergency Response Plan

Introduction

The necessity to remove (cleanup) oil from the environment is primarily based upon the risk it poses to human health, safety and environment. For instance, risk-based corrective action, developed to address environmental repair caused by leaking underground petroleum storage tanks, often involves leaving some contamination behind—allowing "mother nature" to complete the job. Petroleum products, hydrocarbon molecules, are fairly amenable to the natural biological breakdown processes. The completeness of a cleanup (determination of "how clean is clean") is driven primarily by state and local environmental regulatory agencies.

Following the Findings and Recommendation section is narrative regarding the two phases of the cleanup process—immediate and long-term.

Findings and Recommendations

Bay West find that the proposed remediation efforts related to spills to be adequate and consistent with industry practice. To allow for a more expedient decision process and a more favorable cleanup outcome, it is encouraged that specific cleanup techniques be evaluated in advance for at least all identified HCA and USA locations, to be consistent with the findings outlined in Task 4 of this report. No other recommendations are offered.

Background

Immediate Cleanup

Immediate actions are required following a release to "stabilize" the situation. During this time the immediate threats to the public's safety, health and environment are managed usually by containing and then physically removing the bulk of oil on land or in the water. This process, depending upon the size of the release and circumstances, can take days to weeks and can involve such actions as pumping, soil excavation, on-water recovery with boats, shoreline cleaning, etc. Immediate cleanup actions may result in a thorough or sufficient cleanup and not require any or minimal additional cleanup or monitoring effort. Those vested parties responding during the emergency phase of a release (environmental regulators, fire department, pipeline company), are expected to develop an immediate cleanup action plan consisting of objectives and priorities which are often based upon the following factors:

- Overall life-safety, public health and environmental threats
- Timing and amount of available response equipment and personnel
- Weather conditions, site access and other logistical issues

It is true that each incident is unique in its requirements to complete the cleanup. The availability and identification of the correct type and amount of response resources is critical during the early phases of a response. For instance, in some cases where the pipeline is remotely located, the creation of a

make-shift road may be necessary. This would require heavy equipment and possibly gravel. Inland and water-way spill response training can help responders develop techniques and prepare for the challenges and eventualities of a release. Response efforts often involve around-the-clock operations for the first several days to as quickly as possible contain and recover oil. The development of specific response strategies (at least at HCA and USA locations), and the regular testing (practicing) of those strategies, will help to minimize the threat to the public safety, public health and the environment.

Long-term Cleanup

If the natural resources have sustained damaged or remain threatened due to un-recovered contamination, long-term remediation (cleanup), monitoring and/or restoration (returning the resource to a pre-spill state) activities may need to be considered. Ground water contamination is often of concern for land based releases and is monitored with the use of monitoring wells. This approach allows for the extent and magnitude of ground water contamination to be evaluated through time. The success of ground water remediation can be limited depending upon the technology used. Clean-up goals, or desired levels of specific contaminants allowed to remain in the environment (air, soil, surface and ground water), are commonly established by state and federal environmental regulatory agencies.

Natural Resource Damage Assessment: 15 CFR Part 990 (National Oceanic and Atmospheric Administration) enables the designated state trustee (DENR) to complete, with or without the involvement of the responsible party, a natural resource damage assessment (NRDA). The assessment is intended to determine, quantify and propose a remedy due the effects of the spill and any remediation. It accounts for the "services of the resource lost" on behalf of the state. It is not a penalty mechanism but rather seeks a compensatory settlement in returning the resource to its original state. For instance, if during a pipeline release the best approach, to minimize public safety, health and environmental damage was to burn the spill, and in so doing destroyed several acres of forest area, the NRDA would evaluate the cost of the lost resource and develop a restoration plan. From the CFR regarding NRDA actions:

"This goal is achieved through the return of the injured natural resources and services to baseline and compensation for interim losses of such natural resources and services from the date of the incident until recovery. The purpose of this part is to promote expeditious and cost-effective restoration of natural resources and services injured as a result of an incident. To fulfill this purpose, this part provides a natural resource damage assessment process for developing a plan for restoration of the injured natural resources and services and pursuing implementation or funding of the plan by responsible parties. This part also provides an administrative process for involving interested parties in the assessment, a range of assessment procedures for identifying and evaluating injuries to natural resources and services, and a means for selecting restoration actions from a reasonable range of alternatives."

TASK 7 HYDROGEOLOGIC AND GEOLOGIC VULNERABILITY

Source Documents Reviewed:

- United States Department of State, Draft Environmental Impact Statement, for the Keystone Oil Pipeline Project, August 10, 2007 (USDS, 2007).
- United States Geological Survey http://geology.usgs.gov/connections/fws/landscapes/karst_map.htm
- South Dakota Geological Survey (SDGS) Department of Environmental and Natural Resource Maps including:
    - Geologic Map of South Dakota, 2004.
    - First Occurrence of Aquifer Materials, South Dakota, including:
        - Map 2, Clark County
        - Map 3, Marshall County
        - Map 4, Brown County
        - Map 12, Minor County
        - Map 14, Yankton County
        - Map 15, Beadle County
        - Map 24, Kingsbury County
        - Map 25, Hutchinson County
        - Aquifer Materials maps were not available for Day, Hanson, and McCook Counties.
    - SDGS Geologic Quadrangle Maps have not been developed for the study area.

Introduction

The purpose of Task #7 was to review the applicant's filings and available hydrogeological publications for the pipeline area and identify areas where the geology would be highly susceptible to a crude oil release from the pipeline. Our assessment of sensitive geologic and hydrogeologic areas primarily consisted of attempting to identify the most highly susceptible areas where surface contamination may reach groundwater resources and potential catastrophic events like landslides, sinkholes that change topography that could rupture the pipeline. The hydrogeologic evaluation, focusing primarily on drinking water source area protections, was addressed as part of Task 3. Therefore, this assessment focuses mainly on geologically sensitive areas.

Bay West's review was limited by time and to available published geologic maps in conjunction with the summaries provided in the Draft Environmental Impact Statement (DEIS). In addition, several attempts were made to contact representatives of the SDGS to discuss conclusions and summaries of the hydrogeologic and geologic data. However, the SDGS was not available during the time of the review.

Findings and Recommendations

The DEIS presents a general overview of potentially sensitive geologic and hydrogeologic areas. The DEIS geologic summary generally coincides with SDGS geologic maps reviewed. The type of geologic material present at the surface determines the vertical travel time for water-soluble, geologically inert contaminants released at the surface to reach the uppermost aquifer. Travel times are controlled by the permeability, and thickness of the geologic materials through which

contaminants would move. The sensitivity of an aquifer is inversely proportional to the time of travel. Longer travel times are associated with both a greater degree of geologic protection and reduced sensitivity to ground-water pollution. Shorter travel times represent an increased sensitivity and an inability to protect ground water from vertical contaminant movement. However, high sensitivity does not indicate that water quality has or will be degraded. Low sensitivity does not guarantee that ground water will remain pristine.

In general the current published geologic maps available for the pipeline route do not contain enough detailed information about distribution of surficial geologic materials and bedrock outcrops to allow for a complete evaluation of hydrogeologically and geologically sensitive areas. One potential highly susceptible geologic feature is the Niobrara Formation, a carbonate rock that can form fissures up to 1,000 feet long and 100 feet deep. Carbonate bedrock are typified hydrogeologically by very high flow rates along interconnected, solution-enlarged fractures and cavities, which may result in a very high sensitivity area where present, typically regardless of the depth to the water table.

The DEIS indicates the Niobrara Formation may be present in the southern half of the state from mile post (MP) 353 to 436 (Nebraska border). It also states that karst features are found in southern portions of Miner County, northern Hanson County, southern Hutchinson County, and all of Yankton County (ENSR 2006a). However, it does not describe what these features are. The USGS defines Karst as a type of topography that is formed over limestone, gypsum, and other rocks by dissolution. It is characterized by sinkholes, caves, and underground drainages. Human activities can negatively impact karst areas, resulting in subsidence and ground-water contamination. USGS maps indicate that Karst terrain is potentially present in the southern half of the study area. The SDGS First Occurrence Aquifer Maps indicate the Niobrara Formation is the first aquifer present in Beadle County, although it is greater than 100 feet below the ground surface and as you move south it can be between 50 to 100 feet below the ground surface. The aquifer maps suggest that the Niobrara Formation may cover a larger area than summarized in the DEIS. The Geologic Map of South Dakota indicates that the surficial Quaternary deposits can be as thick as 300 feet. However, depth to bedrock was not provided on the maps reviewed.

In concurrence with the DEIS, Bay West recommends that additional measures be performed to assess the thickness of overburden and distribution of bedrock outcrops in the karst areas. Additionally, a detailed review of depth to bedrock maps, boring logs, and well logs should be completed to confirm the thickness of overburden and bedrock type along the pipeline ROW. This review could be supplemented through meetings with the SDGS and a field walking survey in areas where available information is limited and areas that have a potential for landslides, sinkholes, and/or flooding where topography can change rapidly. Also, it is recommended that the karst features in Miner County, northern Hanson County, southern Hutchinson County, in the DEIS be further described and an analysis of their potential impacts to the study area be completed.

We recommend that TransCanada report each identified karst outcropping and areas of shallow overburden (less than 50 feet in depth) that they are aware of or identify in the future that exist within 0.5 miles of the pipeline ROW to the SDGS, SD PUC and United States Department of Transportation (USDOT). In addition to the karst areas, the Environmental Analysis section of the DEIS summarized other potential impacts and mitigation measures which in some instances included recommendations for further evaluation in the study area. These recommendations could best be addressed as conditions of the PUC issuing a construction permit for the project. Findings associated with this more detailed review should be provided to the USDOT, the SD PUC and the Geological

Survey. The USDOT may use the findings to assess if this new information would cause some areas to be defined as geologically sensitive High Consequence Areas.

TASK 8 DOCUMENT REVIEW AND COMPLIANCE

Bay West reviewed the applicable sections of Administrative Rules of South Dakota for Energy Facilities(ARSD 20:10:22). The applicants filings reviewed in association with this project were found to be in compliance with sections ARSD 20:10:22: 13, 14, 15, 16, 17, 18, 20, 21, 23, & 38 and in general accordance with other regulations regarding environmental issues.

TASK 9 UNIDENTIFIED IMPACT ISSUES OF CONSEQUENCE

The purpose of this task was to call attention to and proposes mitigation for other environmental impact issues of consequence not previously identified. The ability to identify environmental issues of consequence were somewhat limited by the documents reviewed as part of Bay West's scope of work. During the review of project documents, environmental issues of consequence, other than what were already identified by others or by Bay West, have not been identified.

TASK 10 SAFETY RISK DETERMINATION

Introduction

Safety risk pertains to the following populations: the general public, first responders, pipeline maintenance crews, regulatory officials and others that may be involved during normal operations or during an emergency situation. Safe operations involve the identification of associated hazards and then properly controlling those hazards.

Finds and Recommendations

During the course of its evaluation Bay West did not find undue safety risks, or associated spill damage, not otherwise associated with normal or emergency pipeline operations. It is imperative that the first responder community be adequately trained to ensure protection of nearby populations.

5.0 CONCLUSION

The construction of the proposed Keystone Pipeline presents both significant and insignificant risk to the environment and inhabitants of South Dakota. The proper implementation of the regulatory design requirements, construction and operational requirements, TransCanada's proposed mitigation measures, and the recommendations provided within this document, reduces, to currently recognized industry standards, the:

- threat (risk) of serious injury to the environment or the inhabitants within the siting area;
- impairment of the health, safety or welfare of the inhabitants in the siting area; and,
- complies with all applicable laws and rules (as they pertain to the Tasks 1 through 6 of this document);
- interference with the orderly development of the region with due consideration being given the views of governing bodies of affected local units of government.

TransCanada would be required to comply with all applicable laws and rules during construction

6.0 LIMITATIONS

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgment of Bay West based on the data obtained from the work. Due to the nature of assessment, the incomplete nature of some project documents, and the limited data available, Bay West cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be construed as legal advice. Should additional information become available which differs significantly from our understanding of conditions presented in this report, Bay West requests that this information be brought to our attention so that Bay West may reassess the conclusions provided herein.

REFERENCES

Each Section of the report identifies source documents reviewed as part of this effort.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	CERTIFICATE OF SERVICE HP07-001

I hereby certify that copies of Staff's Direct Testimony were served by the following means: (i) via E-mail to all individuals listed in the Attached Exhibit A, and; (ii) United States Post Office First Class Mail, postage thereon prepaid, at the addresses shown in Exhibit B, on this the 31st day of October, 2007.

See Attached Exhibit A.
See Attached Exhibit B.

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Before the Public Utilities Commission
of the State of South Dakota

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 DIRECT TESTIMONY OF CURT HOHN October 31, 2007

My name is Curt Hohn. I'm the General Manager of WEB Water Development Association, Inc., with offices at 38462 U.S. Highway 12, P.O. Box 51, Aberdeen, South Dakota 57402-0051. I'm responsible for the overall leadership, operations, development and protection of the WEB water pipeline system which provides domestic water service and drinking water to a 17 county area, which includes 14 counties in South Dakota and 3 counties in North Dakota.

Professional Qualifications - Background

I have been involved in water resource development, management, water resource conservation, aquifer studies, and rural water system development since 1976. From 1976 through 1982, I served as the Manager of the Oahe Conservancy Sub-district, one of five districts established by the South Dakota Legislature for the purpose of regional water resource development. In that capacity, I worked with the South Dakota Geological Survey (SDGS) and United States Geological Survey (USGS) on ground water studies that were completed in the northeast area of South Dakota, including the counties of Marshall, Day, Clark, Brown, and Beadle, all of which would be crossed by the TransCanada-Keystone Pipeline as currently proposed. I have served as the General Manager of the WEB Water Development Association for 15 years, from 1983 through 1987 and again from 1997 to the present date. I have been involved in securing the necessary federal authorization and funding for the WEB project and have been involved in the management and over sight of much of its construction. From 1998 to 1999 I served as a contract facilities consultant for CBM Inc. I also served as the Division Administrator and Operations Manager for the Oregon General Services Department from 1989 to 1993 involved in building facilities construction and operations. As the Manager of Engineering and Technical Services for the Clackamas Water and Sanitary District from 1994 to 1997 I was involved in treatment plant and pipeline system development and construction for a fast growing urban growth area southeast of Portland, OR. I'm a graduate of Northern State University with a Bachelor of Science degree in business and public administration. I worked as plumber on large building and heating/cooling facility

construction to put myself through college. I was born and raised in Aurora County, South Dakota near the town of Plankinton on a family farm which is still being operated by a member of my family.

WEB Water Development Association, Inc.

WEB Water Development owns and operates a regional water pipeline system which provides drinking water and domestic water to 8,000 farms and rural homes, 105 towns and bulk use customers, 5 ethanol plants, 2 electrical peaking power plants, 2 soybean processing plants, a 500,000 head livestock industry, and assorted industries in a 17 county area through a 6,800 mile pipeline system. Our primary source of water is the Missouri River at Lake Oahe Reservoir south of Mobridge, SD. The WEB water system was constructed in 1985 to 1990 to replace the deep artesian water wells, which prior to WEB were the main source of water for most of the area since statehood. The artesian water has high levels of sodium and TDS and fails to meet federal and state safe drinking water standards.

TransCanada-Keystone Impact On WEB

As proposed, the TransCanada- Keystone Pipeline would cross or parallel the WEB water pipeline system at 12 to 20 different locations in Day and Clark Counties, depending on the final route taken by the oil pipeline. The largest pipe being impacted is a 12 inch PVC mainline which provides the primary source of drinking water for 1,029 farms and rural homes, 8 towns and several lake resort areas in Day, Marshall and Clark Counties. One of the few sources of quality water in the area is the glacial drift area that makes up the James Aquifer and the Deep James Aquifer located along the west edge of Marshall, Day, and Clark Counties.

The route that TransCanada has selected for the proposed Keystone oil pipeline would cross through and over this aquifer, which is used by ranchers and farmers in the area for livestock and other uses. WEB is exploring the development of wells in groundwater aquifers near Mansfield, SD and Andover, SD to develop wells and install package water treatment plants to treat ground water, which will be blended with treated Missouri River water to help WEB meet peak water needs of our customer service area including value added plants that are building in the area.

Burden of Proof

Under South Dakota law, the applicant in this case, TransCanada, has the burden of proof as stated in SDCL 49;

> *SDCL 49-41B-22 Applicant's burden of proof. The applicant has the burden of proof to establish that:*
>
> *(1) The proposed facility will comply with all applicable laws and rules;*
> *(2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;*
> *(3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and*
> *(4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.*

The testimony presented in this document will address where we believe the permit application filed by TransCanada fails to meet burden of proof as required under state and federal law.

(1) The proposed facility will comply with all applicable laws & rules

The permit application and project plan presented by Canada-Keystone does not comply with state and federal laws and regulations.

Title 49: Transportation, Part 195 - Transportation of Hazardous Liquids By Pipeline: Federal regulations require that plans for crude oil pipelines provide protection for High Consequence Areas (HCA's) and Unusually Sensitive Areas (USA's) and Wellhead Protection Areas (WHPA) which has not been done by the applicant TransCanada. The permit applications filed with the U.S. State Department and the permit application filed with the SDPUC failed to recognize shallow aquifers being crossed in Marshall, Day, Clark and Beadle Counties and other counties. The applications also failed to recognize and mitigate for eight (8) rural water systems being crossed by the project.

Eminent Domain: The permit application does not comply with South Dakota eminent domain law SDCL 21-35, SDCL 49-41B, SDCL 46-8, SDCL 49-2, SDCL 49-7.

Common Carrier: TransCanada does not meet the test of a "common carrier". TransCanada has not secured the necessary permit from the South Dakota Public Utilities Commission and the necessary approvals. TransCanada has not obtained legislative approval, has not "Negotiated in good faith" as required under the law, and has secured easements through use of "harassment and willful or wanton misconduct and fraudulent means". TransCanada holds itself out as "a common carrier engaging in the business of transporting commodities for hire" when in fact the Keystone Pipeline is owned by a monopoly and will be used primarily to haul the oil products of the owners and investors of the pipeline, Conoco Phillips and EnCana Corp, a Calgary-based company specializing in recovery of oil sands bitumen. (See Exhibit 1) TransCanada-Keystone will move no oil products for anyone in South Dakota and will provide no direct benefit to the residents of South Dakota, which is essential in claiming common carrier status. We believe that TransCanada has violated state and federal law by filing condemnation and eminent domain against 18 South Dakota landowners, 15 landowners in Marshall County and 3 landowners in Day County. TransCanada has taken this action before the SDPUC has even held formal hearings or granted a permit and before the appeal of any such decision could be considered by a circuit court as is required by law and before a permit approval has been granted by U.S. government. TransCanada's permit and project plan does not comply with eminent domain laws of the state or the federal EIS approval process. The easement document TransCanada has used to secure signatures includes a clause that calls for "one or more pipes" to be placed in the easement right-of-way while the permit and project plan specifies one pipeline. (See Exhibit 2) An easement of this kind which is secured under duress or under the pressure or threat of condemnation, is not a valid document and amounts to an illegal taking which is a violation of state and federal law and a possible violation of the civil rights of the property owners involved.

James Bush of Britton, SD was working cattle when TransCanada's land agent dropped by and insisted that Bush stop what he was doing and sign the easement which he had just been given. Bush asked to set up an appointment at a later date. The next contact Jim had with TransCanada was when the sheriff delivered condemnation papers. An elderly lady (whose signed statement will be provided later) will testify that she was told by a TransCanada land agent that if she signed the easement "we can bring the boys back from Iraq sooner". We will present signed statements and testimony from various landowners that TransCanada land agents have raised the threat of condemnation at the first meeting and virtually every meeting or contact. There has been no negotiation as required by state and federal law. Landowners were denied their requests to keep a copy of the easement to share with their attorney or family. If TransCanada, a private company from a foreign country, is allowed to take land and property by eminent domain and condemnation, then property rights are no longer safe in South Dakota and the United States of America. Under South Dakota law, the use of eminent domain (condemnation) is limited to state and local governments, power lines, rural water systems and railroads that provide benefits to the communities they cross. Taking of private land is done only after all other options have been exhausted. Even then, landowners have the right to appeal to locally elected boards and commissions for relief.

National Environmental Policy Act (NEPA): The project plan and testimony presented by TransCanada does not adequately address and compare the environmental and social impacts of the proposed route to various other alternate routes that could and should be considered, including the I-29 Alternate Route along the west road ditch of Interstate Highway 29 which was included as an alternate route in the permit application filed with the US State Department (See Exhibit 3). Or a route from Williston, ND south through the oil field area of western North Dakota and South Dakota which would place the pipe near the oil fields and provide a means for shipping oil out.

Further consideration should be given to these alternate routes by the PUC and federal government as part of the Final Environmental Impact Statement. By failing to seriously consider this and other alternatives, TransCanada is in violation of federal law. In their testimony, TransCanada claims "constructing any pipeline along a major highway will put workers at risk, require highway closures, increase safety impacts and costs, hamper development of commercial districts and trade one group of affected landowners for another". The WEB rural water system constructed miles of large ductile iron pipelines ranging in size from 30 inch and 24 inch pipe in the Highway 12 and Highway 281 road ditches without accident or injury. The pipeline has been operated safely for more than 20 years. Permits were granted by the South Dakota Department of Transportation (See Exhibit 4).

The State of South Dakota owns the highway road ditch along I-29 so very little private farm land would be needed to accommodate construction of the Keystone Pipeline. Road access for construction, operation and emergency response purposes would be better from a four lane interstate highway than a dirt road or gravel section line road that often has load restrictions and often are impassable in the winter and during the spring of the year. There is concern that Keystone with use the easement right-of-way they secure or condemn as a "corridor" for more pipelines. A representative of ConocoPhillips stated in a Houston news story that South Dakota and the Midwest will be a "corridor" for oil pipelines (more than one) and that by the year 2020 as much as 3,500,000 barrels of tar sands crude oil will be moved through pipelines in the USA (See Exhibit 1). To move that much crude oil will require SIX pipelines like TransCanada-Keystone. The state permit process and NEPA require that all connected and related issues be addressed in the project plans and that project plan plans be specific and detailed.

The National Environmental Policy Act (NEPA) requires that alternatives be reviewed and considered and that the public be given an opportunity for comment. In 2006, as part of their filing with the U.S. State Department, TransCanada present maps showing three pipeline routes that would have used the west ditch of Highway I-29. All three options would have passed by Elk Point, South Dakota, the location Hyperion has selected for a tars sands oil refinery. In the end, the route proposed for the Keystone Pipeline was shifted west so that it will run from Britton to Yankton, South Dakota. The citizens of South Dakota were never included in the decision process on site selection for the pipeline or the refinery. The oil

industry in Canada and Texas made the decision, without consultation, which is a violation of federal law and state law. IF the SDPUC grants a permit for the Keystone Pipeline it should be limited to one pipeline.

If a serious review of this project has been done by any state agencies the reports should be released to the public. Alternate pipeline routes through western North Dakota and South Dakota where oil wells are located or installing the pipe in the wide I-29 road ditch was never seriously considered or studied. The Department of Environment and Natural Resources (DENR), GF&P, Health Department, Geological Survey, EPA, and Fish and Wildlife have all been silent. Federal agencies say it's a state issue and state agencies say its federal. If a farmer installs a 1,000 gallon fuel storage tank, the DENR would review the plans and require containment to protect groundwater and the environment. If it leaks the farmer will be fined or prosecuted. The TransCanada pipeline will move 24.8 million gallons of crude oil PER DAY through South Dakota (591,000 barrels) through 220 miles of high pressure thin walled pipe crossing aquifers, wetlands, streams and hundreds of public and private water lines. Risk Management Consultants, DNV, says that a pinhole leak could release 372,000 gallons of oil PER DAY with no review by state agencies. If a farmer drains a wetland GF&P or USF&W would fine them. If a farmer's oil tanks leaks DENR would issue a fine and enforce the law. TransCanada, a private oil company from a foreign country, is allowed to threaten landowners with condemnation, trespass on private property, dig through wetlands, streams and aquifers, and add a new risk to our environment and no state agency gets involved.

Need & National Interest: TransCanada says their pipe is in the "national interest" and is needed to move Canadian tar sands oil south to Illinois and Texas. Yet, US oil refineries are running at less than full capacity. Canadian oil will compete with US energy supplies, including ethanol and wind energy here in the Midwest. TransCanada provides no direct benefit to South Dakota. Federal and state agencies, like the Fish and Wildlife Service, NRCS, and GF&P refuse to grant easements so the oil pipe can't cross government land or land with government easements. That forces the oil pipeline over on to private farm land. Apparently a high pressure crude oil pipe is in the "National Interest" so long as it's on private farm land and doesn't cross government lands.

Full Disclosure - Public Information: Documents TransCanada filed with the SDPUC in April in support of their permit application were all stamped "confidential" and not made available to the public. Even the table of contents was marked confidential. Only after formal complaints were filed by Dakotan's Concerned and others was part of the information made available months later. Those documents that were eventually released were not available until the Friday before the public meetings, too late for the 660 people who attended the meetings to review the documents. TransCanada did most of the talking at the four meetings leaving only limited time for questions and public input. Landowner lists were never made available by TransCanada. After complaints were filed, a list was released by the PUC but it was loaded with names of adjacent landowners so no one could really tell where the pipeline would go and who was impacted. One month before the

PUC hearings, a June 26th version of the pipeline route map is still not available to the public or the PUC as of Oct. 22, 2007.

(2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area……..

At an operating pressure of 1,440 psi to 1,584 psi the thin walled pipe that TransCanada is proposing to construct and operate what will be highly pressurize vessel waiting to fail. At that pressure, TransCanada is asking South Dakota to accept an "unreasonable risk of a crude oil leak or spill occurring resulting in irreversible damage to 220 miles and thousands of acres of productive farmland, millions of acre feet of ground water, hundreds of creeks and streams, wetlands, and the groundwater aquifers, rivers, creeks, wetlands and private property in eastern South Dakota. Robert Jones, TransCanda VP was quoted in an April 29, 2007 Argus Leader news story saying "crude oil regularly moves between 1,400 to 2,000 psi, up from 1,000 psi for pipelines built in the 1950's" (See Exhibit 5). TransCanada will increase the pressure on this pipeline to 2,000 psi to move more and more oil through South Dakota to increase their profits. It's the job of state and federal regulators to protect the resources and the safety of the people of South Dakota.

Thinner Wall Pipe: November 17, 2006, TransCanada applied for a "Special Permit" from the federal government to install a 30-inch pipeline with THINNER PIPE WALL THICKNESS than any other oil pipeline currently operating in the United States. They also asked for permission to run the pipe at a HIGHER OPERATING PRESSURE (11%). TransCanada received the permit approval on April 30, 2007 but didn't inform the SDPUC or the public until August 23, 2007, four months later. What's remarkable is TransCanada has no track record of operating high-pressure crude oil pipelines. Most of TransCanada's pipeline experience is with natural gas pipelines which are less like to spill and damage soil or ground water. When crude oil pipes leak the oil spreads out into the soil and damages the groundwater aquifers. Thinner walled pipe means greater risk for South Dakota. Allowing a company like TransCanada, with no oil pipeline experience, a permit of that kind is an insult to South Dakota and every state crossed. According to recent news reports, much of the steel pipe that will be installed will be made in China and India. Neither country can provide the level of inspection and quality control that U.S. steel pipe company's offer. China has had problems making toothpaste, dog food and children's toys. A news story dated 10/31/07 reported that the estimated cost of the TransCanada-Keystone Pipeline has risen from $2.1 billion to $5.4 billion because of steel and construction costs (See Exhibit 6) . The PUC should require that all pipe installed in South Dakota be made in the USA and be of the same wall thickness or greater wall thickness than existing oil pipelines being operated, tested and inspected by the federal government in the United States of American. If a private company from Canada wants to build a crude oil pipeline through South Dakota they should be required to meet the same standards as the oil companies they are competing with in this country.

49 CFR 195.106 (Thinner Pipe Wall – Higher Pressure): TransCanada's permit application filed with the SDPUC on April 27, 2007 requested a permit to build and operate a pipeline to move 18,270,000 gallons (435,000 barrels) of tar sands oil per day through South Dakota at a pressure of 1,400 psi. Four months later, on August 23, 2007, TransCanada informed the SDPUC that they had requested and received a "Special Permit" from Jeffery D. Wiese, Acting Associate Administrator for Pipeline Safety, on April 30, 2007 to increase the volume moved to 24,822,000 gallons (591,000 barrels) per day which represents a 36% increase in pipeline flow. To accomplish this, TransCanada proposes to increase the operating pressure from the standard followed by other oil pipes in the USA of 72% of pipe design capacity to 80% of pipe design capacity. In testimony, TransCanada officials are now saying the pressure will be 1,440 psi and 24,822,000 gallons (591,000 barrels) per day, and that federal law allows them to exceed the maximum operating pressure by 10% as a result of "abnormal" operation (1,440 psi x 1.10 = 1,584 psi). Once the Keystone Pipeline is built, TransCanada will be tempted to sell or lease the right-of way easement area to other pipelines and to "increase" the operating pressure to move even more oil at greater pressure and greater risk to South Dakota. Robert Jones, TransCanada Vice President was quoted in an Argus Leader news story dated April 29, 2007 saying that "crude oil regularly moves between 1,440 to 2,000 psi, up from 1,000 psi for pipelines built in the 1950's" (See Exhibit 6). Operating a crude oil pipeline through South Dakota at any pressure beyond what is normally done by other oil pipeline operators in the USA will increase the level of risk to South Dakota and should be avoided for public safety reasons if nothing else. TransCanada has not told us what the Maximum Operation Pressure (MOP) will be at the lowest point of elevation between each pump station in South Dakota. There will be low elevation locations along the Keystone pipeline where the pressure on the pipeline will "exceed" the Maximum Operation Pressure. If so, then TransCanada should be required to install, as part of construction, pressure sensors devices which are tied into their computer SCADA system that monitors the project. The SDPUC and the communities crossed by this pipeline have a right to know where high pressure locations will be along the pipeline and what special construction measures, if any, will be taken to protect public safety and the environment. Other pipelines with thicker pipe wall and lower operating pressure have failed because of surges on the line caused by equipment malfunction and operator error.

Oil Leak Impacts

A report prepared by a risk management consultants (DNV), in support of TransCanada permit application confirms that the TransCanada-Keystone Pipeline will leak within five to seven years and that pinhole leaks on the pipeline that will not be detected by computer SCADA systems could result in oil leaks as large as 372,330 gallons per day that could continue to leak for 90 days before they are detected. The Draft Environmental Impact Statement does not adequately address the impact that operational oil leaks on the TrandsCanada-Keystone Pipeline will have on aquifers, the environment, and the farm communities crossed by the project. The Draft EIS and the documents presented to the PUC address oil leaks that occur during construction from equipment and small spills and they do not adequately address the impact that oil leaks

during pipeline operations will have on aquifers, the environment, and the rural communities that will be crossed by the project.

Higher Operating Pressure Means Greater Risk For South Dakota

The application that TransCanada filed with the U.S. State Department in 2006 and the South Dakota PUC in 2007 stated that the Keystone Pipeline would be operated at 72% of pipe design factor and that the pressure would range from 1,400 psi to 1,700 psi. TransCanada recently released copies of a "***Special Permit***" it has received from the Pipeline and Hazardous Materials Safety Administration (PHMSA) to operate the TransCanada-Keystone pipeline at 80% of pipe design factor, or about 11 % higher than other oil pipelines currently operating oil pipelines in the United States (See Exhibit 7). Neither the project plans presented to the PUC or the Draft EIS presented to the State Department adequately addressed this change in pressure and what the associated changes in impact to the state will be. This increase in operating pressure increases the risk of pipe line leaks and failures and increases the risk of contamination of ground water, aquifers, farm land, grass lands, wetlands, wildlife habitat and the safety risk to the people of South Dakota living along the pipeline route. This pipeline will bring a new risk of environmental contamination to a remote rural area of South Dakota where no such risk exists now and will change the social and economic aspects of the area. In addition to the impact this higher operating pressure will have on the environment, we believe that it will increase the risk of oil leaks that could cause serious damage to miles of PVC rural water pipelines that the TransCanada-Keystone would be crossing in eastern South Dakota.

Proximity To Private Homes, HCA's and USA's

Federal 49 CFR 195 requires that oil pipelines be built to protect High Consequence Areas (HCA's) and Unusually Sensitive Areas (USA's) . The regulations include specific set back requirements: We reviewed the latest version of the TransCanada-Keystone Pipeline maps available on the SDPUC website on Oct. 30, 2007 and found the following;

		Sites With Less Than The Recommended Setback
Home or Private Dwelling	50 feet	1
Buildings Must Be Vacated During Pressure Test of The Pipeline	300 feet	16
Other Buildings	660 feet	53
Carlsbad, NM Standard	800 feet	78

(the number shown at right are cumulative)

The TransCanada-Keystone Oil Pipeline will be operated at 1,440 psi to 1,700 psi (pounds per square inch) to deliver 24,822,000 gallons per day (591,000 barrels). In a news story in the *Argus Leader*, Robert Jones, VP for TransCanada was quoted as saying the operating pressure could safely be raised as high as 2,000 psi. In comparison, the 155 mile WEB water mainline built with ductile iron pipe operates at a peak pressure of 100 to 209 psi and delivers 8,000,000 gallons of

water per peak day. A 30" crude oil pipeline pressurized at even 1,440 psi is a very serious and dangerous pressure vessel. The pipeline near Carlsbad, NM that failed in August 2000 was operating at 675 psi when 12 people were killed, including small children. According to NTSB there were 227 reported pipeline failures in the U.S. in 2000 with property damages of $197 million and 16 fatalities. As reported by the National Transportation Safety Board (NSTB), a single pipeline accident…"*can injure hundreds of persons, affect thousands more, and cost millions of dollars in property damage, loss of work opportunity, community disruption, ecological damage, and insurance liability*"(7). According to the Office of Pipeline Safety (OPS) the most common cause of natural gas and liquid (oil) transmission pipeline accidents is corrosion (24%). Another less frequent category is seam weld failure on pipe, when the seam of the pipe splits open. Seam weld failure accounted for 4% to 5% of the failures and 30% of the property damage according to a 2002 OPS report. The "*Distribution Pipeline Incident Summary by Cause Report*" issued by OPS concluded that… "*Outside force damage is a catchall term that includes (1) third party excavation damage, (2) excavation damage caused by the pipeline company itself, (3) landslides, (4) fire, (5) lightning, (6) snow, (7) wind, (8) motor vehicles and (9) vandalism.*" Explosions on large natural gas pipelines can kill people hundreds of feet away. Spills from oil pipelines may extend miles away from the pipeline and often can never be fully cleaned up. (See Bemidji, MN - 1979 Crude Oil Spill, USGS)

TransCanada's Lack of Oil Pipeline Experience:

At public meetings held in Aberdeen and Britton on May 10, 2007, TransCanada officials L.A. "Buster" Gray, Chief Engineer and Nichole Aitken, Stake Holder Relations Manager admitted to a group of landowners, farmers and local officials that TransCanada doesn't own or operate any crude oil pipelines. A recent search of TransCanada's official website found no oil pipeline listed among the facilities they own and operate. Companies with years of experience, like BP (British Petroleum), Exxon and others are having pipe failures and leaks like the one that dumped 200,000 gallons of crude oil into the ground near Prudhoe Bay, Alaska on March 3, 2003 and resulted in millions of dollars in fines (See Exhibit 8). It's a bad idea for the United States, the State of South Dakota and other Midwest states to allow the construction of a 30-inch high pressure crude oil pipeline by a foreign company which has no proven track record as a company in the operation of a high pressure thin walled oil pipeline.

The TransAlaska Pipeline, which is now called Alyeska Pipeline has had a history of oil leaks each of the 30 years that's been in operation from 1977 to 2007 (See Exhibit 9) http://www.alyeska-pipe.com/Pipelinefacts/PipelineOperations.html. The Draft Environmental Impact Statement does not adequately address the impact that high operating pressure will have on the environment and social impact it will have on the aquifers, the environment, the rural water pipeline systems, the communities and the states crossed by the TransCanada-Keystone Pipeline.

Groundwater & Aquifer Protection

The aquifers in eastern South Dakota that would be crossed by the TransCanada pipeline are protected by federal and state laws against contamination and pollution under the Clean Water Act, Source Water Protection and PHMSA regulations and requirements that apply to pipelines moving oil and hazardous liquids. There is no way that TransCanada can "prove" or guarantee South Dakota that the pipeline won't leak as required under SDCL. There are documented cases that prove that oil pipelines of this kind will fail and leak. Oil pipeline failure statistics gathered by the PHMSA confirm that oil pipes fail and leak (See Exhibit 10. The thousands of farms, rural homes, 8 rural water systems, and hundreds of towns that rely on aquifers as a their sole source of drinking water supply have a right to be protected under state and federal law. If the PUC and their staff grant the permit and allow the project to proceed as planned they will be approving the construction of a public nuisance. There is a real and immediate risk and danger that the Keystone Pipeline Project could fail within 7 to 12 years and dump toxic tar sands crude oil into the soil and into the environment. With welded pipe joints at every 40 feet resulting in 132 welded joints per mile, there could be a total of 29,040 welded joints or more across South Dakota, each one a potential risk of oil leakage and pollution that wasn't there before Keystone came. There is a great risk that the pipe could fail during the life of the pipeline which would violate state and federal environmental laws. The oil, which will be warmed to 70 to 80 degrees, will pollute and contaminate shallow ground water and aquifers in eastern South Dakota, including those in Marshall, Day, and Clark Counties as well as other counties crossed through South Dakota. The Alyeska Pipeline has failed and leaked every year that it's been in operation. TransCanada has no history or track record operating high pressure oil pipelines as a company. What makes TransCanada think that they will have a better track record than British Petroleum (BP), Exxon, or other companies that have been in the oil pipeline business for years? Hydraulic testing of the pipeline with water once construction is completed will not eliminate leaks occurring after the pipeline is placed in operation. On the Northern Border Pipeline, which TransCanada is a partner on, there were more than 40 leaks on 31 miles of pipeline in Brown County alone according to statements made by the project foreman to landowners whose land was crossed by the pipeline.

Clean Water Act: There is a real and immediate risk and danger that if constructed as proposed, the Keystone Pipeline Project will leak and contaminate soil, water, wetlands, creeks and streams, and pollute air quality which would be a violation of the Clean Water Act and various state laws, permit requirements and regulations. The "*Frequency Volume Study"* completed by DNV Risk Management Consultants states on page 19 of the report that a pin hole leak smaller than 1.5% of pipe volume in remote areas of the pipeline could release oil into the soil and the environment for as long as 90 days before being detected. At 591,000 barrels of oil volume per day, 1.5% would amount to 372,330 gallons of per day and or 33,509,700 million gallons over a 90-day period. Certainly more than enough oil to contaminate any aquifer, wetland, creek or stream including the James River and Missouri River which will be crossed. It will cause serious damage

to shallow aquifers found in Marshall, Day and Clark Counties and other parts of the state. As proposed, the Keystone Pipeline Project route will cross one of the few sources of quality water and quantity in northeast South Dakota. The sandy soils in eastern Marshall, Day, Clark and Beadle Counties are recharged by snow melt and spring runoff from the Coteau Hills formation. According to a detailed report completed by the South Dakota Geological Survey, the aquifer ranges from 8 to 50 feet from the soil surface and offers a reliable water supply, even during extended dry conditions such as during the Great Depression. At times, the water in the aquifer comes to the surface in the form of springs. Incredibly, this is the location TransCanada has selected as the proposed route for the Keystone Pipeline.

According to USGS elevation maps, the land surface elevation between the Couteau Hills and the Keystone Pipeline route in Marshall and Day Counties drops off 450 feet in elevation. From the pipeline route the land elevation drops even further as the creeks and streams drain to the James River and a man made drainage canal (Crow Creek Drain) moves water through the area. The route selected will shallow aquifers which are used by rural residents, towns and rural water systems as their primary source of drinking water. (See Exhibit 11) TransCanada-Keystone Pipeline will be operated at 1,440 to 1,700 psi. At that pressure, there is a high risk if a crude oil leak or spill occurs that irreversible damage will be done to productive farm land and aquifers in eastern South Dakota. The carbon in the oil may move only a short distance from the location of the leak, but the chemicals in the crude oil, such as Ethylenzen, Xylene, Benzene, Toluene, and Hydrogen Sulfide are water soluble and will quickly move with the water and contaminate large areas of the aquifer.

The runoff from snow melt and spring and summer rains from the Coteau Hills in Marshall, and Clark Counties recharge the aquifers. Because of the elevation change, the runoff will "move" the crude oil spill and chemicals through the aquifer and down the natural drainages to the James River. The Brown-Day-Marshall (BDM) Rural Water System relies on the James Aquifer as its primary source of water. Five of the eight rural water systems that will be crossed by the project currently rely on groundwater aquifers. WEB has been exploring the development of wells in the aquifers located near Mansfield and Andover, SD to help meet the growing water needs of our service area.

The South Dakota Association of Rural Water Systems (SDARWS) has approved a draft resolution regarding the TransCanada-Keystone Pipeline, which will be finalized in early December and presented to the SDPUC as an addendum to this testimony. Once groundwater is contaminated by an oil spill it will never be the same again. The rural water systems and residents of South Dakota who rely on ground water aquifers for their supply have every right to expect that their water supply will be protected by the state and federal government.

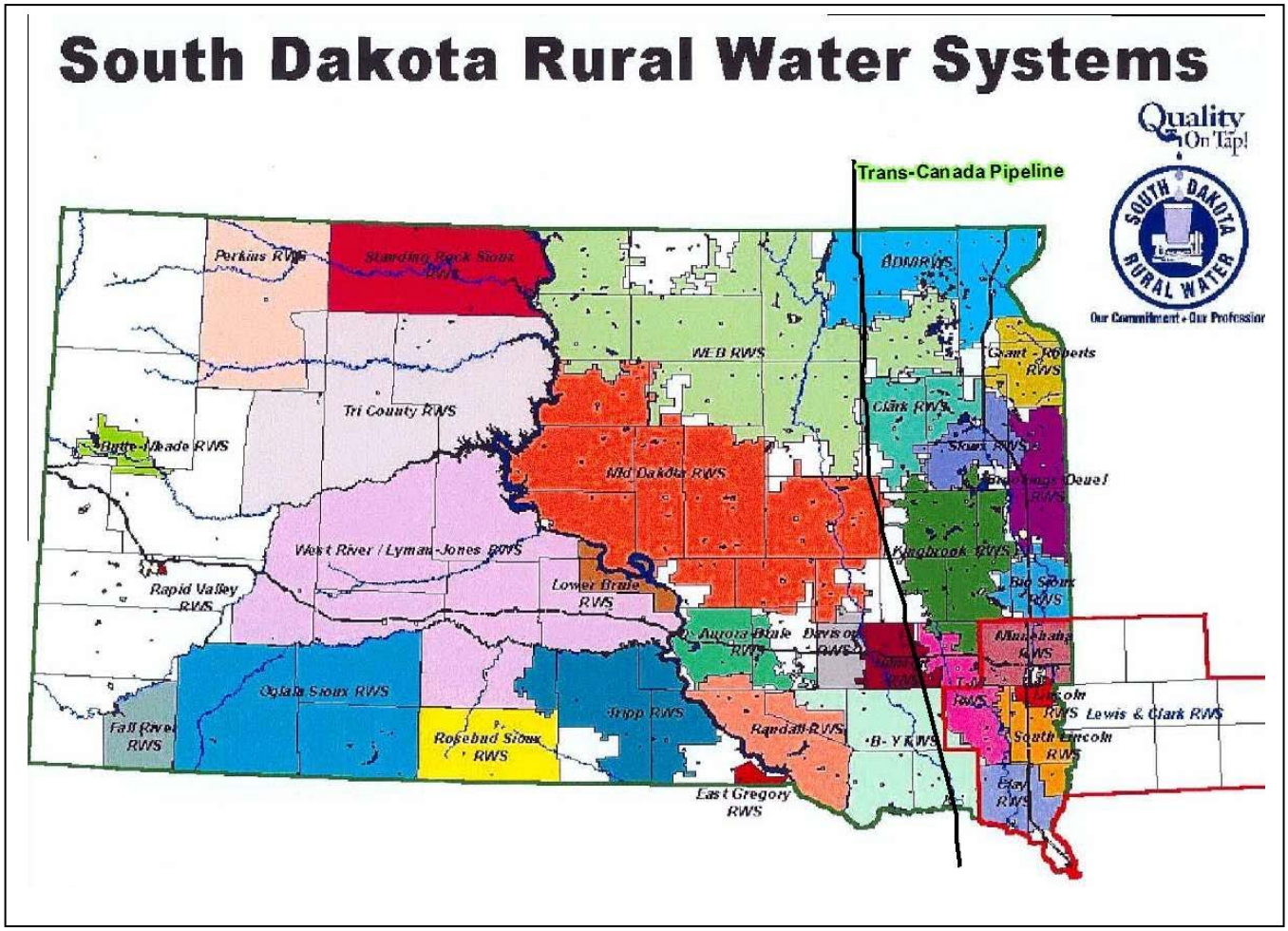
(3) The facility will not substantially impair the health, safety or welfare of the inhabitants

Native Grass & Protected Species: As currently proposed, the TransCanada-Keystone Oil Pipeline poses a threat of serious injury to the inhabitants, the environment, and the social and economic condition of inhabitants in the siting area; TransCanada-Keystone Pipeline has the potential of causing irreversible long term damage to native grass lands in every county crossed. Farm crop lands, wetlands, wildlife and the environment of the rural area crossed in eastern South Dakota will be forever changed. The construction and operation of the Keystone Pipeline will impact virgin native "Buffalo" grass which has been protected and conserved by landowners and their families since statehood and which if disturbed can never be replaced. The native grass provides an important source of feed for livestock during extended drought conditions. The Keystone Pipeline will impact species found in Marshall, Day, Clark and Beadle Counties, including the "*Dakota Skipper*" and the "*Western Prairie Fringed Orchid*" which are both on the federal endangered species list.

Rural Water Systems: The permit application filed with the U.S. State Department by TransCanada failed to acknowledge that the proposed oil pipeline would cross miles of rural water pipeline operated by eight (8) rural water systems in South Dakota. The permit application filed with the federal government by TransCanada in 2006 failed to identify the risk that could result in the event that a crude-oil spill came in contact with buried PVC water pipelines.

A study by Iowa State University, commissioned by the American Water Works Association (AWWA), confirmed that petroleum and crude-oil products can permeate through the rubber gasket of PVC water pipes, contaminating the drinking water being delivered to customers by municipal and rural water systems. How much PVC water pipeline will need to be replaced in the event of a large oil "spill" is not known at this time, nor is it known if TransCanada would be held responsible for the cost of replacement.

In their prefiled testimony, TransCanada questions whether tar sands oil will damage PVC water lines. WEB challenges TransCanada to deliver a 42 gallon barrel of tar sands oil to Iowa State University and the Water Resource Lab at SDSU so that independent tests can be run in t he light of day. We are not going to take the word of a witness who owes his/ her career and future to TransCanada.



The TransCanada Oil Pipeline route will cross eight rural water pipeline systems in South Dakota.

Rural Water Concerns: .

If the TransCanada-Keystone pipeline fails at or near the point where the crude oil pipeline crosses WEB's 12" PVC water mainline a crude-oil spill could damage the rubber pipe joint gaskets, permeate through the pipe wall, and contaminate the drinking water service of 1,029 rural hookups and 8 towns. If the SDPUC issues a permit it should include a condition that TransCanada be required to secure a permit from every rural water system and municipal water system crossed, which includes insurance coverage naming water system as an "additional insured" and a cash bond be deposited in a South Dakota bank to cover the impacts of any future oil "spills" or leaks during the operating life of the pipeline. .

The Draft EIS does not adequately address the protection provided under Title 49 CRF Part 95 to rural water systems and their aquifer water sources. The Draft EIS fails to address how the eight rural water pipeline systems crossed by the TransCanada Keystone pipeline (BDM Rural Water System, WEB Rural Water System, Clark Rural Water System, King-Brook Rural Water System, Mid-Dakota Rural Water System, Hanson Rural Water System, Turner-McCook Rural Water

System and BonHomme-Yankton Rural Water System) will be protected and/or mitigated as required by federal law and Title 49 CRF Part 95.

Missouri River Crossing: The TransCanada-Keystone Oil Pipeline will cross the Missouri River near Yankton, South Dakota, upstream of a section of river which is the only portion of the Missouri River in South Dakota that remains in a natural scenic condition. The area is managed by the National Park Service and will require a permit from the U.S. Secretary of Interior. Constructing an oil pipe crossing under the Missouri River east of Yankton would be a major project and a major environmental concern. It would place the oil pipeline 22 miles upstream of Vermillion which is the location of the Lewis & Clark Regional Water System intake wells. The only thing standing between the Lewis and Clark wells along the Missouri River and the water soluble chemicals found in tar sands oil is river sand which will not block or filter out Ethylene, Xylene, Benzene, Toluene, and Hydrogen Sulfide. The Missouri River is a source of water for over half the population of South Dakota, including the City of Sioux Falls, once the Lewis & Clark water system is completed.

Oil Sands Makeup: TransCanada has refused to release the exact composition of the crude oil they plan to transport across North Dakota and South Dakota claiming it is "proprietary information". Below is a summary of information taken from the Canadian Center for Occupational Health & Safety (http://www.ccohs.ca). Among the many substances in crude-oil are chemicals such as benzene, toluene, ethyl benzene, xylene and other lightweight chemical compounds. These compounds are more water soluble and can disperse further and more rapidly in both surface and ground waters than other crude oil substances. These compounds pose a significant threat to water quality. For example, one teaspoon of benzene (0.005 ppm) can contaminate 260,660 gallons of water. The US-EPA enforceable water quality standard for drinking water allows no more that 0.005 ppm concentration of benzene in both surface water and groundwater. Benzene exposure can cause anemia or a decrease in blood platelets and may result in an increased risk of cancer. Toluene in excess of EPA standards can cause problems with the nervous system, kidneys and liver. Ethylbenzene can cause problems with the liver and kidneys. Xylene can cause damage to the nervous system.

An "*Oil Spill Frequency Volume Study* " filed by TransCanada in 2006 acknowledged that oil spills do occur on oil pipelines. Release of crude oil can occur during transport through a pipeline and pose a significant risk of soil and water contamination surrounding the area of the spill. The Trans-Canada Study estimated that a 1,000 barrel (42,000 gallons) oil spill may occur anywhere along the TransCanada Keystone Pipeline once in 12 years; a 10,000 barrels (420,000 gallons) oil spill may occur once in 39 years; and a spill of more than 10,000 barrels might occur once in 50 years *(TC Pipeline Risk Assessment, pg 3-2).* The projections are theoretical based on historical data of pipeline operation. The extent of environmental damage would depend on the location and quantity of the oil spill, the type of soil and water resources in the area of the spill, and the topography of the land area. In a study independent of the oil industry, the United States

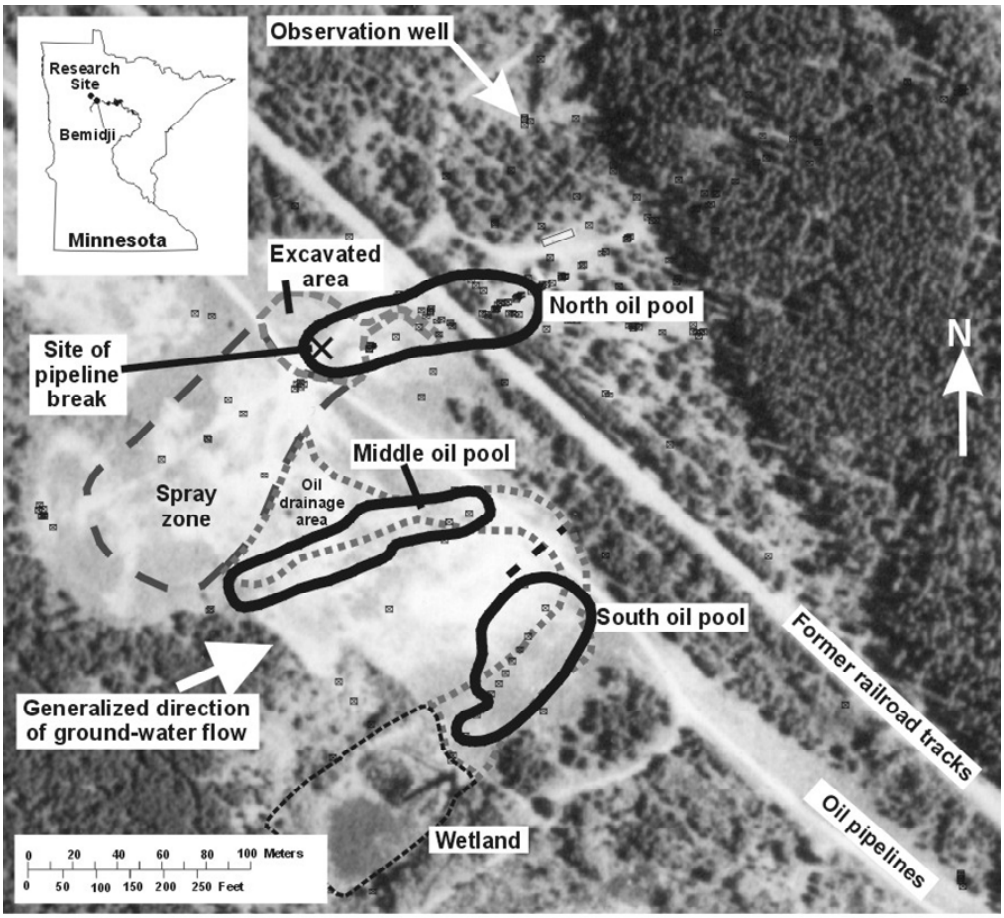
Geological Survey (USGS) estimated that an average of 83 crude-oil spills occurred in the United States during the three year period of 1994-1996, with each spilling about 50,000 barrels (2,100,000 gallons) of crude-oil. The British Petroleum (BP) pipeline failure and spill on March 3, 2003 at Prudhoe Bay, Alaska dumped 200,000 gallons of crude oil. BP is recognized as having years of oil pipeline operations experience, and they had a major pipe failure and oil spill. TransCanada doesn't even own or operate a crude oil pipeline and has no experience or track record operating a high pressure crude oil pipeline.

Oil Spill -Impact On Soils: According to the information filed by TransCanada with the U.S. State Department, the clean-up of a 84,000 gallon oil spill (2,000 barrels) from the TransCanada pipeline spill could require the removal of up to the equivalent land area of 3 feet in depth over 400 acres or about 2,001,277 cubic yards of soil *(Pipeline Risk Assessment, pg 4-4).*

The crude oil is extracted from Alberta oil sands, called "bitumen", is described as "black and thick oil". Crude-oil released into soils will disperse both vertically and horizontally. Much of the land area being crossed by the pipeline in under-laid with large quantities of sand, gravel and sandy soil.

Sandy soils found throughout much of the TransCanada-Keystone Pipeline route would accommodate the dispersion of crude-oil. Soil moisture and run off due to snow melt and spring rains could also increase the dispersion of a crude-oil spill. TransCanada's application states that clean-up of soil contaminated by crude oil can require significant time, effort and cost. Required remedial actions may range from excavation and removal of contaminated soil to allow the contaminated soil to

recover through natural environmental fate process (evaporation, biodegradation, etc). State and federal programs mandate notification and initiation of response actions "*in a timeframe and on a scale commensurate with the threats posed*" whatever that means *(TransCanada Construction Mitigation & Reclamation Plan, 2-50).* What about the loss of crop production, property values and future earnings to farmers as a result of contamination by an oil spill? A crude oil pipeline leak near Bemidji, MN in 1979 was never fully cleaned up and soils remain sterile 28 years later.



Approximate extent of oil, August 1998 modified from Lakehead Pipe Line Co., written commun., 1998

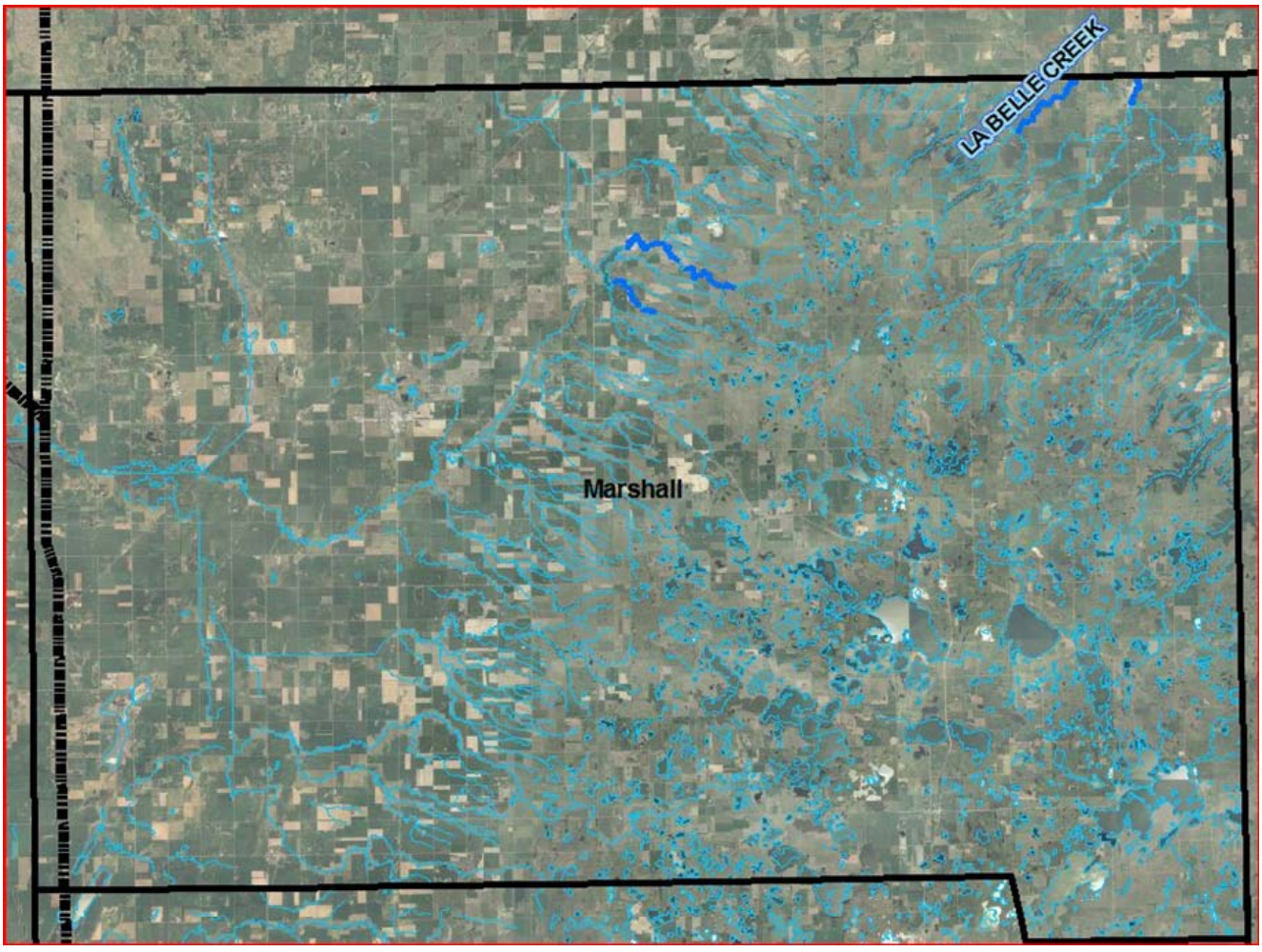
Features of the Bemidji, Minnesota crude-oil spill research site superimposed on a 1991 aerial photograph.

Risk Of Large Crude Oil Spill: The TransCanada-Keystone Oil Pipeline plan calls for a wide separation between mainline automated valves and manual valves. For example, the distance between the pump station at the North Dakota-South Dakota state line and the next pumping station near Ferney, SD is about 42 miles of 30 inch pipe which would hold about 156,660,000 gallons of crude-oil (3,728,571 barrels).

The distance between the Fernery pump station and the next pump station near Carpenter, SD is about 47 miles of 30 inch pipe which would hold about 175,312,000 gallons of crude oil (4,174,000 barrels). In addition to the 4 automated valves at

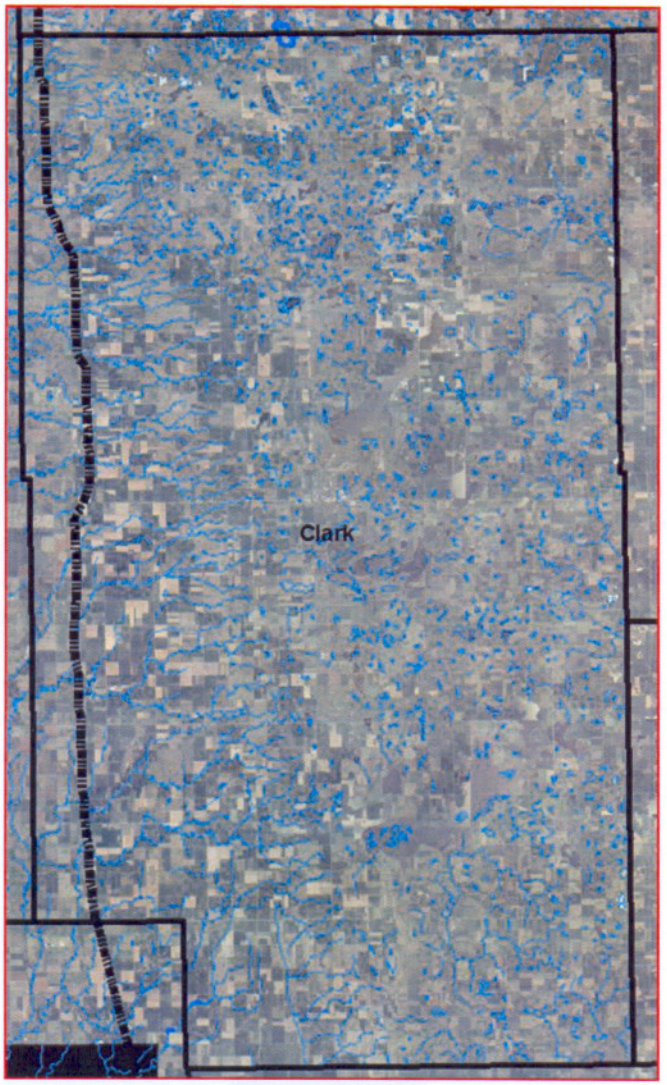
compressor pump stations, the TransCanada-Keystone Pipeline will have 7 to 10 manually operated valves on the 220 miles of pipeline in South Dakota, with some valves being 20 to 30 miles apart.

In the event of a major pipe failure, there may not be time to reach manual valves to stop the crude-oil from draining out of the pipeline and on to productive farm land or wetlands. Manually operated valves won't do much good if the TransCanada operations staff and contractors are hundreds of miles away in Alberta or Omaha. A pipe failure at a low elevation point on either the 42 mile reach between North Dakota and Ferney, SD or the 47 mile reach between Ferney and Carpenter, SD could result in a spill of millions of gallons of crude oil. In line check valves are being provided on either side of the Missouri River near Yankton to protect the river. Similar check valves will be needed in other areas of the pipeline route where elevation changes are great. By way of comparison, the 155 mile WEB water mainline has 31 manual isolation valves, with each valve located every 5 miles, and six pump stations and control points which are monitored and operated by a computerized SCADA system and operations staff dispatched out of Aberdeen, South Dakota. At a May 10, 2007 meeting a TransCanada official stated that their operational staff will be located in Omaha, NE and the SCADA control center will be located in Canada, hundreds of miles from South Dakota.



The black line at the left side of the map is the approximate route of the TransCanada pipeline as it crosses streams and drainages in Day County, all of which contribute to the recharge of the aquifer and drain to the James River.

If the TransCanada Keystone Pipeline fails and leaks the water from the drainage will carry the pollutants into the aquifer and to the James River.



The U.S. Office of Pipeline Safety requires that TransCanada-Keystone prepare and file an Emergency Response Plan (ERP). The TransCanada permit application filed with the U.S. State Department states last year stated that an Emergency Response Plan will be filed as a "supplemental" to the permit application. No plan has been made available as of Sept. 21, 2007. The Emergency Response Plan, which is required by law, should be filed with state and local government, fire departments, utilities and local emergency responders for review, comment and approval BEFORE consideration is given to any permits by the SD Public Utilities Commission or the U.S. State Department. The rural area where TransCanada is proposing to construct their oil pipeline has only volunteer fire departments without the equipment, training and man power to contain an oil leak or fight an oil fire like the one shown at the right.

Computer Monitoring Systems

TransCanada-Keystone says they will use two technology-based leak detection systems, which will include leak detection software SCADA (Supervisory Control and Data Acquisition) monitoring and volumetric balancing. Sensors and monitoring equipment will be located at pump stations and the data collected will be transmitted by satellite to the central control center in Canada (*TransCanada Construction & Reclamation Plan, 2-48).* The SCADA systems that TransCanada will be using will help monitor and operate the crude-oil pipeline and may help detect problems by sensing changes in pressure and flow rate. However, at the point the SCADA system senses a change in pressure or flow and shuts the automated valves off at the pump station, a major release or spill may have already occurred on the pipeline miles away from the pump station. Based on NTSB's reports on oil and gas line failures, and WEB's own experience, computer SCADA systems may detect major changes in pressure and flow but they don't necessarily detect small leaks that develop on pipelines, which over time can develop into a major leak or spill and contaminate soil and ground water for days, weeks or months before the leak is found. That is exactly what happened on March 3, 2005 with the BP crude oil pipeline failure at Prudhoe Bay, Alaska. This kind of leak causes more of a problem when the pipe is located in a remote isolated rural area. Because of the potentially severe consequences of a crude-oil spill, prevention is critically important and successful prevention requires regular testing of the pipeline's integrity, including internal corrosion. Internal inline inspection devices, known as "smart pig" may detect some defects in the pipe as they travel through the pipeline being moved by oil flow and pressure. It is not enough to cite oil industry construction standards and record keeping required by OPS. The Draft EIS should specifically address the impacts that tar sands crude oil will have on the environment and the health and safety of the residents who live along the pipeline and whose lives may come in contact with it.

Ground Water Aquifers

The groundwater aquifers in the path of the proposed pipeline route meet the test of HCA's (High Consequent Areas)" and USAs (Unusual Sensitive Areas) under Title 49 CRF Part 195. Section 195.6 speaks to the issue of groundwater and surface water sources, public water systems, and well head protection areas as sensitive areas. Under federal law, these aquifer resources must receive additional protection from high pressure oil pipelines like the TransCanada-Keystone Pipeline. As currently proposed, the TransCanada-Keystone Pipeline will cross numerous shallow aquifers which are the primary source of drinking water for rural homes, farms and towns in eastern South Dakota, including five of the eight rural water systems being crossed by the TransCanada-Keystone Pipeline. The aquifers have been identified by studies completed by the South Dakota Geological Survey and the USGS. Enclosed are maps and reports completed in Marshall County and Clark County, which are representative of studies completed in other South Dakota Counties. TransCanada made no mention of these water systems in their permit application. Very little mention was made in the Draft Environmental Impact Statement. TransCanada-Keystone Pipeline will be operated at a high operating pressure that could

result in an increased number of oil leaks and will increase the risk of oil leaks that could cause serious damage to underground aquifers that would be crossed by the TransCanada-Keystone Pipeline in eastern South Dakota.

The Draft Environmental Impact Statement fails to address how groundwater aquifers in eastern South Dakota will be impacted by the construction and long term operation on the TransCanada-Keystone Pipeline. The Draft EIS must address how these underground water supplies are to be protected as required under federal law, including Title 49 CRF Part 95, et al, the Clean Water Act and other federal laws. TransCanada claims that shipping oil by pipe is safer than shipping the same oil by truck which is not true. The risk of an oil spill with a tanker truck is limited to volume of the tanker. Unlike the Keystone pipeline, an oil tanker is not under pressure. It would take 47 tankers trucks each pulling 8,000 gallons to equal just one day's oil leak of 372,000 gallons estimated in the DNV Frequency Volume Study. If the pipe leak went 90 days undetected as was estimated, the pill would equal 4,208 tanker trucks of 8,000 gallon each. An oil leak incident does far more damage than a tanker truck because the pipeline has an endless supply of oil.

The permit application information and testimony presented by TransCanada in support of the permit does not adequately address and compare the environmental and social impacts of the proposed route to various alternate routes, including the I-29 Corridor Alternate Route and the western route proposed by North Dakota. Further consideration should be given to the alternate routes in the Final Environmental Impact Statement. By failing to seriously consider this and other alternatives, TransCanada is in violation of federal law. An oil leak along I-29 would be observed and reported sooner than if the same leak were to develop along the remote area between Britton and Yankton, SD. The fire and emergency response teams would be able to access the area much easier from I-29 than from the gravel and dirt section line roads the pipeline would cross in Marshall, Day and Clark County and the rural area between Britton and Yankton.

The Pipeline Safety Improvement Act of 2002, which was signed into law on December 17, 2002, and codified at 49 U.S.C. 60109, provides protections and safe guards for communities crossed by gas and oil pipelines. As a primary source of drinking water for eastern South Dakota, rural water pipeline systems meet the test of being "Highly Consequent Areas" (HCA's) and Unusually Sensitive Areas (USA's) under Title 49 CRF Part 195. Section 195.6 speaks to the issue of groundwater and surface water sources, public water systems, and well head protection areas as sensitive areas. Under federal law, these rural water pipeline systems and their water sources must receive a higher level of protection from a high pressure oil pipeline like the TransCanada-Keystone Pipeline. Eight rural water pipeline systems will be crossed by the TransCanada-Keystone Pipeline in eastern South Dakota, including the WEB water systems. Of the eight rural water systems, five rely on ground water aquifer as their sole source of water. TransCanada-Keystone made no mention of these rural water systems in their application filed with DOS and the SDPUC. WEB raised the issue in written testimony we presented to the Department of State in the fall of 2006. We provided DOS with a map of South Dakota showing the

relationship of the TransCanada-Keystone Pipeline to the location of rural water pipeline systems.

Groundwater Aquifers: The TransCanada-Keystone Pipeline will cross numerous aquifers in South Dakota, including the Oakes, Bramton, Tulare, Vermillion, Altamont, Floyd, and Lower James-Missouri aquifers. The depth to water in the Oakes Aquifer along the route of the pipeline in Marshall County is 10-15 feet in depth. The depth to the upper layer of water of the Altamont Aquifer near Raymond in Clark County varies from 10-35 feet. The same is true for ground water in the Carpenter area of Clark County. Near-surface groundwater occurs at various locations where the pipeline crosses small streams in northwestern Day County *(TransCanada Construction Mitigation & Reclamation Plan, pg 3.5-35)*. Much of the ground water in northwest and western Day County is within 4 feet of the surface according to the *Day County Soils Survey* completed by USDA-NRCS.

MP-257
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The Coteau Hills, in the center of the photo above, snow melt and runoff from spring and summer rain recharge the aquifers in western Marshall, Day, and Clark Counties. The sandy soils at the base of the hills filter and retain the water as it recharges the shallow aquifer below. The potential for groundwater contamination is greater where the water table is relatively close to the surface, and where the soils overlying the aquifer are porous materials. Depending on the type of pipe failure, the volume of the spill, the depth of the groundwater and the soil conditions in the area, a crude oil spill could continue to move and contaminate an aquifer in a very short time. Crude-oil moving through gravel or sandy soils could reach and damage PVC water pipelines used by municipal water systems and rural water systems to deliver drinking water to towns, farms, rural homes, livestock hookups, ethanol plants and other customers. Five of the eight rural water systems crossed by TransCanada currently rely on groundwater wells (See Exhibit 12).

DNV Risk Management consultants say that the thin walled 30-inch high-pressured 1,700 psi oil pipeline will fail within the first 5 to 7 years. When that happens, TransCanada wants the oil leak in some remote back road area and not along a well-traveled highway like I-29. Small town local volunteer fire departments like Britton, Langford, Carpenter, Iroquois, Freeman, and Alexandria aren't equipped or trained to contain oil spills or fight crude oil fires where the fumes can cause cancer and damage to the lungs and vital organs. The DNV Report title "*Frequency Volume Study*" states that 53% of the leaks on the Keystone Pipeline will be from pinhole leaks that cannot be detected by the computer SCADA systems TransCanada will use to monitor and operate the system (See WEB Attachment # 4). The DNV report estimates that leaks smaller than 1.5% of the pipe volume flow will go undetected. At 591,000 barrels per day a 1.5% volume leak undetected could result in a leak of 8,864 barrels per day or the equivalent of 372,330 gallons per day. In prefiled testimony a TransCanada witness raised the unaccounted for pipe volume to 2% which at 591,000 barrels per day would amount to 496,440 gallons per day. The DNV report also states that oil lost to pin holes leaks could go undetected for as long as 90 days which could result in an oil leak totaling 33 million gallons to 44.7 million gallons. An oil leak of that size and magnitude could pollute and ruin an entire aquifer and rural community resulting in millions of dollars of damages.

Oil spill at Coffeyville, Kansas on July 2, 2007

Oil leak at Burnaby, BC on July 24, 2007

(4) The facility will not substantially interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

As currently proposed, the TransCanada-Keystone pipeline will restrict and limit development of WEB and other rural water systems by a new threat of risk over available ground water supplies. No serious consideration was given to alternative routes, including the I-29 Corridor Alternative Route which would offer less long term risk and environmental damage to South Dakota. The I-29 route would offer better access for construction, inspection, operations and emergency response. The larger towns along I-29, such as Watertown, Brookings and Sioux Falls, have full time fully equipped professional fire

departments and emergency responders, with the equipment and staff to handle oil pipeline emergencies. The small communities along the proposed route do not. The people of South Dakota and the communities to be crossed by the pipeline were never included in the process for selecting a route. North Dakota government officials have asked that a route through western North Dakota be considered to allow crude oil in that part of the state to use the Keystone Pipeline to ship their product to market. The I-29 route and the western route proposed by North Dakota officials should be considered in the DEIS process. The TransCanada-Keystone Pipeline route, as currently proposed and routed, would unduly interfere with and restrict economic development in the counties that would be crossed. Aquifer ground water that is relied on by the community for livestock development, irrigation, housing development, industry, value added development and new home construction could be seriously impacted. Landowners who would have an oil pipeline through the center of their property or going at odd angles would not have the full use of their property. New farming practices have such as "no till" have increased production. Innovate uses of the land, such as fish farming, rice production, organic farming and wind farms are all possible for the landowner to explore. The Keystone Pipeline would limit and restrict that development. The I-29 Alternative Route, which would place the oil pipeline in state owned road right-of-way would have less impact on land use and communities and less impact on orderly development.

Taxes: TransCanada claims that they will pay $6.4 million in annual tax on the pipeline the first year it is built and sales and excise tax from the construction. County governments have been told they will benefit. A Britton School official was quoted in the Britton Journal as saying their school district would get very little of the taxes paid by Keystone. TransCanada has printed ads in papers and mailed out letters bragging about the taxes South Dakota will get if the oil pipeline is built.

Then a news story in the American News dated Sept. 28, 2007 written by Bob Mercer quotes TransCanada's Vice President Robert Jones as saying that $13 million of the $18 million in sales and excise tax (75%) will be waived by the State. (See Exhibit 13).

So, TransCanada will REALLY ONLY PAY $4.5 million (25%) of the sales and excise tax they owe. If a farmer builds a shop, or a business adds on to their business, or a home owner hires a contractor to shingle the roof, they all pay their share of South Dakota's sales and excise tax. But private oil company from Canada gets 75% break. WHY? There is no reason for South Dakota to give TransCanada a tax break, they were coming anyway. The SDPUC and the Legislature should ask the Revenue Department and the Auditor General to look into that.

Dated this 31st day of October, 2007

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Curt Hohn

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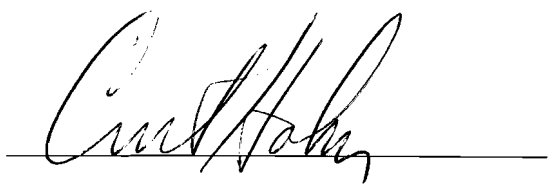
Dated this **31st** day of **October, 2007**



Curt Hohn

Douglas, Tina (PUC)

From: Curt Hohn [chohn@webwater.org]

Sent: Wednesday, October 31, 2007 5:02 PM

To: PUC Docket Filings; koenecke@magt.com; rrasmussen@sbslaw.net; Curt Hohn

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Subject: RE: Existing Docket Filing

FROM: Curt Hohn, WEB Water Development

Docket Number: HP07-001

Expert Witnesses:

This is to inform all parties that WEB Water Development, Inc., plans to call the following witnesses to support our testimony which as been filed in Docket # HP07-001 and to review , discuss and rebute testimony presented by TransCanada and other witnesses. I will be sending a more complete list of resumes, email, etc., with in the next few days.

Perry Rahn, Phd, PE — geology and ground water aquifers and the impacts of oil and petroleum spills
Rapid City, SD

Arden Davis, Phd, PE — professor at SD School of Mines with expertise in ground water aquifers: gasoline, oil and benzene contamination in ground water.
Rapid City, SD

Robert W. Coppock, DVM, Phd — Toxicology Expert Witness and Agriculture Expert Witness
Vegreville, Alberta

Ed Miller — retired Exxon employee, statistics analysis
Salem, SD

Joe Nease, PE
Kevin Meader, PE
Black & Veatch Engineers
Denver, CO

engineering, oil and gas pipeline design and construction

September 11, 2007

VITA

Perry H. Rahn, PhD, PE
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Education

B.A., (Geology) Lafayette College, 1959
B.S., (Civil Engineering) Lafayette College, 1959
Ph.D., (Geology) Pennsylvania State University, 1965

Professional Organizations and Honors

1. Fellow, Geological Society of America (Engr. Geol. Div.), 1965 to present.
2. Member, Association of Engineering Geologists, 1965 to present.
3. Member, American Institute of Professional Geologists, 1977 to present (Cert. Prof. Geol. Sci. #3724).
4 Member, South Dakota Academy of Science, 1969 to present.
5. Member, National Society of Professional Engineers, 1980 to present (President, Black Hills Chapter, 1993). [Registered Professional Engineer, #SD 4513]
6. Recipient of Assoc. Engr. Geologists "Claire P. Holdredge Award" for book "Engineering Geology, an Environmental Approach", 1987.
7. Member, Restoration Advisory Board, Ellsworth AFB Superfund Site, 1990-present.
8. Recipient of Eng. Geol. Div., Geol. Soc. Am. "E.B. Burwell, Jr." award for book "Engineering Geology, an Environmental Approach", 1990.
9. "Engineer of the Year" by Black Hills Chapter of S.D. Engr. Soc., 1995.
10. Editorial Board for "Engineering Geology" (% Elsevier Publ. Co., Netherlands), 1995 to present.
11. "Drinking Water Protection" committee, City of Rapid City, 2000 to present.
12. Richard H. Jahns Lecturer, Eng. Geol. Div., Geological Society of America and Association of Engineering Geologists, 2002.
13. Distinguished Practice Award, Association of Engineering Geologists, 2003.

Work Experience

1. Engineering Geologist, Calif. Dept. of Water Resources, Oroville, CA, 1959-61.
2. Assistant Professor, University of Connecticut, Storrs, CT, 1965-68
3. Assistant Professor, S.D. School of Mines and Tech., Rapid City, SD, 1968-70
4. Associate Professor, S.D. School of Mines and Tech., 1970-79

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5. Professor, S.D. School of Mines and Tech., 1979-1997.
6. Professor Emeritus, S.D. School of Mines and Tech., 1997-present.
7. Visiting Scientist, Division of Environmental Impact Studies, Argonne National Laboratory, Argonne, Illinois, 1977-78 (15 months)
8. Hydrologist, U.S. Geological Survey, Phoenix, AZ, Summer 1963
9. Visiting Professor, Pennsylvania State University Geology Field Camp, Red Lodge, Montana, Summer 1965
10. Glacial Geologist, Conn. Geological Survey, Middletown, CT, Summer 1967
11. Hydrogeologist, S.D. Geological Survey, Vermillion, SD, Summers 1968-72
12. Geomorphologist, S.D. Remote Sensing Institute, Summers 1973-74
13. Hydrogeologist, S.D. School of Mines & Technology research projects, Summers 1975, 1976, 1979, 1980, 1981, 1984-1993
13. Visiting Professor, Bucknell U., Lewisburg, PA., Spring Semester, 1989
14. Director, Black Hills Nat. Science Field Station, 1995 to 1999.

Publications

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October 11, 2007

Elizabeth Orlando
NEPA Coordinator, Keystone EIS Project Manager
US Department of State
OES/ENV Room 2657A
Washington, DC 20520

Re: Draft Programmatic Agreement comments

Dear Ms. Orlando:

The Standing Rock Tribal Historic Preservation Office has several concerns regarding the second draft of the Programmatic Agreement for the TransCanada Keystone Pipeline Project. The agreement does not include adequate provisions for notification and consultation with Indian tribes as surveys are completed and construction begins. The timeline embedded in the Draft PA does not allow for the sufficient consultation and incorporation of tribal concerns necessary to comply with Section 106 of the NHPA. Our specific concerns with the Draft PA stipulations are as follows:

Whereas clauses:

- "WHEREAS, in accordance with 36 CFR §§ 800.4(b)(2) and 800.5(a)(3), the DOS has elected to phase identification and evaluation of historic properties and the application of the criteria of adverse effect, …." This clause reaches the heart of Standing Rock's concern with this entire process. If identification and evaluation are phased, then tribal participation and review becomes impossible. Tribal input must be made a priority in this process if DOS intends to comply with Section 106 of NHPA, as amended.
- "WHEREAS, pursuant to 36 CFR § 800.14(b), the DOS has elected to execute a Programmatic Agreement (PA) because effects on historic properties cannot be fully determined prior to the approval of the Keystone Project…" Standing Rock argues that effects can and must be determined before approval is issued. Though it will require a good deal of effort from all parties, such survey and evaluation with tribal input must be taken into consideration before DOS issues any kind of decision.
- The list of tribes invited to consult should include all tribes invited, contrary to the comments suggesting otherwise. Whether or not they respond to correspondence

from DOS regarding Section 106 is irrelevant. All should be notified of human remains found in the corridor because all have a cultural tie to the area.

- "WHEREAS, the Applicant has participated in consultation, maintains a major responsibility to implement the terms of this agreement and, therefore, has been invited to sign this agreement…" The Applicant's role in this process is to follow the stipulations set forth by the DOS, not to aid in establishing them. To allow the Applicant such influence undermines the integrity of the entire consultation process.

Stipulations:

- I – Standards, D – This stipulation explains the development of Unanticipated Discovery Plans for each state. Though apparently the concerns of Indian tribes have already been incorporated, these plans have already been approved by the respective SHPO. This approval indicates that these plans are finalized and no further comment will be accepted. The Standing Rock THPO has concerns regarding these plans, as can be seen below, which we would like incorporated into the final draft of the PA and the Unanticipated Discovery Plans. This stipulation also indicates that the Unanticipated Discovery Plans were developed in accordance with applicable state laws and NAGPRA. Because recent events indicate that NAGPRA may soon be changed, we'd like clarification on what will happen to this PA and the Unanticipated Discovery Plans should that change occur.
- II – Standards, F – "The scope of this agreement is confined to the Area of Potential Effects (APE of this Project)…" This stipulation ignores the possible existence of Traditional Cultural Properties or areas of religious and cultural significance (Section 101(d)(6)(B)).
- II – Identification of Historic Properties, A - "Any resources located completely outside the APE do not require evaluation under this Agreement." The APE is defined as a 300-foot wide corridor in both North and South Dakota (page 3, paragraph #1). This APE does not incorporate the possibility of disturbance of Traditional Cultural Properties, cultural landscapes and viewsheds that extend beyond the 300-foot corridor. The evaluation should be amended to include these areas, as this is inconsistent with the PA.
- II – Identification of Historic Properties, C - "All interested tribes with TCP concerns shall be consulted and TCP surveys shall be conducted in areas of tribal concern based on consultation." This statement assumes that TCP surveys will be conducted *after* tribal consultation. On the contrary, TCP surveys should be conducted with full tribal input and consultation both during and after the surveys. If tribal concerns are to be adequately addressed, tribes should be fully involved in both the survey and evaluation process. Please explain the process used to identify these areas and address how tribes will be included.
- II – Identification of Historic Properties, G – The DOS, who retains the responsibility to identify and evaluate historic properties, is doing so "assisted by the Applicant." This shows the same conflict of interest apparent in the Draft EIS prepared for the project. The Applicant should have no part in determining the significance of historic properties.

- III – Treatment of Historic Properties, A (Avoidance) - This section includes no provisions for tribal consultation in terms of avoiding historic properties. Also, the evaluation and avoidance of properties contained within reroute areas is not addressed.
- III – Treatment of Historic Properties, B – Treatment Plans and Post-Review Discoveries, 3 – "Since most of this work will take place after the FEIS has been published, the Applicant will serve as the agent to the DOS for purposes of completing Section 106 compliance." Placing the responsibility of fulfilling Section 106 obligations with the Applicant is a gross oversight on the part of DOS. Also, the proposed timeline, with the Final EIS expected in early December of this year and construction set for April 2008, makes adequate consultation and the completion of Section 106 impossible.
- III – Treatment of Historic Properties, B – Treatment Plans and Post-Review Discoveries, 7 – "If Native American human remains are discovered on the ___ acres of Federal land involved in this Project, the Applicant shall notify the DOS, the appropriate SHPO, and the appropriate Federal land managing agency." The discovery of Native American human remains requires the notification of associated Native American tribes. The lack of a requirement for such notification in the event of an inadvertent discovery is an unacceptable omission.
- VII – Construction Clearance – "For those segments of the Project where surveys have been completed, reports provided and approved, and eligible sites avoided, the DOS after consultation with the appropriate SHPO will provide the Applicant with notice to proceed with construction." This statement assumes that the federal permit required from the DOS is forthcoming. Such an assumption, by either the Applicant or the DOS, shows an alarming bias.

Unanticipated Discovery Plans

- The North and South Dakota Unanticipated Discovery Plans fail to adequately address tribal involvement in dealing with human remains. As the SDSHPO comments indicated, the Unanticipated Discovery Plan is inconsistent with NAGPRA. The DOS needs to address this, whether through developing completely new plans or amending the existing ones. Also of concern is the uncertainty surrounding exactly what state law was used to develop these plans and where that law applies as opposed to NAGPRA. How does DOS plan to resolve this split-estate issue?

It has also been brought to our attention that the drafting of the Programmatic Agreement for this project was to be the responsibility of the Advisory Council on Historic Preservation. The Department of State and Entrix have clearly taken over that task, showing a lack of concern for the involvement and responsibilities of the ACHP.

We would like these concerns to be addressed in the draft that is prepared for the October 23rd consultation meeting, and additional time will be needed for review, comments, and consultation on the final draft. October 23rd cannot be meant to complete the obligations of Section 106, so we would like to be kept informed of additional consultation meetings as the process continues.

Thank you for your time and consideration of these matters.

Sincerely,
Standing Rock Sioux Tribe

Tim Mentz, Sr.
Tribal Historic Preservation Officer

TM/kb

September 19, 2007

Elizabeth Orlando
NEPA Coordinator, Keystone EIS Project Manager
US Department of State
OES/ENV Room 2657A
Washington, DC 20520

Re: Keystone Pipeline DEIS comments

Dear Ms. Orlando:

The Standing Rock Tribal Historic Preservation Office rejects the draft EIS as written. We believe that there are major, unresolved issues regarding the identification and evaluation of cultural resources within the proposed corridor of TransCanada's Keystone Pipeline where it crosses the ancestral homelands of the Great Plains Tribes.

Our comments are as follows.

3.11 Cultural Resources:

- 3.11, paragraph #3 outlines the legal responsibilities of the federal agency in regards to consultation with the SHPO and their role in evaluating cultural resources. The SHPO's responsibility, as described, includes working with Native American tribes "to mitigate any negative impacts that could occur to NRHP-eligible or –listed properties." The use of the word mitigate assumes that avoidance is not an option for the construction of the Keystone Pipeline. This is whole sale destruction of sites within the corridor without Tribal participation and DOS doesn't have a process Identified to address this in the draft EIS. Please clarify this fatal flaw.
- 3.11, paragraph #4 asserts the "importance of consulting with tribes for federal undertakings that are proposed within Native American ancestral territories," as described in 36 CFR 800.2(c)(2)(ii). According to the Draft EIS, the cultural resources surveys for the proposed corridor began in early 2006, yet consultation with affected Native American tribes and THPOs was not initiated until August 2006. Research designs were submitted to State SHPOs and approved in early 2007, yet efforts were

not made to do the same with the appropriate THPOs.The DOS must initiate consultation on the archaeology conducted by Metcalf, Inc.

- 3.11, paragraph #7 states that the guidelines used to assess cultural resources was developed by FERC, and that Keystone assisted DOS in complying with Section 106. This indicates that the DOS has delegated its responsibilities to the very company that they are supposed to be evaluating. This assistance shows a clear conflict of interest on the part of Keystone, who cannot be expected to provide unbiased information and analyses for a survey that may determine the outcome of their application for a federal permit. Also, the FERC guidelines provide for the input and guidance of relevant THPOs in evaluating the significance of any cultural resources found (page 13). The DEIS indicates that evaluations were made only by the contracted group selected by Keystone to perform the required assessments. This action doesn't fulfill the requirements of Section 106 of NHPA.
- 3.11, paragraph #8 defines Traditional Cultural Properties (TCPs) as in Bulletin #38 of the National Register, and "traditional" is an identified category of cultural resources for the analysis. Neither the Class I nor the Class II survey conducted identified any resources that fell into this category. This is most probably due to a lack of consultation with appropriate THPOs during the survey process. How will DOS address this?

3.11.1.1 and 3.11.1.2 Potential Impacts and Mitigation:

The Standing Rock Sioux Tribe is particularly concerned about those types of sites that archaeologists describe as "archaeological sites" rather than "historic" or "architectural sites." Occupation of the project area by ancestral Sioux bands is most likely reflected by pre-contact, archaeological sites.

Metcalf Archaeological Consultants (MAC) recommended a Class II inventory of the Keystone pipeline route in North Dakota based upon a "sampling strategy focused on landform types that were derived from the known site database and the results of previous surveys" (DEIS 3.11-4). On the basis of this strategy, MAC recommended conducting on-the-ground inventories on only 22.8% of the project corridor (49.5 miles of 216.9 miles). MAC's sampling strategy assumes either (1) that there are sufficient numbers of previously recorded sites to predict the types of landforms on which sites most frequently occur or (2) that there are sufficient numbers of previous surveys to predict where sites occur. Neither assumption is warranted along the Keystone pipeline route.

In the 388 sections included in the Class I inventory of the North Dakota segment by MAC inventory there is a total of only 18 pre-contact sites. Obviously, a sample limited to 18 sites over a distance of approximately 216.9 miles is not statistically valid and does not provide a large enough data base to formulate a predictive model. Moreover, nine of the previously-recorded sites are in two heavily inventoried sections (135/59-11 and 136/58-35). These two sections demonstrate the value of conducting intensive ground searches (Class

III). For the remaining 215 miles of pipeline corridor there are only nine recorded archaeological sites. Clearly, this small number reflects a lack of inventories rather than a low site density.

The number of previous inventories is also not sufficient to formulate a predictive model. Of the 388 sections in the Class I inventory, 210 are listed as "no sites/no surveys." To this number can be added an additional 17 sections where there is a recorded historic site or site lead but no survey has been conducted. This data indicates that of the 388 sections, 58.5% of the sections have received no archaeological surveys. When constructing predictive models the data from Class II (reconnaissance) inventories also must be excluded because Class II inventories by design provide a biased sample. Class I inventories are excluded since no fieldwork was conducted and inventories restricted to historic sites are excluded because they are not relevant to prehistoric site locations. Excluding these inventories excludes an additional 49 sections. Taken cumulatively, there is no data or only biased data on 276 sections. There is no data or inadequate inventory data for over 70% of the project corridor in North Dakota.

Along the South Dakota segment of the Keystone pipeline MAC recommended a Class II inventory based upon a "sampling strategy focused on landform types that were derived from the known site database and the results of previous surveys" (DEIS 3.11-8). On the basis of this strategy, MAC recommended conducting on-the-ground inventories on only 17.6% of the project corridor (38.5 miles of 218.9 miles). As with the North Dakota segment, MAC's South Dakota sampling strategy assumes either (1) that there are sufficient numbers of previously recorded sites to predict the types of landforms on which sites most frequently occur or (2) that there are sufficient numbers of previous surveys to predict where sites occur. Neither assumption is valid.

In the 736 sections included in the Class I inventory of the South Dakota segment there is a total of only 10 pre-contact sites. Obviously, a sample limited to 10 sites over a distance of approximately 218.9 miles is not statistically valid and does not provide a large enough data base to formulate a predictive model.

The number of previous inventories is also not sufficient to formulate a predictive model. Of the 736 sections in the Class I inventory, 485 are listed as "no sites/no surveys." To this number can be added an additional 81 sections where there is a recorded historic site or site lead but no survey has been conducted. This data indicates that of the 736 sections, 76.9% of the sections have received no archaeological surveys. When Class II (reconnaissance) are excluded data from an additional 19 sections is excluded. In sum, there is no data or inadequate inventory data for almost 80% of the project corridor in South Dakota.

On the basis of the above, the Class II inventories of the North Dakota and South Dakota segments of the Keystone pipeline are not adequate because there is insufficient data to formulate statistically-significant predictions about what landforms have the highest probability of having archaeological sites. The cultural resources summaries of the North and South Dakota segments in the EIS must be rejected because the modeling underpinning the Class II inventories

is fatally flawed. Class III inventories must be conducted along both the North and South Dakota segments.

3.11.2 Potential Impacts and Mitigation

- Paragraph #3 addresses the development of a PA to establish protocol for "unanticipated discoveries, future cultural resources identification and avoidance commitments and measures, and the process for future consultation." However, **3.11.4** shows that an Unanticipated Discoveries Plan has already been established, without considering the interests of affected Native American tribes.
- Tables for identified cultural resources show that determinations regarding NRHP eligibility have been made for many sites. These determinations were made without the knowledge or input from any Native American tribes who may know of their significance, contrary to the FERC guidelines that were supposedly followed.

5.11 Cultural Resources, Conclusions

- "Cultural resources inventory and geoarcheological studies will be completed and reported to DOS by April 2008." **2.2.4**, Construction Schedule and Workforce anticipates construction to begin in April 2008. This assumes that the DOS will approve the project (a decision is expected in "early 2008") without a completed 100% Class III survey. Approval of a major undertaking while such important information has not been compiled is unacceptable.

Information recently surfaced concerning land in South Dakota that was stolen from the Lakota people without the benefit of treaty. As forty-five days is an insufficient amount of time to review and comment on the entire Draft EIS, we were unable to research this concern further, but we would like this issue to be addressed in the Final EIS as more information becomes available.

We request a response in detail to each of the above issues. Thank you for your time and your consideration.

Sincerely,

Standing Rock Sioux Tribe

Tim Mentz, Sr.
Tribal Historic Preservation Officer

TM/kb

Monday, October 22, 2007 Yankton Press & Dakotan
Story last updated at 11:30 pm on 10/21/2007

S.D. Sits At Crossroads Of Oil Projects

By: **Dirk Lammers**
Associated Press Writer
http://www.yankton.net/stories/102207/new_210741666.shtml

SIOUX FALLS -- As oil hovers around $90 a barrel, the race is on to more heavily tap into the world's second-largest oil reserve, and South Dakota -- a major ethanol producer that typically sits on the alternative side of the fuel industry -- is finding itself at the crossroads of two major oil projects. One is a 590,000-barrel-a-day pipeline with plans to deliver Canadian crude to Patoka, Ill. and Cushing, Okla. The other is a proposed refinery that would be the first new U.S. refinery location in more than 25 years. Supply for both projects would come from the Alberta oil sands of northern Canada, home to some 175 billion barrels of crude putting the region second only to Saudi Arabia in terms of the world's oil reserves.

U.S. refiners are converting their plants to handle thicker Canadian crude, and pipeline specialists such as Calgary-based TransCanada Corp. are looking to connect supply with demand. TransCanada plans to begin construction this spring on the Keystone pipeline, a 2,148-mile route passing through the Dakotas, Nebraska, Kansas and Missouri. Robert Jones, a TransCanada vice president and director of the Keystone project, said transporting crude oil by rail or trucks is less environmentally friendly than moving it underground. New pipelines are critical infrastructure if North America is to achieve greater energy independence, he said. "The U.S. refiners have to do something to respond to increasing energy demands in the U.S.," Jones said. "So their choices are import more oil offshore from foreign sources or look to Canada and have a reliable source of crude oil to supply the refineries."

Jones said TransCanada already has firm long-term compacts on nearly 500,000 of the 590,000 barrels that will be transported along the route each day. That means passage along Keystone is nearly booked, and the line won't be able to supply South Dakota's other potential oil project -- the Hyperion Energy Center. Privately held Hyperion Resources of Dallas wants to build a 400,000-barrel-per-day oil refinery in either Elk Point -- which sits less than 50 miles from the planned Keystone route -- or another undisclosed Midwest location. The refinery would be built to handle Canadian crude, and the most obvious way to get it to a refinery is by pipeline, J.L. "Corky" Frank, a Hyperion project executive, told The Associated Press. "Our 400,000 barrels a day that we'd require for our refinery would probably be more than enough to justify a separate line, in and of itself, to serve this refinery as well as any other potential customers that were on that line," he said.

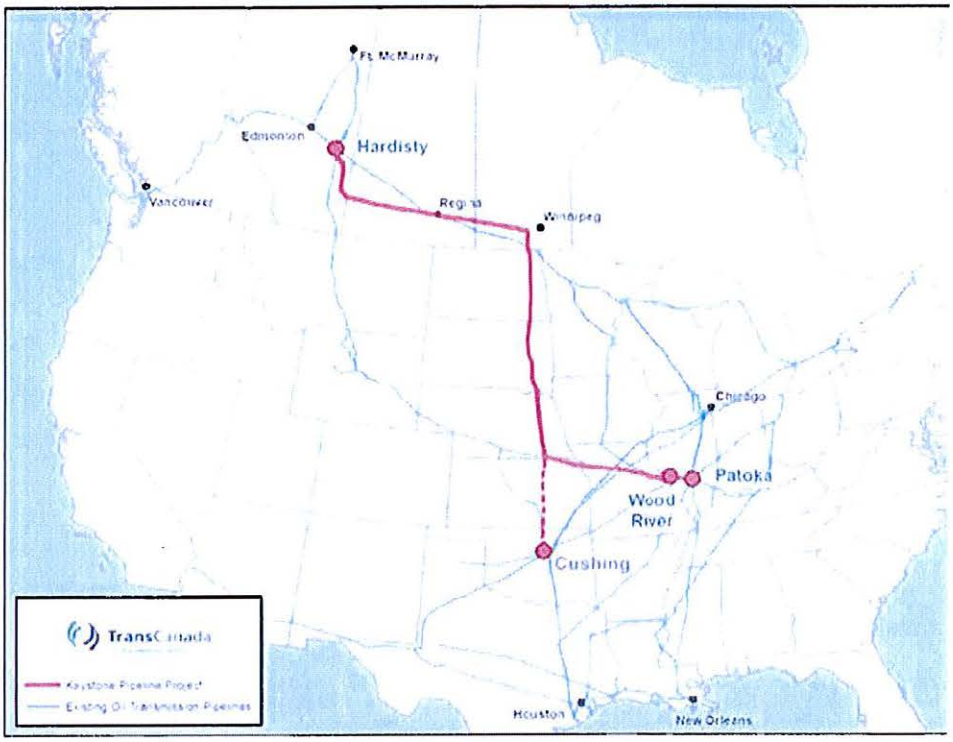
Frank said the U.S. needs more refining capacity, and building refineries inland to shield them from weather-related catastrophes such as hurricanes makes sense. The Hyperion Energy Center would produce ultra-low sulfur gasoline and diesel and be one of the most environmentally friendly in the world, he said. Its price tag has been estimated at between $8 billion and $10 billion, but Frank said the industry is changing daily, so the final cost could be

WEB Exhibit # 1-a

more or less. Frank said Hyperion is open to partnering with pipeline companies, producers and equity firms, but the company has yet to select a final site for the refinery and is keeping its options open.

"First thing you have to do before anybody wants to talk seriously about doing something is to have a site," Frank said. Throughout North America, companies are courting corporate partners to better tap into Canada's valuable resource.

TransCanada and Houston-based ConocoPhillips Co. signed an agreement in 2005 to use the Keystone pipeline to deliver crude to ConocoPhillips' Wood River, Ill. and Borger, Texas refineries, which are being expanded. The deal gives ConocoPhillips the right to up to a 50 percent ownership stake in the pipeline.



WEB Exhibit # 1-6

In January, ConocoPhillips signed an agreement with EnCana Corp., a Calgary-based company specializing in recovery of oil sands bitumen -- the thick, gooey crude that's found in that part of the world.

The deal gives EnCana a 50-percent stake in ConocoPhillips' Wood River and Borger refineries in the U.S. in exchange for a 50-percent stake in EnCana's Foster Creek and Christina Lake oil sands properties in northeast Alberta. Encana spokesman Alan Boras said it's a win-win for both companies. "For us, we got access to the capacity to turn heavy oil into gasoline and diesel that goes to the market," Boras said. "And for ConocoPhillips, it got access to additional reserves so that its refineries can run efficiently and have a secure supply of oil." Boras said the partnership removes some of the market's price volatility. Canadian oil recovery companies typically get **20 to 30 percent less for their oil** compared to lighter crude, and that differential can climb as high as 50 percent when supply exceeds demand.

With a 50-50 partnership, the upstream partner makes more money when the crude is selling for more, and the downstream partner reaps the benefits when the price is cheaper. "So it integrated the business, and as a result you protected yourself or removed that risk of the volatility of price, both on each side of the equation," he said. The transition from foreign oil to Canadian crude was highlighted in 2006, when two pipelines typically used to move oil from the Gulf Coast area to northern Midwest points were reversed. **ExxonMobil reversed one of its oil pipelines so it could bring Canadian oil already running to Patoka, Ill. down to Texas. And Enbridge Inc., a major Canadian pipeline company, reversed its Spearhead Pipeline so oil could flow from Chicago to a major industry hub in Cushing, Okla.**, said Denise Hamsher, Enbridge's director of public and regulatory affairs in the U.S. "The economics being what they are, that secure supply is growing," Hamsher said.
Enbridge has several other major expansion projects in the works. One would expand its existing pipeline system, including pump station modifications in Alberta, Saskatchewan and Manitoba and new pipeline in Wisconsin and Illinois, to increase crude oil capacity to Midwest refineries and **beyond.** Another, called the Alberta Clipper, would construct a new crude oil pipeline from Alberta to Superior, Wis., to initially increase capacity to 450,000 barrels per day with potential growth to 800,000 barrels per day. **An additional pipeline running in the opposite direction along the same route would transport diluents -- light hydrocarbons used to thin Canadian crude so it can move through a pipeline -- up to Alberta.** Enbridge is teaming with ExxonMobil to assess the development of **a new pipeline project to transport crude from Patoka, Ill. to the Texas cities of Beaumont and Houston**. Other oil companies are also making moves in the industry: -- Houston-based energy company Marathon Oil Corp. is acquiring Western Oil Sands Inc. for $5.5 billion in a deal that would give the nation's fifth-largest refiner a 20-percent stake in the Athabasca Oil Sands Project. Shell Canada Ltd. and Chevron Canada Ltd. hold the remaining 60 percent and 20 percent stakes, respectively. Marathon stands to tap a net production of about 31,000 barrels of bitumen per day, increasing to more than 130,000 barrels per day by 2020. -- BP, which owns and operates a 600-mile long crude pipeline that moves oil from Oklahoma to Chicago, wants to reverse the line's flow if it can solicit enough long-term transport agreements. If demand warrants, the Viridian Pipeline could begin running north-south by the fourth quarter of 2009 with an immediate capacity of 100,000 barrels per day and potential for another 100,000 barrels, the company says.

AP researcher Rhonda Shafner in New York contributed to this report.

On the Net:
TransCanada Keystone Pipeline: http://www.transcanada.com/keystone/
Hyperion Energy Center: http://www.hyperionec.com/

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Encana Corp.: http://www.encana.com/
ConocoPhillips Co.: http://www.conocophillips.com/
Enbridge Inc.: http://www.enbridge.com/
Post your comments

Conoco Has Big Plans for Alberta Oilsands, CEO Says

By Shawn McCarthy
20 Jul 2007 at 10:19 AM GMT-04:00 ***Resource Investor***

OTTAWA (CP) -- ConocoPhillips Co. [NYSE:COP] is prepared to spend billions of dollars on pipelines and refinery upgrades to allow it to process oilsands crude throughout its refinery network stretching to the U.S. Gulf Coast, the Globe and Mail reported on its website Thursday night.

Company chairman Jim Mulva said the extension of the pipeline network into the Gulf Coast would open a vast new market for Canadian oil sands producers and help ensure that oilsands projects that have already been proposed could go ahead.

The industry is worried, however, that federal and local governments on both sides of the border could create a regulatory logjam that would stall the planned investments.

Mulva said the rapid development of the Canadian oilsands is a key goal as the U.S. seeks to reduce its dependency on imported oil from outside North America, while still meeting rising gasoline demand at home. In a telephone news conference from Washington, Mulva said Conoco, the third-largest U.S. oil company, sees few hurdles in the way of the massive expansion of oilsands production, and is upgrading its fleet of refineries to handle the tarry crude.

Last year, Houston-based Conoco and Calgary's EnCana Corp. [NYSE:ECA; TSX:ECA] joined forces to boost production in the oilsands, with Conoco gaining a 50% stake in oilsands projects such as Surmont and Christina Lake, while the Canadian company gained a 50% share in two of Conoco's refineries.

The two companies are already pouring in some US$5.3-billion to upgrade the Wood River refinery near St. Louis, and the Borger facility in northwest Texas to handle oilsands production. Now, Mulva said the company is considering extending pipelines and upgrading three refineries along the Gulf Coast to handle Canadian crude. Those facilities currently rely on declining U.S. production and imports from outside North America.

"We're considering projects that we can do to upgrade capacity to the extent that we need to handle this type of oil at our Gulf Coast refineries," Mulva said, adding that the Canadian crude would replace dwindling U.S. production there. U.S.-based energy economist James Williams said access to the Gulf Coast would help ensure robust markets for vastly expanded oilsands production, **which could reach 3.5 million barrels a day by 2020.**

"There's no downside for Canada," he said. Not only would it provide a new market for

WEB Exhibit # 1-d

production, but, in doing so, it would reduce the price differential that now exists between oilsands crude output and the benchmark light U.S. The prospect of an expansion of the U.S. market for Canadian crude comes just a week after Chinese oil officials pulled the plug on their involvement in the Gateway pipeline project that would deliver oil sands crude to the West Coast for delivery to Asian markets.

Industry insiders have long acknowledged that the Gateway pipeline project faced huge hurdles, because Alberta producers have shown a clear preference for the U.S. market, and the route would have required right-of-way deals with scores of native bands. Mulva said Conoco and EnCana expect to eventually produce 400,000 barrels a day of crude from two major oil sands projects, and will be looking to book pipeline space now. He said the industry as a whole will need additional pipeline capacity for roughly one million barrels within about five years.

TransCanada Corp.[NYSE:TRP; TSX:TRP] is planning to build the Keystone pipeline, which would connect Alberta with southern Illinois, near the Wood River refinery, with an extension into Oklahoma. It would have a capacity of 435,000 barrels a day in the initial stage to open in 2009, and 590,000 barrels a day for the final phase, which would be completed in 2011.

Enbridge Inc. [NYSE:ENB; TSX:ENB], is proceeding with the Alberta Clipper line that would carry 450,000 barrels a day into the U.S. Midwest. New pipeline construction would be required to ship the Canadian crude to the Gulf Coast, which is the refining hub of the U.S.

Mulva said the industry will need **accelerated regulatory reviews and permits** to get the pipeline built in time to meet the market demand. David MacInnis, president of the Canadian Energy Pipeline Association, said the expansion of the network to the Gulf Coast would be a major boon to Alberta oilsands producers. But he said the regulatory hurdles remain significant and could delay projects if the various jurisdictions don't work together to expedite the reviews.

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WEB Exhibit # 1-e

LANDOWNER WARNING:

Don't sign this document before having a lawyer review it for you.
Look closely at Section 1, Section 5 and Section 8.

COPY

Tract No [redacted]

EASEMENT AND RIGHT-OF-WAY
AGREEMENT

For and in consideration of the sum of Ten Dollars ($10.00) paid in accordance with this Easement and Right-of-Way Agreement (this "**Agreement**"), the mutual promises of the parties herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged (collectively, the "**Consideration**"), [redacted] whose mailing address is [redacted] (hereinafter called "**Grantor**") does hereby grant, sell, convey and warrant unto TRANSCANADA KEYSTONE PIPELINE, LP., a Limited Partnership having its principal place of business at 450 – 1 Street SW, Calgary, Alberta, Canada, T2P 5H1, its successors and assigns (hereinafter called "**Grantee**"), a perpetual, permanent easement and right-of-way (the "**Easement**") for the purposes of surveying, laying, constructing, inspecting, maintaining, operating, repairing, replacing, altering, reconstructing, removing and abandoning in place one or more pipelines, together with all fittings, cathodic protection equipment, pipeline markers and all other equipment and appurtenances thereto, for the transportation of oil, natural gas, hydrocarbons, petroleum products and all by-products thereof, along routes convenient for Grantee's operations on, over, under, across and/or through a strip of land generally 50 feet in width, as more particularly described under the heading "Permanent Easement and Right-of-Way" in Exhibit A, which is attached hereto and made a part hereof (the "**Easement Area**") described as being situated in the County of Marshall, State of South Dakota, located on real property (the "**Property**"). [redacted] owned by Grantor, as more particularly described in Exhibit A attached hereto and made a part hereof (the "**Property**"). In addition, during the original construction of the pipeline(s), the easement and right-of-way granted hereunder shall also include the area described under the headings "Temporary Work Space" and "Additional Temporary Work Space" in Exhibit A hereto (the "**Temporary Work Space**").

Grantee may further define the location of the Easement Area by recording a "Notice of Location" referring to this instrument and setting forth a legal description of the Easement Area and the location of the pipelines contained therein, which description may be set forth by map attached to said Notice. A copy of said Notice shall be delivered to Grantor.

The aforesaid Easement is granted subject to the following terms, stipulations and conditions which are hereby covenanted and agreed to by Grantor. By acceptance of any of the benefits hereunder, Grantee shall be deemed to have agreed to be bound by the covenants applicable to Grantee hereunder.

1. The above recited Consideration is accepted by Grantor, and, subject to Paragraph 4, Paragraph 6 and Paragraph 8, below, Grantor (on behalf itself and its heirs, assigns, agents, successors in interest and any other person or entity taking through or under it) does hereby release, acquit, waive and forever discharge Grantee, and its successors and assigns, its parent, subsidiary and related companies and their officers, directors, employees, shareholders, agents, successors, assigns, attorneys, insurers, subcontractors, consultants, or any other person or entity taking through or under them, or any of them, of all and from all manner of action, causes of action, lawsuits, claims and demands of every kind and nature whatsoever, whether known or unknown and whether arising in law or in equity, that Grantor has or may have against Grantee (its successors and assigns) in connection with this Agreement.

WEB Exhibit # 2-a

2. Insofar as it may be practicable to do so, Grantee shall, unless otherwise requested by Grantor, strip the topsoil from the ditch line in the Easement Area only prior to construction and installation of any pipeline placed in the Easement Area. Following the construction and installation of each pipeline, the top soil will be replaced, to the extent feasible, as near as practicable to its original location and condition.

3. Except for above-ground piping facilities, such as mainline block valves, pump stations, etc., and except as otherwise stated in this Agreement, each pipeline shall be installed at a depth conforming with industry standards and the requirements of applicable laws.

4. Grantee shall have the right to remove all fences from the Easement Area and the Temporary Work Space, as required for purposes of construction of Grantee's pipeline(s) and Grantee shall repair all such fences promptly upon completion of construction on Grantor's Property to substantially the same condition as such fences were in prior to removal by Grantee.

5. Provided its use of the Property does not in any manner interfere with or prevent the exercise by Grantee of its rights hereunder, or create an actual or potential hazard to the pipeline(s) or its appurtenances, the undersigned Grantor, its successors, heirs or assigns, reserve all oil, gas and minerals on and under Property and the right to farm, graze and otherwise fully use and enjoy the Property; provided, however, that Grantee shall have the right hereafter to cut, keep clear and remove all trees, brush, shrubbery, structures and other obstructions or facilities in the Easement Area being conveyed that are deemed by Grantee to injure, endanger or interfere in any manner with the proper and efficient construction, use, inspection or maintenance of said pipeline(s), or fittings, cathodic protection equipment and other appurtenances thereto; and, provided, further, that Grantor shall not excavate or otherwise alter the ground elevation, construct any dam or otherwise create a water impoundment within or over the Easement Area without prior authorization of Grantee. Grantee shall have all privileges necessary or convenient for the full use of the rights herein granted, together with reasonable ingress and egress over and across that part of the Property located adjacent to the Easement Area and the Temporary Work Space.

6. Grantee agrees to pay all commercially reasonable costs and expenses relating to damages to crops, pasture, fences, structures, timber on the Property, or any other damages to the Property, resulting from Grantee's use of the Easement Area and the Temporary Work Space, except to the extent arising out of or relating to the negligence, recklessness or willful misconduct of Grantor or any of Grantor's invitees, licensees, agents or employees.

7. Any payment hereunder may be made or mailed to Grantor at the address shown above or to

_____

_____

_____

who is hereby appointed agent and authorized to receive and receipt for same, and who is also appointed the true and lawful attorney in fact for Grantor. The agency and power of attorney granted by Grantor to its agent hereunder shall not be deemed revoked until written notice from Grantor has been received by Grantee.

8. Except as provided above with respect to limitations on damages, from and after the date of this Agreement, Grantee shall indemnify and hold harmless Grantor from any loss, damages, claims or actions resulting from Grantee's use of the Easement, except to the extent such loss, damage, claim or action results from the negligence or willful misconduct of Grantor, its invitees, licensees, agents or employees. Grantor shall indemnify and hold harmless Grantee from any loss, damages, claims or actions alleging injury to Grantor, its invitees, licensees, agents or employees who enter the Easement Area, except to the extent such loss, damage, claim or action results from the negligence or willful misconduct of Grantee.

9. All notices under this Agreement shall be in writing, addressed to the addresses first set forth above and be delivered by certified mail, postage prepaid, and return receipt requested, next business day delivery via a reputable national courier service, regular United States mail, facsimile, e-mail or hand delivery. A party may change its address for notice by giving notice of such change to the other party.

10. The undersigned hereby bind themselves, and their respective heirs, executors, administrators, successors and assigns, to warrant and forever defend this easement and right-of-way unto Grantee, its successors and assigns, against every person claiming or to claim the same, or any part thereof. The Easement granted hereby shall create a covenant and burden upon the Property and running therewith.

WEB Exhibit # 26

11. Grantor and Grantee acknowledge that the actual location of the Easement Area may change because of various engineering factors and Grantor agrees to execute and deliver to Grantee, without additional compensation, and, where necessary, in recordable form, any additional documents needed to correct the legal description of the Easement Area to conform with the actual location of the pipeline(s). Said document, if required, will be prepared by Grantee at its expense.

12. It is agreed that this Agreement constitutes the entire agreement between the parties and that no other agreements have been made modifying, adding to or changing the terms of the same. This Agreement may not be abrogated, modified, rescinded or amended in whole or in part without the consent of Grantor and Grantee, in writing and executed by each of them, and duly recorded in the appropriate real property records.

13. The rights granted hereby to Grantee may be assigned by Grantee in whole or in part, in Grantee's sole discretion.

14. This Agreement shall be governed by the law of the State in which the Easement Area is situated.

15. This Agreement may be executed in counterparts, each of which shall be considered an original for all purposes; provided, however, that all such counterparts shall together constitute one and the same instrument.

IN WITNESS WHEREOF, Grantor has executed this Agreement as of the _____ day of _____, 200__.

COPY

GRANTOR:

Print: [redacted]

Sign: _____

CORPORATE ACKNOWLEDGMENT

STATE OF South Dakota)
) SS
COUNTY OF Marshall)

Before me, a Notary Public in and for said County and State, on this ___ day of _____ 20 ___, personally appeared _____, to me known to be the identical person who Subscribed the name of the maker thereof to the foregoing instrument as its _____ and acknowledged to me that he executed the same as his free and voluntary act and deed and as the free and voluntary act and deed of such corporation for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal the day and year last above written.

My Commission expires:

_____

_____
NOTARY PUBLIC

ADDRESS

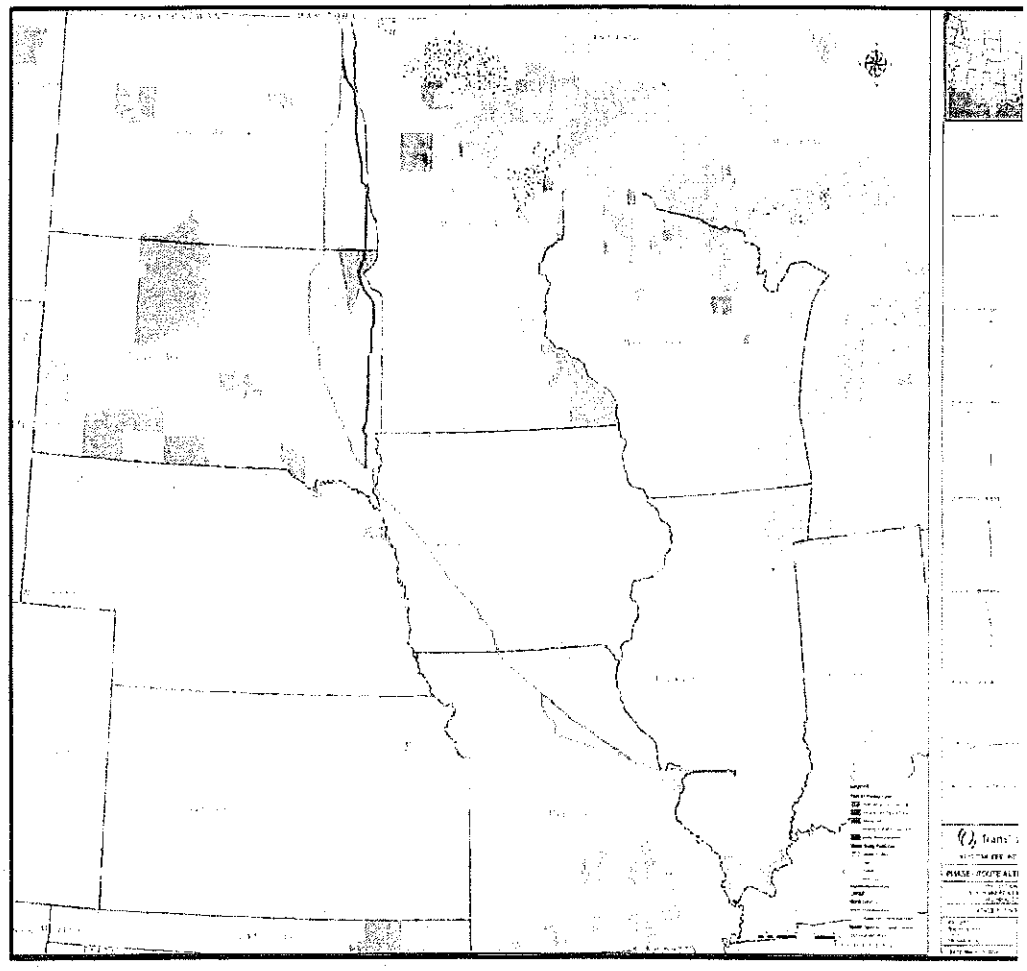
_____

This Instrument Prepared by:

TRANSCANADA KEYSTONE PIPELINE, LP
450-1 Street SW
Calgary, Alberta, Canada
T2P 5H1

WEB Exhibit # 2 - c

Interstate 29 - Alternate Route - TransCanada Oil Pipeline



WEB Exhibit # 3

DOT 241
(7-1-74)

Permit No. 84334

UTILITY PERMIT

Date: August 10, 1984

ISSUED TO:

WEB Water Development Association
Box 1911
Aberdeen, SD 57401

Project: 0122-376

Gentlemen:

The South Dakota Department of Transportation on August 10, 1984 has approved your request to occupy highway right-of-way as outlined in your application.

Therefore, permission is hereby granted, in accordance with the laws of the State of South Dakota relative thereto, to install 24 inches underground water pipe facilities within the highway right-of-way of US Highway Number(s) 12 in Walworth County, South Dakota, provided same is done at the expense of the permitee, under the supervision and to the satisfaction of the Area Engineer and according to Exhibits A, B, and ____ attached.

In the event it is deemed necessary by the South Dakota Department of Transportation to move or alter the line in any way due to maintenance or highway reconstruction within its present right-of-way width, the alteration will be accomplished by the owner without cost to the State.

Very truly yours,

DEPARTMENT OF TRANSPORTATION
Operations Support
Pierre, South Dakota

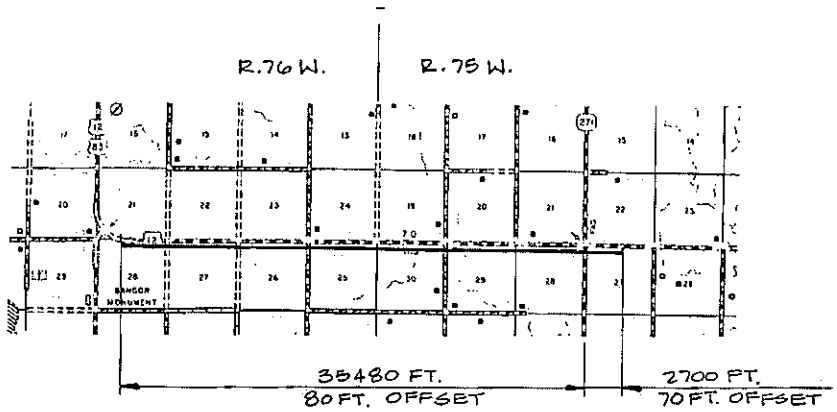
Larry Snyder by Ltr
Larry Snyder
Lease - Permit Engineer

LS:MT
cc: Records Center
File
Region Engineer
Area Engineer

WEB Exhibit # 4-a

RECEIVED AUG 13 1984

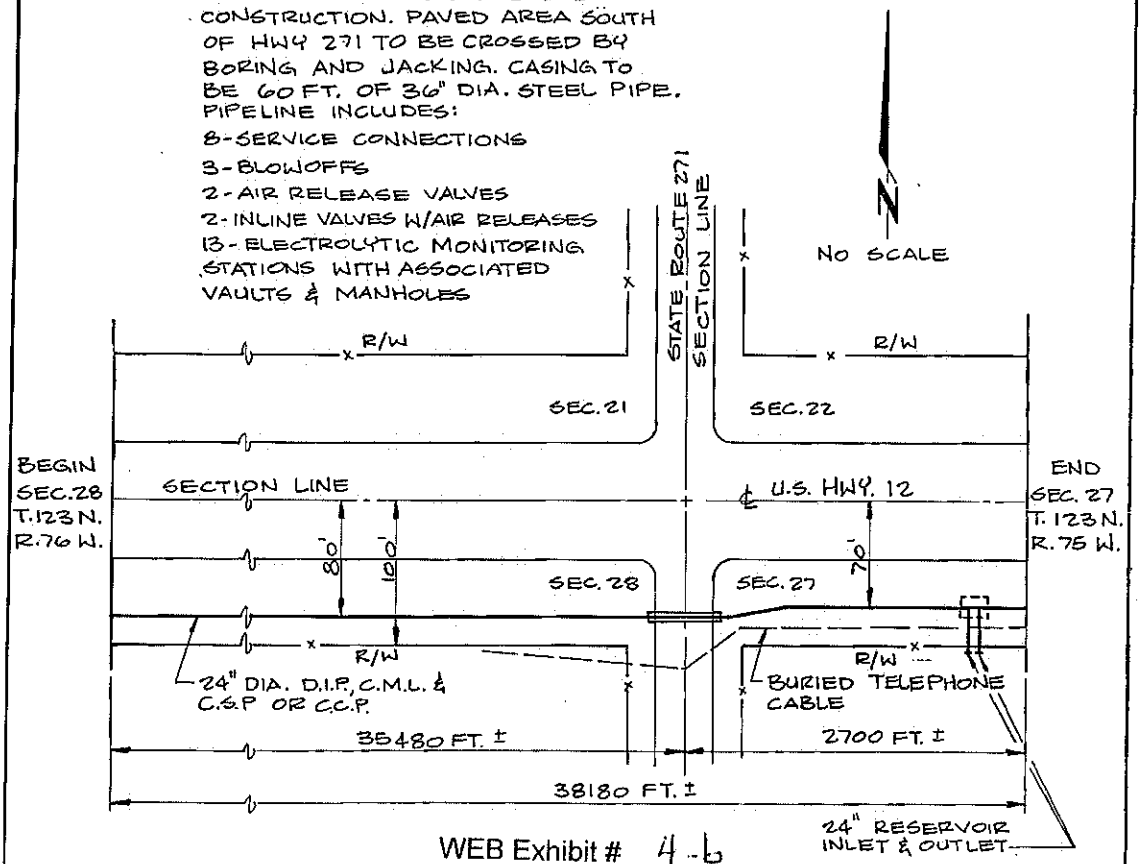
010231



LOCATION MAP

NOTE: PAVED DRIVEWAYS TO BE REPLACED IN KIND WHERE DISTURBED BY CONSTRUCTION. PAVED AREA SOUTH OF HWY 271 TO BE CROSSED BY BORING AND JACKING. CASING TO BE 60 FT. OF 36" DIA. STEEL PIPE. PIPELINE INCLUDES:

- 8-SERVICE CONNECTIONS
- 3-BLOWOFFS
- 2-AIR RELEASE VALVES
- 2-INLINE VALVES W/AIR RELEASES
- 13-ELECTROLYTIC MONITORING STATIONS WITH ASSOCIATED VAULTS & MANHOLES



WEB Exhibit # 4-b

EXHIBIT A

WEB WATER DEVELOPMENT ASSOCIATION, INC.

APPLICATION FOR PERMIT

ISSUED TO:

WEB Water Development Association
Box 1911
Aberdeen, SD 57401

You are hereby advised to notify the Mobridge Area Engineer,

William Bain at Mobridge

South Dakota; telephone number 605/845-3844

five working days prior to starting work covered by (Permit No.) 84334

dated August 10, 1984 on Project 0122-376

Please complete and send to Area Engineer as shown above.

To: William Bain, Area Engr., Dept. of Trans., P.O. Box 488, Mobridge, S.D. 57601

Permit No. 84334

Dated: August 10, 1984

Project No. 0122-376

Type of Installation 24 inches underground water pipe

Proposed Installation date

Submitted by

Title

Company

Address

WEB Exhibit # 4-c

DOT-200
(1-83)

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION
~~XXXXXXXXXXXXXXXXXX~~

APPLICATION FOR UTILITY PERMIT

Highway No. 12 County Walworth Approximately 0 Mi. N S X E W

from U.S. Hwy. 12 for construction of potable water pipeline
(City or well defined point) (type of utility facility)

Begin Section 28 Township 123N Range 76W End Section 27 Township 123N Range 75W

Intended usage or rating Domestic water supply

Cable size and type N/A

~~XXXXXXX~~ pipe diameter 24-inch ductile iron, CML&C steel pipe, or concrete cylinder pipe

Maximum pipeline operating pressure 225 psi

Size and type of metal casing N/A

Minimum depth of cable or pipeline 72-inch

Method of installation Trenching (Boring and jacking 60 ft. only)

Approximate construction dates - Start November 1984 Finish November 1985

Special conditions _____

I, the undersigned, request permission to construct and maintain an utility facility on public right-of-way at the above location and as shown on the attached layout sheet and in accordance with provisions of Administrative Rule chapter 70:01:08 of the South Dakota Department of Transportation, ~~XXXXXXXXXXXXXXXXXXXXX~~. In consideration for this permission, I agree to abide by all conditions as herein stated.

1. To furnish all materials, labor, incidentals and pay all costs involved with the construction and maintenance of the utility facility. To perform approved open cut trench operations in accordance with current DOT Open Cut Trench Policy. To restore any damaged portions of the roadway and right-of-way to equal or better conditions than existed prior to beginning work covered by this permit.

2. To provide protection to highway traffic during construction and maintenance by the use of proper signs, barricades, flagpersons and lights as prescribed in the "Manual of Uniform Traffic Control Devices".

3. To indemnify, hold and save harmless the State of South Dakota, its Department of Transportation, ~~XXXXXXXXXXXXXXXXXXXXX~~ its Officers and Employees, from any and all suits, actions or claims of any kind or nature brought because of any injuries or damage received or sustained by any person or property on account of the use or occupancy of highway right-of-way designated in this application.

COMPANY WEB Water Development Association DATE 2-30-84

ADDRESS Box 1911A Aberdeen, SD 57401 Telephone (605)229-4749

BY: Curt Holm TITLE Project Coordinator

* * * To be completed by ~~XXXXXXXXXXXXXXXXXX~~ Dept. of Transportation * * *

Project (Const.) F044-3(2) Station 85± to 396± Milepost 214.1 to 221.5

Project (Maint.) 0122 Maintenance Unit 376

1. Prior to commencing construction and upon completion of work the applicant shall notify William Bain, Area Engineer at Mobridge, South Dakota
Telephone 845-3844

2. Special Conditions: _____

3. Failure to construct and maintain the utility facility in accordance with the provisions of this permit will automatically render this permit null and void and constitute grounds for its removal and/or full restoration of the site at the applicant's expense.

Recommended: August 7, 19 84. _____
~~XXXXXXXXXXXXXXXXX~~
PIERRE REGIONAL MANAGER

This permit to construct and maintain an utility facility is granted subject to all conditions as herein stated on this _____ day of _____, 19_____.

_____
Utility Engineer

WEB Exhibit # 4-d

INSTRUCTIONS

APPLICANT:

1. Complete all items at top of form.

2. Prepare separate sheets showing details of the proposed installation. The drawings should include:

   a. Location of the facility in relation to the highway and the right-of-way line along with section lines, bridges and any other permanent features.

   b. Installations on bridges must include details of method of attachment.

   c. A North arrow.

   d. Any other pertinent information.

3. Sign and submit 2 copies of the request and 6 copies of the attachments to the district office for processing.

DIVISION OF HIGHWAYS:

District Engineer:

1. Review request and complete bottom portion of form.

2. If request is not recommended, return request to applicant stating reason for denial.

3. If request is recommended, forward request and all attachments to the Utility Engineer.

Utility Engineer:

1. Review request and if denied, return to applicant stating reason for denial with copy to District Engineer.

2. If request is granted, make and send copies of the permit and attachments as follows:

   a. 3 copies to District Engineer.

   b. 1 copy to applicant.

   c. Original to Record Center.

3. File 1 copy in Utility Office.

WEB Exhibit # 4-e

)OT 241
3-1-85)

SE ... SD Dept ...

Permit No. 85184

UTILITY PERMIT

Date: June 28, 1985

ISSUED TO:

WEB Water Development Association, Inc.
P.O. Box 51
Aberdeen, SD 57401

Project: 0122-155

Gentlemen:

The South Dakota Department of Transportation on June 28, 1985 has approved your request to occupy highway right-of-way as outlined in your application.

Therefore, permission is hereby granted, in accordance with the laws of the State of South Dakota relative thereto, to install 18 in. water line parallel installation facilities within the highway right-of-way of US Highway Number(s) 12 in Edmunds County, South Dakota, provided same is done at the expense of the permitee, under the supervision and to the satisfaction of the Area Engineer and according to Exhibits B, and A attached.

IN THE EVENT IT IS DEEMED NECESSARY BY THE SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION TO MOVE OR ALTER THE LINE IN ANY WAY DUE TO MAINTENANCE OR HIGHWAY RECONSTRUCTION WITHIN ITS PRESENT RIGHT-OF-WAY WIDTH, THE ALTERATION WILL BE ACCOMPLISHED BY THE OWNER WITHOUT COST TO THE STATE.

Very truly yours,

DEPARTMENT OF TRANSPORTATION
Operations Support
Pierre, South Dakota

Robert D. Victor

Permit Engineer

BV:dg
cc: Records Center
File
Region Engineer
Area Engineer

WEB Exhibit # 4-F

ISSUED TO:

WEB Water Development Association, Inc.
P.O. Box 51
Aberdeen, SD 57401

You are hereby advised to notify the Aberdeen Area Engineer,

Eugene Mattern at Aberdeen

South Dakota; telephone number 605/622-2244

five working days prior to starting work covered by (Permit No.) 85184

dated June 28, 1985 on Project 0122-155

Please complete and send to Area Engineer as shown above.

To: Eugene Mattern, Area Engr., Dept. of Trans., P.O. Box 1767, Aberdeen, S.D. 57401

Permit No. 85184

Dated: June 28, 1985

Project No. 0122-155

Type of Installation 18 in. water line parallel installation

Proposed Installation date _____

Submitted by _____

Title _____

Company _____

Address _____

WEB Exhibit # 4-9

DOT-207
(2-84)

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

APPLICATION FOR UTILITY PERMIT

Highway No. 12 County Edmunds Approximately 4.2 Mi. N S (E) W

from Roscoe for construction of Potable Water Pipeline
(City or well defined point) (type of utility facility)

Begin Section 23 Township 123N Range 70N End Section 21 Township 123N Range 68W

Intended usage or rating Domestic Water Supply

Cable size and type N/A

Outside pipe diameter See Drawings (Attached)

Maximum pipeline operating pressure 225 P.S.I.

Size and type of metal casing N/A

Minimum depth of cable or pipeline 72 inches

Method of installation Trenching (Parallel Installation)

Approximate construction dates - Start August, 1985 Finish December, 1986

Special conditions

I, the undersigned, request permission to construct and maintain an utility facility on public right-of-way at the above location and as shown on the attached layout sheet and in accordance with provisions of Administrative Rule chapter 70:01:08 of the South Dakota Department of Transportation. In consideration for this permission, I agree to abide by all conditions as herein stated.

1. To furnish all materials, labor, incidentals and pay all costs involved with the construction and maintenance of the utility facility. To perform approved open cut trench operations in accordance with current DOT Open Cut Trench Policy. To restore any damaged portions of the roadway and right-of-way to equal or better conditions than existed prior to beginning work covered by this permit.
2. To provide protection to highway traffic during construction and maintenance by the use of proper signs, barricades, flagpersons and lights as prescribed in the "Manual of Uniform Traffic Control Devices".
3. To indemnify, hold and save harmless the State of South Dakota, its Department of Transportation, its Officers and Employees, from any and all suits, actions or claims of any kind or nature brought because of any injuries or damage received or sustained by any person or property on account of the use or occupancy of highway right-of-way designated in this application.

COMPANY WEB Water Development Assoc., Inc. DATE 6-8-85

ADDRESS P.O. Box 51 Aberdeen, SD 57401 Telephone (605) 229-4749

BY: Curt Hohn TITLE Project Coordinator

* * * To be completed by Department of Transportation * * *

Project (Const.) Station Milepost 262+ to 252+

Project (Maint.) 0122-155 Maintenance Unit 155

1. Prior to commencing construction and upon completion of work the applicant shall notify Eugene Mathern, Area Engineer, SD DOT at Aberdeen, SD 57401 Telephone 622-2294
2. Special Conditions: See attached sheet
3. Failure to construct and maintain the utility facility in accordance with the provisions of this permit will automatically render this permit null and void and constitute grounds for its removal and/or full restoration of the site at the applicant's expense.

Recommended: 6-21, 1985. Region Manager

This permit to construct and maintain an utility facility is granted subject to all conditions as herein stated on this 28 day of June, 1985.

Robert D. Victor
Utility Engineer

WEB Exhibit # 4-h EXHIBIT B

Special Conditions

(1) Traffic into and out of the ditches shall be from approaches as much as possible during construction and maintenance phases.

(2) Equipment and materials will not be allowed within 42' of the highway centerline except when absolutely necessary.

(3) The Area Engineer is to be notified when the work is completed so a finals inspection can be made.

(4) A copy of the as built plans will be furnished to the DOT by the WE Water Development Association on completion of the work.

(5) Placement of Markers on the pipeline shall be in accordance with the DOT Right-Of-Way Encroachment Rules.

WEB Exhibit # 4-i

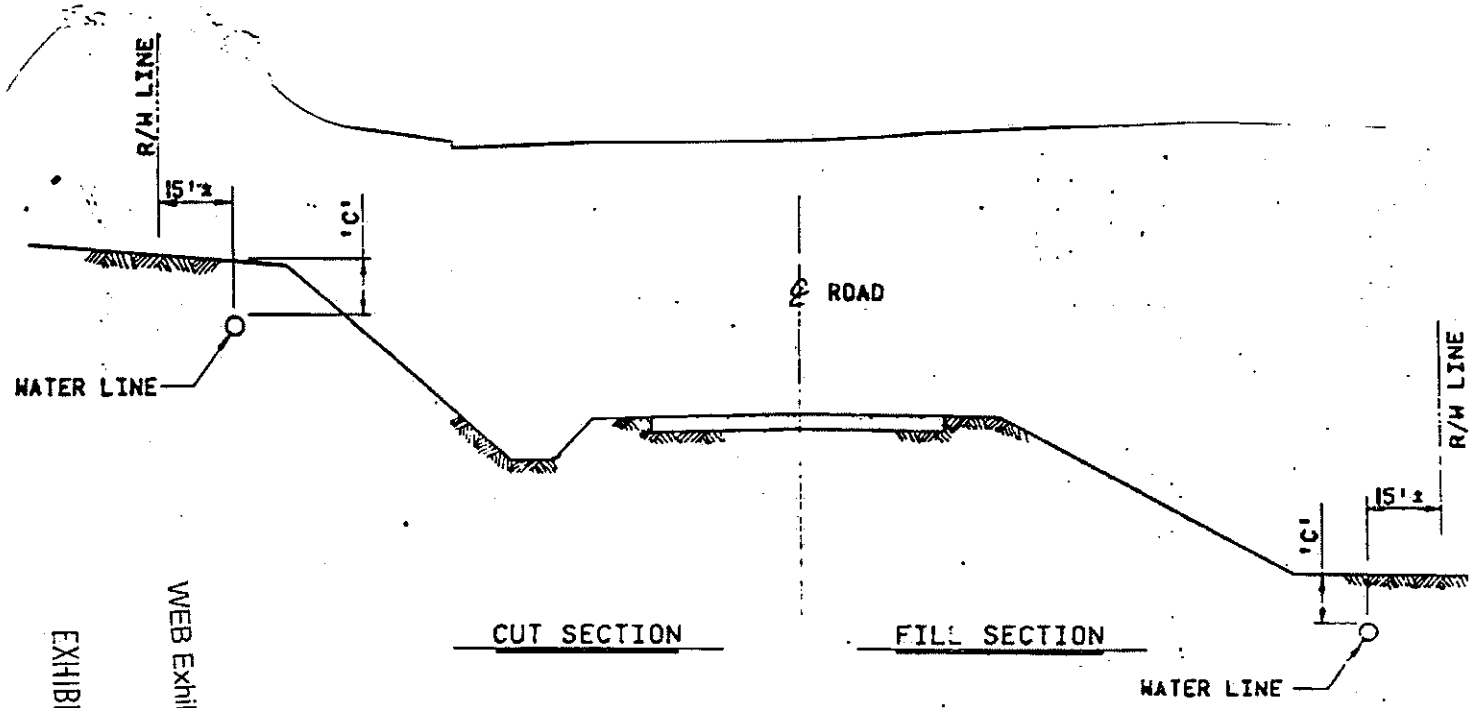


EXHIBIT A

WEB Exhibit # 4-1

TYPICAL LINE INSTALLATION IN ROAD RIGHT OF WAY

NO SCALE

PROJECT: WEB Water Development Assoc. Inc 3-1A

Highway No. 12

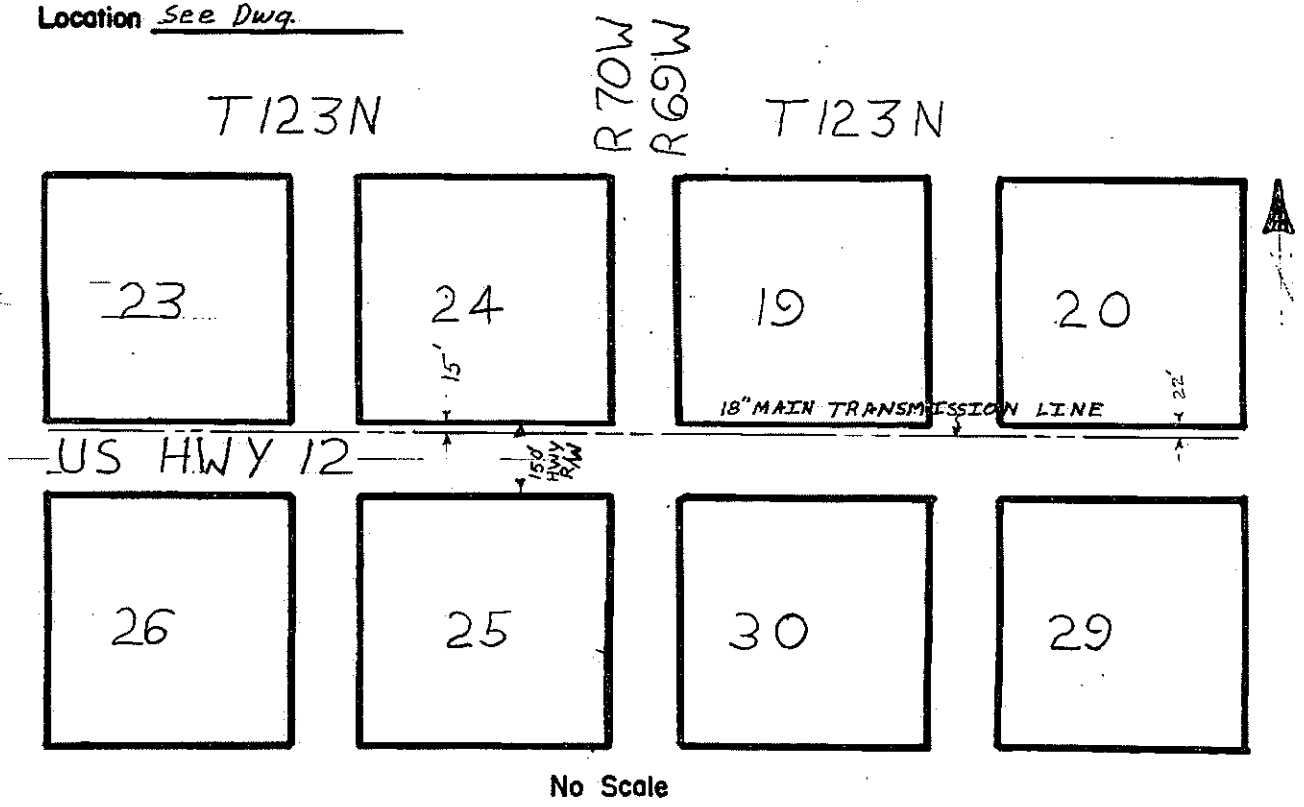
County Edmunds

Crossing No. Parallel Installation Within Highway R/W

Carrier Size 18"

Location See Dwg.

WEB Exhibit # 4-K



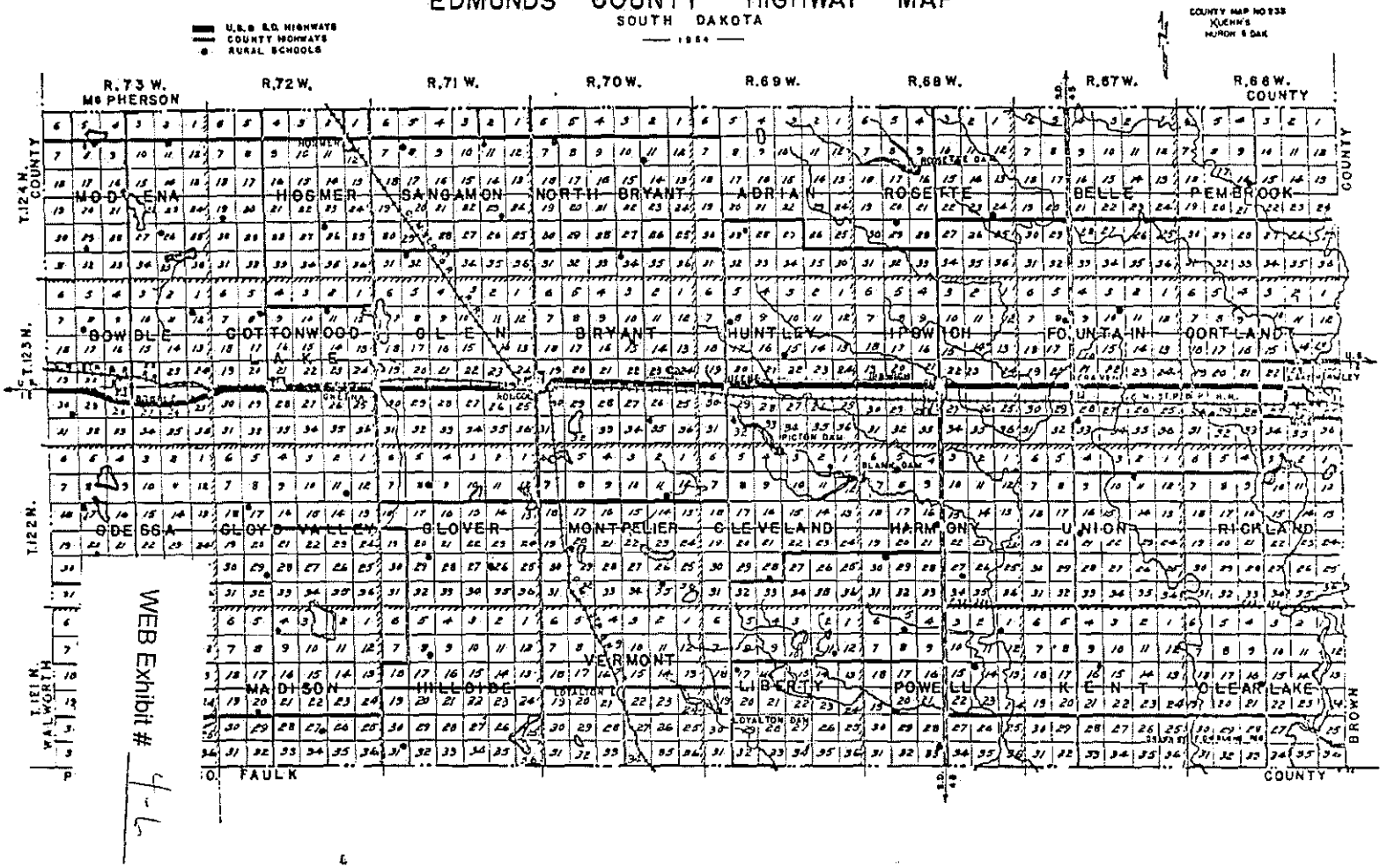
No Scale

010241

EDMUNDS COUNTY HIGHWAY MAP

SOUTH DAKOTA

— 1954 —



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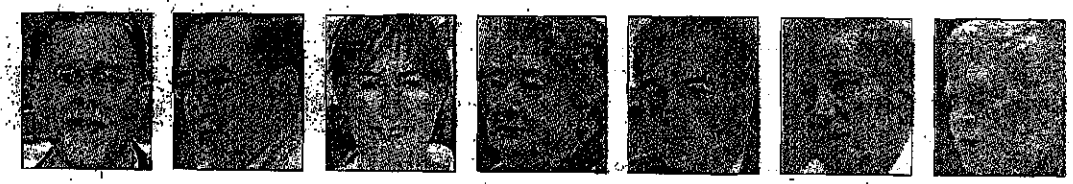
Argus Leader
, April 29, 2007 SIOUX FALLS, SOUTH DAKOTA ☆☆ $1.50

MEET THE SCHOOL BOARD CANDIDATES



▶ Seven Sioux Falls residents seek two seats in the May 15 school board election. Read about them inside today's edition and learn more of their views Monday. FULL PAGE REPORT: PAGE 5A

Oil pipeline on fast track

Firm hopes to pump 435,000 barrels per day under S.D. by 2009

Curt Hohn: Has concerns about the oil pipeline's safety.

Bob Sheedy: Says TransCanada has an impeccable safety record.

BY PETER HARRIMAN
pharrima@argusleader.com

For South Dakotans used to seeing large projects such as the Dakota Minnesota & Eastern Railroad expansion toil for years to gain regulatory approval and fight legal challenges, a proposed oil pipeline through eastern South Dakota appears to be moving at astonishing speed.

"In my estimation, this thing is on as fast a track as I've ever seen," said John Davidson of the Living River Group of the South Dakota Sierra Club chapter, about the Keystone pipeline, a plan by utility giant TransCanada to send 435,000 barrels of crude oil per day by 2009 under South Dakota. The oil would move through a 30-inch pipe pressurized at 1,400 pounds per square inch.

@ARGUS LEADER.COM

See Dave Mingo, Yankton development director, talk about TransCanada's Keystone Pipeline.

Many see it as steady progress. But at least one official with some insight into pipelines is raising concerns about potential leaks.

Curt Hohn, general manager of the WEB Water Development Association in northeastern South Dakota and North Dakota, is in charge of a 6,200-mile network of underground

See **PIPELINE**, Page 6A

WEB Exhibit # 5 - A

Pipeline: So far, criticism has been minimal

Continued from 1A

pipes and valves carrying an environmentally safe product: water. At 200 psi, WEB Water's pipeline is pressurized considerably less than TransCanada's oil pipeline would be.

Hohn might be a lonely critic amid the many supporters of the project, but he is trying to rally support for sharp scrutiny of the TransCanada plan. He is raising questions about whether a huge, high-pressure daily pulse of crude oil an average of 4 feet under South Dakota's productive farmland, range and wetlands is really all that safe.

"Even in the best laid pipelines, the pipes fail," Hohn said.

Across South Dakota, the TransCanada project is designed to have shutoff valves about 20 miles apart remotely monitored and operated by a computer system in Canada. The WEB system has valves every two miles to isolate breaks in the line and minimize spills, Hohn said.

Awaiting approval

TransCanada's $2.1 billion Keystone pipeline was announced as a proposal in early 2005. Its total length of 1,830 miles will reach from vast oil reserves in the sandy soil underlying Alberta to an oil storage and pipeline hub near Patoka, Ill. Spur lines also will connect with pipelines leading to refineries in Cushing, Okla., Wood River, Ill., and the Gulf Coast.

On Feb. 12, the Canadian National Energy Board approved the project. The U.S. State Department is preparing an Environmental Impact Statement to secure a Presidential Permit. An array of federal and state agencies are assisting in the preparation of the Environmental Impact Statement and other permitting issues. No pipe will be laid in South Dakota until the permitting is completed.

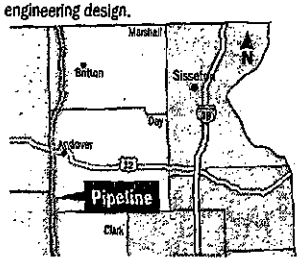
Many experts laud TransCanada's

LARA NEEL / ARGUS LEADER

Yankton community development director Dave Mingo talks about the Missouri River at Paddle Wheel Point. Mingo said pipeline plans mean his city is looking as far as 70 years out to make sure the pipeline doesn't affect growth.

Proposed Keystone pipeline

This map is the proposed Keystone pipeline route through South Dakota as of April 7. This route will continue to be refined based on consultation with stakeholders and engineering design.



Hohn might look askance at the proposed distance between Keystone's isolation valves. However, Jones said spacing them about every 20 miles "is suitable for the environment we're going through." In areas of higher population, there would be more.

Furthermore, Jones said corrosion and leaks that plague the BP pipeline in Alaska probably won't affect Keystone because much of the water and sulphur mixed with crude oil that has degraded the BP pipeline will be removed before Alberta crude oil enters the Keystone network.

TransCanada is building Keystone

Dakota's interests.

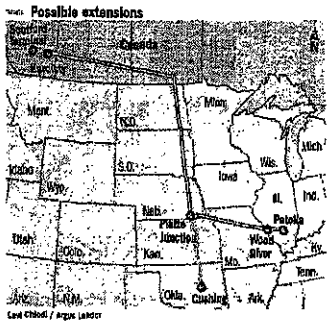
Mitch Krebs, Gov. Mike Rounds' spokesman, said Rounds is relying on the state agencies but is keeping abreast of Keystone's permitting issues. Rounds also continues to support the approximately $310 million economic benefit from pipeline construction and the $6.5 million in annual taxes Keystone will bring to South Dakota, Krebs said.

Wildlife worries

The State Department oversees Keystone's federal permit process, but agencies more familiar to South

TransCanada's proposed Keystone pipeline project route

Possible extensions



Levi Chlodi / Argus Leader

ment during pipeline construction.

Planning future growth

A straight blue line on a map offers a graphic illustration of the challenge Keystone will cause Yankton. The line is the planned Keystone route, and it borders a vacant plain on Yankton's southeast where the city is expected to add industrial development.

"It's a wall," said Dave Mingo, Yankton's community development director.

TransCanada has been willing to run the pipeline deeper so it won't interfere with the city's plans to eventually bring utilities to the area, but the pipeline "has forced us to look maybe as far as 70 years out as far as infrastructure planning is concerned. Typically, we would look no more than 20 years out," Mingo said. "If we don't let them know now, when the pipeline ends up in the ground, we would be designing around them rather than them designing around us."

The pipeline route also crosses under 70 acres of recreational trail, prairie and shoreline associated with the city's visitor center. South Dakota currently has no crude oil pipelines and only three carrying refined petroleum products. One of them is already located here: The Kaneb line carrying

WEB Exhibit # 5-6

010244

will connect with pipelines leading to refineries in Cushing, Okla., Wood River, Ill., and the Gulf Coast.

On Feb. 12, the Canadian National Energy Board approved the project. The U.S. State Department is preparing an Environmental Impact Statement to secure a Presidential Permit. An array of federal and state agencies are assisting in the preparation of the Environmental Impact Statement and other permitting issues. No pipe will be laid in South Dakota until the permitting is completed.

Many experts laud TransCanada's track record and business practices.

Chuck Hamel is an ardent watchdog of oil pipelines who has drawn attention to the failings of the British Petroleum pipeline at Prudhoe Bay in Alaska.

"As long as it is done right and operated correctly, I don't see a problem. They've got crude oil lines all over the world," he said. Furthermore, "the Canadians have done very well. I've never heard a bad thing about TransCanada."

Bob Sheedy, a writer from Roblin, Manitoba, who works with the Manitoba government to develop trout fisheries in prairie lakes, says TransCanada "has an impeccable safety record."

Robert Jones, TransCanada's vice president and director of the Keystone pipeline, says a combination of high-grade steel and welding, monitoring technology and forethought about picking the Keystone route make it safe.

"We try and avoid sensitive areas, state and national parks. We don't cross any aboriginal lands.

"We try to stay away from major metropolitan areas. We don't want to run this thing down Main Street," he said.

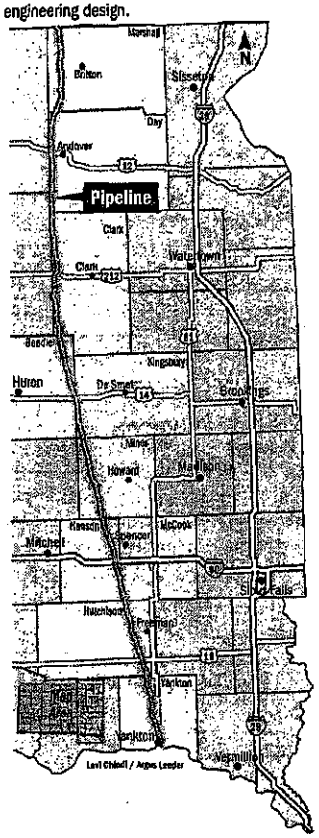
The pipeline will be buried an average depth of 4 feet. It will not interfere with farming activity and municipal utilities, Jones said. In comparison, the Lewis & Clark water pipeline is being buried an average of 6 feet underground for many of those same reasons, Lewis & Clark Rural Water director Troy Larson said.

Leak prevention

Hohn's concerns about pipeline pressure notwithstanding, crude oil regularly moves between 1,400 and 2,000 psi, Jones said. It's up from 1,000 psi for pipelines built in the 1950s. This reflects improved quality of steel and welding. "We try to test 100 percent of our welds, so when we put it in the ground, we never have to look at it again," Jones said.

Proposed Keystone pipeline

This map is the proposed Keystone pipeline route through South Dakota as of April 7. This route will continue to be refined based on consultation with stakeholders and engineering design.



In TransCanada's modern oil pipelines, in-line computerized inspections detect dents, corrosion and other anomalies before they become leaks. And pipeline pressures are monitored. If there is any sudden change, pump stations are shut down, and the line is isolated to minimize damage from leaking oil.

posed distance between Keystone's isolation valves. However, Jones said spacing them about every 20 miles "is suitable for the environment we're going through." In areas of higher population, there would be more.

Furthermore, Jones said corrosion and leaks that plague the BP pipeline in Alaska probably won't affect Keystone because much of the water and sulphur mixed with crude oil that has degraded the BP pipeline will be removed before Alberta crude oil enters the Keystone network.

TransCanada is building Keystone itself, but oil giant ConocoPhillips has an opportunity to become a partner, Jones said. Whether it does will not affect TransCanada's management of Keystone and ongoing commitment to maintain it, Jones said.

PUC permit

Jones said the project is moving along at a responsible pace.

"We've done all the consultation and all the surveys. We've selected the route. We've talked to all the different stakeholders. We've filed evidence with the Department of State," he said. A draft Environmental Impact Statement is due out in June, and TransCanada next will file for a state permit with the Public Utilities Commission.

The draft Environmental Impact Statement and PUC request might present opportunities for Keystone opponents to mount challenges. To date, criticism of the project is minimal. "If there's a concern, it's the lack of a forum to seriously raise" potential environmental issues associated with the pipeline, Davidson said.

TransCanada seems to be skillfully driving the regulatory process.

"At this point, it really appears they are taking in everyone's concerns," said Kara Van Bockern, PUC lawyer. She calls the relationship between TransCanada and the myriad federal, state and local agencies "a very harmonious state of affairs."

She also said when TransCanada files for a state permit, the PUC and the Department of Environment and Natural Resources will have sufficient statutory clout to look out for South

Mitch Krebs, Gov. Mike Rounds' spokesman, said Rounds is relying on the state agencies but is keeping abreast of Keystone's permitting issues. Rounds also continues to support the approximately $310 million economic benefit from pipeline construction and the $6.5 million in annual taxes Keystone will bring to South Dakota, Krebs said.

Wildlife worries

The State Department oversees Keystone's federal permit process, but agencies more familiar to South Dakotans, such as the U.S. Fish and Wildlife Service and Army Corps of Engineers, are shaping the project.

"It's almost impossible to build a project of this scale and scope without crossing some of the easements we have," said Jack Lalor, assistant manager of the USFWS Tewaukon National Wildlife Refuge, who is working on wetlands issues associated with Keystone. The Corps, under the Clean Water Act, is responsible for ensuring that Keystone does not degrade water quality, and it has to approve Keystone's crossing of the Missouri River at Paddle Wheel Point in Yankton.

The USFWS is largely concerned that Keystone does not disturb valuable habitat for threatened and endangered species and that building the pipeline does not permanently harm wetlands the pipe will pass under. Tom Tornow, who heads the USFWS Madison wetlands district, said the pipeline "will be crossing some critical habitat for Topeka shiners," a federally designated endangered species, and construction is expected to result in a one-year disturbance in nesting for wetland birds.

Lalor said TransCanada has been amenable to a USFWS request to reroute Keystone away from the Hecla sand hills that drain into Waubay and the Sand Lake Wildlife Refuge, and the agency is taking inventory of other areas with rare plants and animals that might be affected by a pipeline.

Most of the wetland soils that would be disturbed by construction "recover nicely" Lalor said, and Jones added that TransCanada in the past decade has made "real advances" in soil management planning is concerned. Typically, we would look no more than 20 years out," Mingo said. "If we don't let them know now, when the pipeline ends up in the ground, we would be designing around them rather than them designing around us."

The pipeline route also crosses under 70 acres of recreational trail, prairie and shoreline associated with the city's visitor center. South Dakota currently has no crude oil pipelines and only three carrying refined petroleum products. One of them is already located here: The Kaneb line carrying vehicle fuels crosses the Missouri at Paddle Wheel Point. The Corps of Engineers will require Keystone to use the same crossing. Mingo says in the 15 years he has worked for Yankton, there have been no problems with the Kaneb pipeline.

According to the U.S. Energy Information Administration, Kaneb, Williams and Amoco have refined petroleum products pipelines in South Dakota. After Sept. 11, the National Pipeline Mapping System no longer makes its maps available to the public.

As Keystone gets closer to securing regulatory approval, Hohn at WEB Water questions whether TransCanada will have sufficient staff in the U.S. to maintain the pipeline. Will TransCanada post bonds with state or local governments to establish a mitigation fund if Keystone leaks, or will landowners have to fight for restitution? If crude oil escapes the pipeline at 1,400 psi, could friction start a fire? If so, who will fight it?

Hohn also points to a pipeline rupture near Bemidji, Minn., in 1979 that spilled 10,700 barrels of crude oil. Despite cleanup efforts, about 110,000 gallons remain in the soil and water table and are migrating toward a nearby lake. Is this South Dakota's fate?

While the draft Environmental Impact Statement might prompt such inquiry, so far, Hohn seems to be a lone voice asking questions.

The loudest voice talking about Keystone might belong to Jones. He said this: "A pipeline is by far the safest way to move hydrocarbon products."

Reach reporter Peter Harriman at 575-3615.

WEB Exhibit # 5, 1 of 2

010245

PIPELINE

TransCan's Keystone costs soar

DAVID EBNER

October 31, 2007

CALGARY -- The cost estimate of a planned new pipeline to move raw oil sands production to the United States has almost doubled, **TransCanada Corp.** says.

The Calgary-based pipeline and power-generation company said yesterday its proposed Keystone pipeline will cost $5.2-billion (U.S.), up from an estimate of $2.8-billion four months ago.

TransCanada is a natural gas pipeline company trying to break into the oil-transportation business. It would be taking on archrival **Enbridge Inc.**, the No. 1 mover of oil."Even with the cost increases, we're still very, very competitive," Russ Girling, president of TransCanada's pipeline business, said during a conference call yesterday to discuss quarterly earnings.

The Keystone pipeline, which could be moving oil in late 2009, would connect a major hub near Edmonton with two refining centres in southern Illinois. There would also be another connection with Cushing, Okla. In total, Keystone could carry 590,000 barrels of oil a day.

Groups such as the Canadian Energy & Paperworkers Union have said the pipeline would effectively ship 18,000 high-value domestic jobs "down the pipeline" to the United States, and they want the federal cabinet to stop the project.

The massive jump in Keystone's price tag is due to design changes, as well as high costs for steel and workers, and overall inflation, TransCanada said.

Canadian regulatory approval has been secured to move 435,000 barrels per day on Keystone, and TransCanada said yesterday it will request approval for 590,000 barrels. It still needs approval for Keystone in the United States.

Calgary-based Enbridge already moves upward of two million barrels a day between Alberta and Chicago and further south.

The company is looking to add 450,000 barrels per day of new capacity on a planned new pipeline called Alberta Clipper, which would run alongside its main line from Alberta to Wisconsin, with additional connections beyond. TRANSCANADA CORP. (TRP)

WEB Exhibit # 6

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August 23, 2007

Writer's E-mail: koenecke@magt.com

Patricia Van Gerpen, Executive Director
South Dakota Public Utilities Commission
500 E. Capitol
Pierre, SD 57501

Re: In the Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone Pipeline Project; HP 07-001. Informational Submittal

Our File: 5057

Dear Ms. Van Gerpen:

TransCanada Keystone Pipeline, LP (Keystone) hereby provides, as an informational submittal in connection with its application for a permit under the South Dakota Energy Conversion and Transmission Facilities Act, a copy of the "Special Permit" granted to Keystone by the United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA).

The federal pipeline safety regulations require that the formula used by pipeline operators to establish maximum operating pressure use the design factor contained in 49 C.F.R. § 195.106. The formula specifies a design factor of 0.72 for onshore pipelines. Under the federal Pipeline Safety Act, PHMSA may grant a waiver of any regulatory requirement if the agency finds that granting the waiver "is not inconsistent with pipeline safety." 49 U.S.C. § 60118. On November 17, 2006, Keystone filed a request for waiver of 49 C.F.R. § 195.106, seeking permission to use an 0.80 design factor, in lieu of a 0.72 design factor, for the Mainline and Cushing Extension portions of the Keystone Pipeline project.

PHMSA undertook an extensive, detailed technical review of Keystone's request. PHMSA also engaged outside experts in the field of steel pipeline fracture mechanics, leak detection and SCADA systems to assist in the review of Keystone's application. PHMSA publicly noticed Keystone's application and incorporated the concerns expressed in public comment into its review. As a result of its review, PHMSA issued the attached Special Permit allowing Keystone to design, construct and operate its crude oil pipeline project using a design

WEB Exhibit # 7-a

factor and operating stress level of 80 percent of the steel pipe's specified minimum strength (SMYS) in most areas.

In issuing the Special Permit, PHMSA found specifically that allowing Keystone to operate at 80 percent of SMYS is not inconsistent with pipeline safety and that it "will provide a level of safety equal to or greater than that which would be provided if the pipelines were operated under existing regulations." The Special Permit contains 51 conditions that Keystone must comply with, addressing areas such as steel properties, manufacturing standards, fracture control, quality control, puncture resistance, hydrostatic testing, pipe coating, overpressure control, welding procedures, depth of cover, SCADA, leak detection, pigging, corrosion monitoring, pipeline markers, in-line inspection, damage prevention program, reporting, and other areas. Failure to comply with any condition may result in revocation of the Special Permit. In addition, the Special Permit is not applicable to certain sensitive areas including commercially navigable high consequence areas, high population high consequence areas, highway, railroad and road crossings, and pipeline located within pump stations, mainline valve assemblies, pigging facilities, and measurement facilities. Issuance of the Special Permit was based on PHMSA's determinations that the aggregate affect of Keystone's actions and PHMSA's conditions provide for more inspections and oversight than would occur on pipelines installed under the existing regulations, and that PHMSA's conditions require Keystone to more closely inspect and monitor its pipeline over its operational life than similar pipelines installed without a Special Permit.

The PHMSA Special Permit does not materially change Keystone's application before the Public Service Commission. Specifically, issuance of the Special Permit will not result in an increase in Keystone's maximum allowable operating pressure of 1,440 psig.

While compliance with the federal pipeline safety regulations is a matter subject to PHMSA's jurisdiction, Keystone appreciates the PUC's interest in the Special Permit and trusts this informational submittal is helpful to the Commission.

Respectfully submitted,

MAY, ADAM, GERDES & THOMPSON LLP

BRETT KOENECKE

BK:lar

WEB Exhibit # M-6

U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

APR 30 2007

Mr. Robert Jones
Vice President
TransCanada Keystone Pipeline, LP
450 1st Street, SW
Calgary, Alberta, T2P 5H1
Canada

Dear Mr. Jones:

On November 17, 2006 you wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a waiver of compliance from PHMSA's pipeline safety regulation 49 CFR 195.106 for two pipelines. The regulation specifies the design factor used in the design pressure formula to establish the maximum operating pressure for a hazardous liquid pipeline.

The PHMSA is granting this waiver through the enclosed special permit. This special permit will allow TransCanada Keystone Pipeline, LP (Keystone) to establish a maximum operating pressure for two pipelines using a 0.80 design factor in lieu of 0.72, with conditions and limitations. The proposed pipelines covered by this special permit are the 1,025-mile, 30-inch, mainline from the Canadian border at Cavalier County, North Dakota, to Wood River, Illinois; and, the 291-mile, 36-inch, Cushing Extension from Jefferson County, Nebraska, to Cushing (Marion County), Oklahoma. The special permit provides some relief from the Federal pipeline safety regulations for Keystone while ensuring that pipeline safety is not compromised.

If necessary, my staff would be pleased to discuss this special permit or any other regulatory matter with you. Florence Hamn, Director, Office of Regulations (202-366-4595) would be pleased to assist you.

Sincerely,

Jeffrey D. Wiese
Acting Associate Administrator
for Pipeline Safety

Enclosure

WEB Exhibit # 7-C

DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION (PHMSA)

SPECIAL PERMIT

Docket Number: PHMSA-2006-26617
Pipeline Operator: TransCanada Keystone Pipeline, L.P.
Date Requested: November 17, 2006
Code Section(s): 49 CFR 195.106

Grant of Special Permit:

Based on the findings set forth below, the Pipeline and Hazardous Materials Safety Administration (PHMSA) grants this special permit to TransCanada Keystone Pipeline, L.P. (Keystone). This special permit allows Keystone to design, construct and operate two new crude oil pipelines using a design factor and operating stress level of 80 percent of the steel pipe's specified minimum yield strength (SMYS) in rural areas. The current regulations in 49 CFR 195.106 limit the design factor and operating stress level for hazardous liquids pipelines to 72 percent of SMYS. This special permit is subject to the conditions set forth below.

Except for the non-covered portions of the pipelines described below, this special permit covers two proposed pipelines in the United States:

- The 1,025-mile, 30-inch, Mainline from the Canadian border at Cavalier County, North Dakota, traversing the States of South Dakota, Nebraska, Kansas and Missouri, to Wood River, Illinois; and

- The 291-mile, 36-inch, Cushing Extension from Jefferson County, Nebraska, through Kansas, to Cushing (Marion County), Oklahoma.

This special permit does not cover certain portions of the Mainline and Cushing Extension pipelines. These non-covered portions are the following:

- Pipeline segments operating in high consequence areas (HCAs) described as commercially navigable waterways in 49 CFR 195.450;

- Pipeline segments operating in HCAs described as high population areas in 49 CFR 195.450;

WEB Exhibit # 7-C

- Pipeline segments operating at highway, railroad and road crossings; and
- Piping located within pump stations, mainline valve assemblies, pigging facilities and measurement facilities.

For the purpose of this special permit, the "special permit area" means the area consisting of the entire pipeline right-of-way for those segments of the pipeline that will operate above 72 percent of SMYS.

Findings:

PHMSA finds that granting this special permit to Keystone to operate two new crude oil pipelines at a pressure corresponding to a hoop stress of up to 80 percent SMYS is not inconsistent with pipeline safety. Doing so will provide a level of safety equal to, or greater than, that which would be provided if the pipelines were operated under existing regulations. We do so because the special permit analysis shows the following:

- Keystone's special permit application describes actions for the life cycle of each proposed pipeline addressing pipe and material quality, construction quality control, pre-in service strength testing, the Supervisory Control and Data Acquisition (SCADA) system inclusive of leak detection, operations and maintenance and integrity management. The aggregate affect of these actions and PHMSA's conditions provide for more inspections and oversight than would occur on pipelines installed under existing regulations; and
- The conditions contained in this special permit grant require Keystone to more closely inspect and monitor the pipelines over its operational life than similar pipelines installed without a special permit.

Conditions:

The grant of this special permit is subject to the following conditions:

1) Steel Properties: The skelp/plate must be micro alloyed, fine grain, fully killed steel with calcium treatment and continuous casting.
2) Manufacturing Standards: The pipe must be manufactured according to American Petroleum Institute Specification 5L, *Specification for Line Pipe* (API 5L), product

specification level 2 (PSL 2), supplementary requirements (SR) for maximum operating pressures and minimum operating temperatures. Pipe carbon equivalents must be at or below 0.23 percent based on the material chemistry parameter (Pcm) formula.

3) Transportation Standards: The pipe delivered by rail car must be transported according to the API Recommended Practice 5L1, *Recommended Practice for Railroad Transportation of Line Pipe* (API 5L1).

4) Fracture Control: API 5L and other specifications and standards address the steel pipe toughness properties needed to resist crack initiation. Keystone must institute an overall fracture control plan addressing steel pipe properties necessary to resist crack initiation and propagation. The plan must include acceptable Charpy Impact and Drop Weight Tear Test values, which are measures of a steel pipeline's toughness and resistance to fracture. The fracture control plan, which must be submitted to PHMSA headquarters, must be in accordance with API 5L, Appendix F and must include the following tests:

   a) SR 5A - Fracture Toughness Testing for Shear Area: Test results must indicate at least 85 percent minimum average shear area for all X-70 heats and 80 percent minimum shear area for all X-80 heats with a minimum result of 80 percent shear area for any single test. The test results must also ensure a ductile fracture;

   b) SR 5B – Fracture Toughness Testing for Absorbed Energy; and

   c) SR 6 – Fracture Toughness Testing by Drop Weight Tear Test: Test results must be at least 80 percent of the average shear area for all heats with a minimum result of 60 percent of the shear area for any single test. The test results must also ensure a ductile fracture.

   The above fracture initiation, propagation and arrest plan must account for the entire range of pipeline operating temperatures, pressures and product compositions planned for the pipeline diameter, grade and operating stress levels, including maximum pressures and minimum temperatures for start up and shut down conditions associated with the special permit area. If the fracture control plan for the pipe in the special permit area does not meet these specifications, Keystone must submit to PHMSA headquarters an alternative plan providing an acceptable method to resist crack initiation, crack propagation and to arrest ductile fractures in the special permit area.

5) Steel Plate Quality Control: The steel mill and/or pipe rolling mill must incorporate a comprehensive plate/coil mill and pipe mill inspection program to check for defects and

inclusions that could affect the pipe quality. This program must include a plate or rolled pipe (body and all ends) ultrasonic testing (UT) inspection program per ASTM A578 to check for imperfections such as laminations. An inspection protocol for centerline segregation evaluation using a test method referred to as slab macro-etching must be employed to check for inclusions that may form as the steel plate cools after it has been cast. A minimum of one macro-etch or a suitable alternative test must be performed from the first or second heat (manufacturing run) of each sequence (approximately four heats) and graded on the Mannesmann scale or equivalent. Test results with a Mannesmann scale rating of one or two out of a possible five scale are acceptable.

6) Pipe Seam Quality Control: A quality assurance program must be instituted for pipe weld seams. The pipe weld seam tests must meet the minimum requirements for tensile strength in API 5L for the appropriate pipe grade properties. A pipe weld seam hardness test using the Vickers hardness testing of a cross-section from the weld seam must be performed on one length of pipe from each heat. The maximum weld seam and heat affected zone hardness must be a maximum of 280 Vickers hardness (Hv10). The hardness tests must include a minimum of two readings for each heat affected zone, two readings in the weld metal and two readings in each section of pipe base metal for a total of 10 readings. The pipe weld seam must be 100 percent UT inspected after expansion and hydrostatic testing per APL 5L.

7) Monitoring for Seam Fatigue from Transportation: Keystone must inspect the double submerged arc welded pipe seams of the delivered pipe using properly calibrated manual or automatic UT techniques. For each lay down area, a minimum of one pipe section from the bottom layer of pipes of the first five rail car shipments from each pipe mill must be inspected. The entire longitudinal weld seam must be tested and the results appropriately documented. For helical seam submerged arc welded pipe, Keystone must test and document the weld seam in the area along the transportation bearing surfaces and all other exposed weld areas during the test. Each pipe section test record must be traceable to the pipe section tested. PHMSA headquarters must be notified of any flaws that exceeded specifications and needed to be removed. Keystone's findings will determine if PHMSA will require the testing program be expanded to include a larger sampling population for seam defects originating during pipeline transportation.

WEB Exhibit # 7-F

8) Puncture Resistance: Steel pipe must be puncture resistant to an excavator weighing up to 65 tons with a general purpose tooth size of 3.54 inches by 0.137 inches. Puncture resistance will be calculated based on industry established calculations such as the Pipeline Research Council International's *Reliability Based Prevention of Mechanical Damage to Pipelines* calculation method.

9) Mill Hydrostatic Test: The pipe must be subjected to a mill hydrostatic test pressure of 95 percent of SMYS or greater for 10 seconds. Any mill hydrostatic test failures must be reported to PHMSA headquarters with the reason for the test failure.

10) Pipe Coating: The application of a corrosion resistant coating to the steel pipe must be subject to a coating application quality control program. The program must address pipe surface cleanliness standards, blast cleaning, application temperature control, adhesion, cathodic disbondment, moisture permeation, bending, minimum coating thickness, coating imperfections and coating repair.

11) Field Coating: Keystone must implement a field girth weld joint coating application specification and quality standards to ensure pipe surface cleanliness, application temperature control, adhesion quality, cathodic disbondment, moisture permeation, bending, minimum coating thickness, holiday detection and repair quality must be implemented in field conditions. Field joint coatings must be non-shielding to cathodic protection (CP). Field coating applicators must use valid coating procedures and be trained to use these procedures. Keystone will perform follow-up tests on field-applied coating to confirm adequate adhesion to metal and mill coating.

12) Coatings for Trenchless Installation: Coatings used for directional bore, slick bore and other trenchless installation methods must resist abrasions and other damages that may occur due to rocks and other obstructions encountered in this installation technique.

13) Bends Quality: Certification records of factory induction bends and/or factory weld bends must be obtained and retained. All bends, flanges and fittings must have carbon equivalents (CE) equal to or below 0.42 or a pre-heat procedure must be applied prior to welding for CE above 0.42.

14) Fittings: All pressure rated fittings and components (including flanges, valves, gaskets, pressure vessels and pumps) must be rated for a pressure rating commensurate with the MOP of the pipeline.

WEB Exhibit # 7-9

15) Design Factor - Pipelines: Pipe installed under this special permit may use a 0.80 design factor. Pipe installed in pump stations, road crossings, railroad crossings, launcher/receiver fabrications, population HCAs and navigable waters must comply with the design factor in 49 CFR 195.106. If portions of the pipeline become population HCAs during the operational life of the pipeline, Keystone will apply to PHMSA headquarters for a special permit for the affected pipeline sections.

16) Temperature Control: The pipeline operating temperatures must be less than 150 degrees Fahrenheit.

17) Overpressure Protection Control: Mainline pipeline overpressure protection must be limited to a maximum of 110 percent MOP consistent with 49 CFR 195.406(b).

18) Construction Plans and Schedule: The construction plans, schedule and specifications must be submitted to the appropriate PHMSA regional office for review within two months of the anticipated construction start date. Subsequent plans and schedule revisions must also be submitted to the PHMSA regional office.

19) Welding Procedures: The appropriate PHMSA regional office must be notified within 14 days of the beginning of welding procedure qualification activities. Automated or manual welding procedure documentation must be submitted to the same PHMSA regional office for review. For X-80 pipe, Keystone must conform to revised procedures contained in the 20th edition of API Standard 1104, *Welding of Pipelines and Related Facilities* (API 1104), Appendix A, or by an alternative procedure approved by PHMSA headquarters.

20) Depth of Cover: The soil cover must be maintained at a minimum depth of 48 inches in all areas except consolidated rock. In areas where conditions prevent the maintenance of 42 inches of cover, Keystone must employ additional protective measures to alert the public and excavators to the presence of the pipeline. The additional measures shall include placing warning tape and additional pipeline markers along the affected pipeline segment. In areas where the pipeline is susceptible to threats from chisel plowing or other activities, the top of the pipeline must be installed at least one foot below the deepest penetration above the pipeline. If routine patrols indicate the possible loss of cover over the pipeline, Keystone must perform a depth of cover study and replace cover as necessary to meet the minimum depth of cover requirements specified herein. If the replacement of cover is impractical or not possible, Keystone must install other protective measures including warning tape and closely spaced signs.

WEB Exhibit # 7-h

21) Construction Quality: A construction quality assurance plan for quality standards and controls must be maintained throughout the construction phase with respect to: inspection, pipe hauling and stringing, field bending, welding, non-destructive examination (NDE) of girth welds, field joint coating, pipeline coating integrity tests, lowering of the pipeline in the ditch, padding materials to protect the pipeline, backfilling, alternating current (AC) interference mitigation and CP systems. All girth welds must be NDE by radiography or alternative means. The NDE examiner must have all current required certifications.

22) Interference Currents Control: Control of induced alternating current from parallel electric transmission lines and other interference issues that may affect the pipeline must be incorporated into the design of the pipeline and addressed during the construction phase. Issues identified and not originally addressed in the design phase must be brought to PHMSA headquarters' attention. An induced AC program to protect the pipeline from corrosion caused by stray currents must be in place and functioning within six months after placing the pipeline in service.

23) Test Level: The pre-in service hydrostatic test must be to a pressure producing a hoop stress of 100 percent SMYS and 1.25 X MOP in areas to operate to 80 percent SMYS. The hydrostatic test results from each test after completion of each pipeline must be submitted to PHMSA headquarters.

24) Assessment of Test Failures: Any pipe failure occurring during the pre-in service hydrostatic test must undergo a root cause failure analysis to include a metallurgical examination of the failed pipe. The results of this examination must preclude a systemic pipeline material issue and the results must be reported to PHMSA headquarters and the appropriate PHMSA regional office.

25) Supervisory Control and Data Acquisition (SCADA) System: A SCADA system to provide remote monitoring and control of the entire pipeline system must be employed.

26) SCADA System – General:

a) Scan rate shall be fast enough to minimize overpressure conditions (overpressure control system), provide very responsive abnormal operation indications to controllers and detect small leaks within technology limitations;

b) Must meet the requirements of regulations developed as a result of the findings of the National Transportation Safety Board, *Supervisory Control and Data Acquisition (SCADA) in Liquid Pipelines,* Safety Study, NTSB/SS-05/02 specifically including:

WEB Exhibit # 7-i

- Operator displays shall adhere to guidance provided in API Recommended Practice 1165, *Recommended Practice for Pipeline SCADA Display* (API RP 1165)
- Operators must have a policy for the review/audit of alarms for false alarm reduction and near miss or lessons learned criteria
- SCADA controller training shall include simulator for controller recognition of abnormal operating conditions, in particular leak events
- See item 27b below on fatigue management
- Install computer-based leak detection system on all lines unless an engineering analysis determines that such a system is not necessary

c) Develop and implement shift change procedures for controllers;

d) Verify point-to-point display screens and SCADA system inputs before placing the line in service;

e) Implement individual controller log-in provisions;

f) Establish and maintain a secure operating control room environment;

g) Establish controls to functionally test the pipeline in an off-line mode prior to beginning the line fill and placing the pipeline in service; and

h) Provide SCADA computer process load information tracking.

27) SCADA – Alarm Management: Alarm Management Policy and Procedures shall address:

a) Alarm priorities determination;

b) Controllers' authority and responsibility;

c) Clear alarm and event descriptors that are understood by controllers;

d) Number of alarms;

e) Potential systemic system issues;

f) Unnecessary alarms;

g) Controllers' performance regarding alarm or event response;

h) Alarm indication of abnormal operating conditions (AOCs);

i) Combination AOCs or sequential alarms and events; and

j) Workload concerns.

28) SCADA – Leak Detection System (LDS): The LDS Plan shall include provisions for:

a) Implementing applicable provisions in API Recommended Practice 1130, *Computational Pipeline Monitoring for Liquid Pipelines* (API RP 1130), as appropriate;

WEB Exhibit # 7-j

b) Addressing the following leak detection system testing and validation issues:
   - Routine testing to ensure degradation has not affected functionality
   - Validation of the ability of the LDS to detect small leaks and modification of the LDS as necessary to enhance its accuracy to detect small leaks
   - Conduct a risk analysis of pipeline segments to identify additional actions that would enhance public safety or environmental protection

c) Developing data validation plan (ensure input data to SCADA is valid);

d) Defining leak detection criteria in the following areas:
   - Minimum size of leak to be detected regardless of pipeline operating conditions including slack and transient conditions
   - Leak location accuracy for various pipeline conditions
   - Response time for various pipeline conditions

e) Providing redundancy plans for hardware and software and a periodic test requirement for equipment to be used live (also applies to SCADA equipment).

29) SCADA – Pipeline Model and Simulator: The Thermal-Hydraulic Pipeline Model/ Simulator including pressure control system shall include a Model Validation/Verification Plan.

30) SCADA – Training: The training and qualification plan (including simulator training) for controllers shall:

a) Emphasize procedures for detecting and mitigating leaks;

b) Include a fatigue management plan and implementation of a shift rotation schedule that minimizes possible fatigue concerns;

c) Define controller maximum hours of service limitations;

d) Meet the requirements of regulations developed as a result of the guidance provided in the American Society of Mechanical Engineers Standard B31Q, *Pipeline Personnel Qualification Standard* (ASME B31Q), September 2006 for developing qualification program plans;

e) Include and implement a full training simulator capable of replaying near miss or lesson learned scenarios for training purposes;

f) Implement tabletop exercises periodically that allow controllers to provide feedback to the exercises, participate in exercise scenario development and actively participate in the exercise;

WEB Exhibit # 7-K

g) Include field visits for controllers accompanied by field personnel who will respond to call-outs for that specific facility location;

h) Provide facility specifics in regard to the position certain equipment devices will default to upon power loss;

i) Include color blind and hearing provisions and testing if these are required to identify alarm priority or equipment status;

j) Training components for task specific abnormal operating conditions and generic abnormal operating conditions;

k) If controllers are required to respond to "800" calls, include a training program conveying proper procedures for responding to emergency calls, notification of other pipeline operators in the area when affecting a common pipeline corridor and education on the types of communications supplied to emergency responders and the public using API Recommended Practice 1162, *Public Awareness Programs for Pipeline Operators* (API RP 1162);

l) Implement on-the-job training component intervals established by performance review to include thorough documentation of all items covered during oral communication instruction; and

m) Implement a substantiated qualification program for re-qualification intervals addressing program requirements for circumstances resulting in disqualification, procedure documentation for maximum controller absences before a period of review, shadowing, retraining, and addressing interim performance verification measures between re-qualification intervals.

31) SCADA – Calibration and Maintenance: The calibration and maintenance plan for the instrumentation and SCADA system shall be developed using guidance provided in API 1130. Instrumentation repairs shall be tracked and documentation provided regarding prioritization of these repairs. Controller log notes shall periodically be reviewed for concerns regarding mechanical problems. This information will be tracked and prioritized.

32) SCADA – Leak Detection Manual: The Leak Detection Manual shall be prepared using guidance provided in Canadian Standards Association, *Oil and Gas Pipeline Systems*, CSA Z662-03, Annex E, Section E.5.2, Leak Detection Manual.

33) Mainline Valve Control: Mainline valves located on either side of a pipeline segment containing an HCA where personnel response time to the valve exceeds one hour must be

WEB Exhibit # 7-L

remotely controlled by the SCADA system. The SCADA system must be capable of opening and closing the valve and monitoring the valve position, upstream pressure and downstream pressure.

34) Pipeline Inspection: The pipeline must be capable of passing in line inspection (ILI) tools. All headers and other segments covered under this special permit that do not allow the passage of an ILI device must have a corrosion mitigation plan.

35) Internal Corrosion: Keystone shall limit sediment and water (S&W) to 0.5 percent by volume and report S&W testing results to PHMSA in the 180-day and annual reports. Keystone shall also report upset conditions causing S&W level excursions above the limit. This report shall also contain remedial measures Keystone has taken to prevent a recurrence of excursions above the S&W limits. Keystone must run cleaning pigs twice in the first full year of operation and as necessary in succeeding years based on the analysis of oil constituents, weight loss coupons located in areas with the greatest internal corrosion threat and other internal corrosion threats. Keystone will send their analyses and further actions, if any, to PHMSA.

36) Cathodic Protection (CP): The initial CP system must be operational within six months of placing a pipeline segment in service.

37) Interference Current Surveys: Interference surveys must be performed within six months of placing the pipeline in service to ensure compliance with applicable NACE International Standard Recommended Practices 0169 and 0177 (NACE RP 0169 and NACE RP 0177) for interference current levels. If interference currents are found, Keystone will determine if there have been any adverse affects to the pipeline and mitigate the affects as necessary. Keystone will report the results of any negative finding and the associated mitigative efforts to the appropriate PHMSA regional office.

38) Corrosion Surveys: Corrosion surveys of the affected pipeline must be completed within six months of placing the respective CP system(s) in operation to ensure adequate external corrosion protection per NACE RP 0169. The survey will also address the proper number and location of CP test stations as well as AC interference mitigation and AC grounding programs per NACE RP 0177. At least one CP test station must be located within each HCA with a maximum spacing between test stations of one-half mile within the HCA. If placement of a test station within an HCA is impractical, the test station must be placed at the nearest practical location. If any annual test station reading fails to meet 49 CFR 195,

Subpart H requirements, remedial actions must occur within six months. Remedial actions must include a close interval survey on each side of the affected test station and all modifications to the CP system necessary to ensure adequate external corrosion control.

39) Initial Close Interval Survey (CIS) - Initial: A CIS must be performed on the pipeline within two years of the pipeline in-service date. The CIS results must be integrated with the baseline ILI to determine whether further action is needed.

40) Pipeline Markers: Keystone must employ line-of-sight markings on the pipeline in the special permit area except in agricultural areas or large water crossings such as lakes where line of sight markers are impractical. The marking of pipelines is also subject to Federal Energy Regulatory Commission orders or environmental permits and local restrictions. Additional markers must be placed along the pipeline in areas where the pipeline is buried less than 42 inches.

41) Monitoring of Ground Movement: An effective monitoring/mitigation plan must be in place to monitor for and mitigate issues of unstable soil and ground movement.

42) Initial In-Line Inspection (ILI): Keystone must perform a baseline ILI in association with the construction of the pipeline using a high-resolution Magnetic Flux Leakage (MFL) tool to be completed within three years of placing a pipeline segment in service. The high-resolution MFL tool must be capable of gouge detection. Keystone must perform a baseline geometry tool run after completion of the hydrostatic strength test and backfill of the pipeline, but no later than six months after placing the pipeline in service under a special permit. The ILI data summary sheets and planned digs with associated ILI tool readings will be sent to the PHMSA regional office. The PHMSA regional office will be given at least 14 days notice before confirmation digs are executed on site. The dimensional data and other characteristics extracted from these digs will be shared with the PHMSA regional office. Keystone will also compare dimensional data and other characteristics extracted from the digs and compare them with ILI tool data. If there are large variations between dig data and ILI tool data, Keystone will submit PHMSA a plan on further actions, inclusive of more digs, to calibrate their analysis and remediation process.

43) Future ILI: Future ILI inspection must be performed on the entire pipeline subject to the special permit, on a frequency consistent with 49 CFR 195.452(j)(3), assessment intervals,

WEB Exhibit # 7-n

or on a frequency determined by fatigue studies based on actual operating conditions, inclusive of flaw and corrosion growth models.

44) Verification of Reassessment Interval: Keystone must submit a new fatigue analysis to validate the pipeline reassessment interval annually for the first five years after placing the pipeline subject to this special permit in service. The analysis must be performed on the segment experiencing the most severe historical pressure cycling conditions using actual pipeline pressure data.

45) Two years after the pipeline in-service date, Keystone will use all data gathered on pipeline section experiencing the most pressure cycles to determine effect on flaw growth that passed manufacturing standards and installation specifications. This study will be performed by an independent party agreed to by Keystone and PHMSA headquarters. Furthermore, this study will be shared with PHMSA headquarters as soon as practical after its completion, preferably before baseline assessment begins. These findings will determine if an ultrasonic crack detection tool must be launched in that pipeline section to confirm crack growth with Keystone's crack growth predictive models.

46) Direct Assessment Plan: Headers, mainline valve bypasses and other sections covered by this special permit that cannot accommodate ILI tools must be part of a Direct Assessment (DA) plan or other acceptable integrity monitoring method using External and Internal Corrosion Direct Assessment criteria (ECDA/ICDA).

47) Damage Prevention Program: The Common Ground Alliance (CGA) damage prevention best practices applicable to pipelines must be incorporated into the Keystone's damage prevention program.

48) Anomaly Evaluation and Repair: Anomaly evaluations and repairs in the special permit area must be performed based upon the following:

a) Immediate Repair Conditions: Follow 195.452(h)(4)(i) except designate the calculated remaining strength failure pressure ratio (FPR) = < 1.16;

b) 60-Day Conditions: No changes to 195.452(h)(4)(ii);

c) 180-Day Conditions: Follow 195.452(H)(4)(iii) with exceptions for the following conditions which must be scheduled for repair within 180 days:

- Calculated FPR = < 1.32
- Areas of general corrosion with predicted metal loss greater than 40 percent

WEB Exhibit # 7-o

- Predicted metal loss is greater than 40 percent of nominal wall that is located at a crossing of another pipeline
- Gouge or groove greater than 8 percent of nominal wall

d) Each anomaly not repaired under the immediate repair requirements must have a corrosion growth rate and ILI tool tolerance assigned per the Integrity Management Program (IMP) to determine the maximum re-inspection interval.

e) Anomaly Assessment Methods: Keystone must confirm the remaining strength (R-STRENG) effective area, R-STRENG - 0.85dL and ASME B31G assessment methods are valid for the pipe diameter, wall thickness, grade, operating pressure, operating stress level and operating temperature. Keystone must also use the most conservative method until confirmation of the proper method is made to PHMSA headquarters.

f) Flow Stress: Remaining strength calculations for X-80 pipe must use a flow stress equal to the average of the ultimate (tensile) strength and the SMYS.

g) Dents: For initial construction and the initial geometry tool run, any dent with a depth greater than 2 percent of the nominal pipe diameter must be removed unless the dent is repaired by a method that reliable engineering tests and analyses show can permanently restore the serviceability of the pipe. For the purposes of this condition, a "dent" is a depression that produces a gross disturbance in the curvature of the pipe wall without reducing the pipe wall thickness. The depth of the dent is measured as the gap between the lowest point of the dent and the prolongation of the original contour of the pipe.

49) Reporting - Immediate: Keystone must notify the appropriate PHMSA regional office within 24 hours of any non-reportable leaks originating in the pipe body in the special permit area.

50) Reporting – 180 Day: Within 180 days of the pipeline in-service date under a special permit, Keystone shall report on its compliance with special permit conditions to PHMSA headquarters and the appropriate regional office. The report must also include pipeline operating pressure data, including all pressures and pressure cycles versus time. The data format must include both raw data in a tabular format and a graphical format. Any alternative formats must be approved by PHMSA headquarters.

51) Annual Reporting: Following approval of the special permit, Keystone must annually report the following:

WEB Exhibit # 7-P

a) The results of any ILI or direct assessment results performed within the special permit area during the previous year;

b) The results of all internal corrosion management programs including the results of:
   - S&W analyses
   - Report of processing plant upset conditions where elevated levels of S&W are introduced into the pipeline
   - Corrosion inhibitor and biocide injection
   - Internal cleaning program
   - Wall loss coupon tests

c) Any new integrity threats identified within the special permit area during the previous year;

d) Any encroachment in the special permit area, including the number of new residences or public gathering areas;

e) Any HCA changes in the special permit area during the previous year;

f) Any reportable incidents associated with the special permit area that occurred during the previous year;

g) Any leaks on the pipeline in the special permit area that occurred during the previous year;

h) A list of all repairs on the pipeline in the special permit area during the previous year;

i) On-going damage prevention initiatives on the pipeline in the special permit area and a discussion of their success or failure;

j) Any changes in procedures used to assess and/or monitor the pipeline operating under this special permit;

k) Any company mergers, acquisitions, transfers of assets, or other events affecting the regulatory responsibility of the company operating the pipeline to which this special permit applies; and

l) A report of pipeline operating pressure data to include all pressures and pressure cycles versus time. The data format must include both raw data in a tabular format and a graphical format. Any alternative formats must be approved by PHMSA headquarters.

WEB Exhibit # 7-9

Limitations:

Should Keystone fail to comply with any conditions of this special permit, or should PHMSA determine this special permit is no longer appropriate or that this special permit is inconsistent with pipeline safety, PHMSA may revoke this special permit and require Keystone to comply with the regulatory requirements in 49 CFR 195.106.

Background and process:

The Keystone Pipeline is a 1,845-mile international and interstate crude oil pipeline project developed by TransCanada Keystone Pipeline L.P., a wholly owned subsidiary of TransCanada Pipelines Limited. The Keystone Pipeline will transport a nominal capacity of 435,000 barrels per day of crude oil from western Canada's sedimentary basin producing areas in Alberta to refineries in the United States. Keystone indicates it has filed an application with the U.S. Department of State for a Presidential Permit for the Keystone Pipeline since the project involves construction, operation and maintenance of facilities for the importation of petroleum from a foreign country. Keystone anticipates receiving all necessary government approvals by November 2007 and beginning construction in late 2007. The targeted in-service date is during the fourth quarter of 2009.

The existing regulations in 49 CFR 195.106 provide the method used by pipeline operators to establish the MOP of a proposed pipeline by using the design formula contained in that section. The formula incorporates a design factor, also called a de-rating factor, which is fixed at 0.72 for an onshore pipeline. Keystone requests the use of a 0.80 design factor in the formula instead of 0.72 design factor.

PHMSA previously granted waivers to four natural gas pipeline operators to operate certain pipelines at a hoop stresses up to 80 percent SMYS. The Keystone pipeline project represents the first request by an operator in the United States for approval to design and operate a hazardous liquid (crude oil) pipeline beyond the existing regulatory maximum level. Canadian standards already allow operators to design and operate hazardous liquids pipelines at 80 percent SMYS.

On January 15, March 27, and April 17, 2006, PHMSA conducted technical meetings to learn more about the technical merits of Keystone's proposal to operate at 80 percent SMYS and to

answer questions posed by internal and external subject matter experts. The meetings resulted in numerous technical information requests and deliverables, to which Keystone satisfactorily responded.

PHMSA also secured the services of experts in the field of steel pipeline fracture mechanics, leak detection and SCADA systems to assist in the review of appropriate areas of Keystone's application. The experts' reports are included in the public docket.

On February 8, 2007, PHMSA posted a notice of this special permit request in the Federal Register (FR) (72 FR 6042). In the same FR notice we informed the public that we have changed the name granting such a request to a special permit. The request letter, the FR notice, supplemental information and all other pertinent documents are available for review under Docket Number PHMSA-2006-26617, in the DOT's Document Management System.

Two comments were received and posted to the public docket concerning the Keystone pipeline project request for a special permit. One commenter listed a number of recommended and relevant conditions for hazardous liquid pipelines to operate at 80 percent SMYS. The conditions developed by PHMSA and incorporated into the grant of special permit include the concerns of the commenter. The second commenter did not provide substantive comments relevant to the special permit request.

AUTHORITY: 49 U.S.C. 60118(c) and 49 CFR 1.53.

Issued in Washington, DC on APR 30 2007.

Jeffrey D. Wiese,

Acting Associate Administrator for Pipeline Safety.

WEB Exhibit # 7-5

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BP fined $20 million for pipeline corrosion

By WESLEY LOY
wloy@adn.com
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Last Modified: October 26, 2007 at 01:23 PM

BP will plead guilty to a federal misdemeanor and pay $20 million in criminal penalties for last year's Prudhoe Bay oil spills, which prosecutors said were the result of the company's knowing neglect of corroding pipelines.

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Prosecutors said BP managers failed to heed "many red flags and warning signs" that key pipelines within the nation's largest oil field were going bad, with one of them leaking an estimated 201,000 gallons of oil onto the tundra and a frozen pond in March 2006, the largest oil spill ever on the North Slope.

Another leak the following August forced a temporary shutdown of half the field, driving up the price of oil on world markets and adding fuel to a federal criminal investigation that already was under way.

BP's pending plea in the Prudhoe case was among three major criminal and civil settlements the London-based company reached Thursday with federal authorities.

BP agreed to pay $50 million and plead guilty to a felony for its 2005 Texas refinery explosion that killed 15 and injured more than 170 people, and it was penalized $303 million in connection with price manipulation of the Lower 48 propane market. In addition, a federal grand jury in Chicago on Thursday indicted four former BP employees on charges of conspiring to manipulate and corner the propane market.

Federal and state authorities said Thursday that BP didn't spend the money necessary to maintain Prudhoe pipes. BP runs the field and shares costs with other owners Conoco Phillips, Exxon Mobil and Chevron.

"As a result of BP's criminal negligence, corroded pipelines leaked crude oil into one of the nation's most fragile ecosystems," said Granta Nakayama, assistant administrator for enforcement with the U.S. Environmental Protection Agency, which helped investigate the case with the FBI and other agencies.

"Global companies like BP, with their experience, capabilities and financial resources, have no excuse for committing environmental crimes," he said.

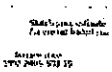
"BP cut corners with disastrous consequences and is being held

enlarge

Plea and trial timing might benefit state
PDF: Charging documents
PDF: BP plea agreement
Oil spill reported at Prudhoe Bay (03/02/2006)
Photos: Prudhoe Bay spill fallout
More on the Prudhoe Bay spill

Defense rests without Kohring's testimony
Democrats call House oil tax proposal numbers misleading
Persistence wins out
Hope dims in Cordova after court takes Exxon spill case
Ex-legislator's call for new trial disputed by federal attorneys

Alaska oil



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WEB Exhibit # 8.a

to account," said Ronald Tenpas, a ranking assistant U.S. attorney general.

STATE PROBE CONTINUES

In a statement, BP America president Bob Malone said the March spill "revealed a significant gap in our corrosion management program -- a gap that existed because our approach to assessing and managing corrosion risk in these lines was not robust or systematic enough."

In the Alaska case, BP will pay a $12 million federal criminal fine, $4 million in criminal restitution to the state, and $4 million for Arctic research. BP's local subsidiary, BP Exploration (Alaska) Inc., also will go on probation for three years, a 28-page plea agreement says.

BP Alaska will plead guilty in late November to one misdemeanor count of negligently discharging oil in violation of the federal Clean Water Act.

The charge pertains only to the March oil spill. BP was not charged with the second spill in August, which was much smaller, because the company "was prompt in detecting and containing this leak," the plea agreement says.

Nelson Cohen, U.S. attorney for Alaska, and state Attorney General Talis Colberg said BP's plea to the misdemeanor will wrap up the criminal aspect of the Prudhoe spills for both the federal and state governments.

However, they said authorities still can seek criminal prosecution of BP employees or contractors and can pursue civil penalties against BP Alaska.

Colberg acknowledged the state has a civil investigation ongoing, but he declined to provide details.

In the past, state officials including Colberg's predecessor, former Attorney General David Marquez, said that the state might seek what could be a multimillion-dollar civil fine against BP, and that the state also would review whether it lost money due to interrupted production of millions of barrels of oil during the partial Prudhoe shutdown.

BP'S CRIMINAL RECORD

The guilty plea will mark the second time in eight years that BP Alaska will have been convicted of a federal environmental crime in Alaska.

In 1999, the company pleaded guilty to one felony count in connection with the illegal dumping of nearly 1,000 gallons of hazardous waste by one of its drilling contractors in BP's Endicott oil field. BP paid $15.5 million in penalties and was placed on probation for five years.

Because that probation period had ended, BP was not in violation as a result of last year's pipeline leaks, Cohen said.

The pipe that leaked the 201,000 gallons had been neglected since 1998, prosecutors said.

That was the last time BP ran a cleaning or testing device called a pig through the steel pipe, which is part of a key network of Prudhoe trunk lines that funnel oil into the 800-mile trans-Alaska pipeline.

After the March 2006 spill, a grand jury began investigating. Prosecutors said BP cooperated by supplying millions of documents, explaining technical details, and sawing out a section of the leaky pipeline for examination as evidence.

Investigators found a 6-inch layer of hardened sediment caked to the bottom of the pipe section.

Cohen said the sludge helped breed acidic bacteria and corrosion that ultimately ate an almond-sized hole through the line, allowing a slow leak that released 201,000 gallons before a BP worker who was driving nearby smelled oil that had oozed beneath snow blanketing the tundra.

SAVING MONEY

BP executives and spokesmen have said they were surprised that corrosion developed in the large trunk lines, which unlike many other pipes don't carry much water mixed with the oil.

But BP knew that sediment was collecting in the pipes, that the changing nature of the oil and its slow flow could encourage corrosion, and that leak-detection technology wouldn't work well unless the pipelines were periodically cleaned.

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Dow Jones Industrial Avg.
13864.17

DOW	13864.17
NSDQ	2638.49
NYSE	10253.82
S&P 500	1542.55
AMEX	2516.40
RUS 2K	824.79
Crude Oil	93.23

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Carnival Cruise to Alaska
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WEB Exhibit # 8-b

Saving money was a factor, prosecutors said.

"BP didn't spend money that it should have spent," Cohen said.

He said the $20 million in penalties likely is the largest dollar punishment ever for an environmental misdemeanor in Alaska.

BP said Thursday work is under way to replace 16 miles of corroded Prudhoe pipelines and the roughly $250 million job will be done next year.

The company said it "promptly and thoroughly cleaned up" the spills and "no lasting harm to the surrounding environment is expected."

The larger spill covered 2 acres and it could take up to a decade for the tundra vegetation to return to normal, state environmental officials said Thursday.

Other changes have occurred at BP Alaska since last year's corrosion crisis. The company now has a new president and a new Prudhoe Bay field manager, and it has beefed up its anticorrosion unit.

Federal pipeline regulators also have intensified scrutiny of the pipelines that leaked.

Among other details to emerge Thursday:

• The plea agreement forbids BP from deducting the $20 million in penalties from its state or federal taxes.

• BP can shorten its three-year probation to one year if it promptly replaces bad pipes and meets other conditions.

Find Wesley Loy online at adn.com/contact/wloy or call 257-4590. Daily News reporter Erika Bolstad contributed to this story.

MORE

AT A GLANCE: See the terms of BP's penalties in Alaska and the Lower 48.

JUNEAU: Will the BP fine prompt legislators to tighten deductions on state oil taxes?

BP agreement

IN ALASKA

The U.S. Justice Department's criminal investigation focused on Prudhoe Bay oil spills last year, particularly 201,000 gallons spilled from a pipeline, the largest North Slope oil spill ever. BP Exploration (Alaska) Inc. will:

Plead guilty to a misdemeanor violation of the Clean Water Act.

Serve three years of probation.

Pay a $12 million criminal fine.

Pay $4 million criminal restitution to the state.

Pay $4 million for research on Alaska's Arctic.

IN TEXAS

The criminal investigation concerned a 2005 explosion at a BP refinery that killed 15 workers and injured more than 170 others. BP Products North America Inc. will:

Plead guilty to violating the Clean Water Act, a felony.

Serve three years of probation.

Pay a $50 million criminal fine.

PROPANE MARKET

The criminal investigation centered on a conspiracy to manipulate the Lower 48 propane market:

BP America Inc. is charged with violating the Commodity Exchange Act, mail fraud and wire fraud. But federal prosecutors will not prosecute the case for three years if BP cooperates with an ongoing investigation and with an independent monitor.

WEB Exhibit # 83 - C

THE INDIANAPOLIS STAR
INDYSTAR.COM

BP refinery safety violations revealed

Associated Press

WHITING, Ind. -- A 5-month investigation of BP's Whiting refinery following a deadly explosion at a Texas refinery owned by BP found untested fire hoses, broken equipment and outdated safety procedures, The Times of Munster reported.

While significant, state officials say the violations at the Whiting refinery largely pale in comparison to the problems uncovered at BP's Texas City refinery, where a March 2005 explosion killed 15 people and injured more than 170 others.

The Indiana Occupational Safety and Health Administration, or IOSHA, finished its lengthy review of the Whiting refinery -- the nation's fourth largest -- last year, finding more than a dozen serious safety hazards and leveling $384,250 in fines.

The Times, which first reported the fines last month, recently obtained state inspection records detailing the hazards cited at the refinery.

Those records show that the refinery's most critical violations centered on problems with pressure gauges and rupture disks -- a type of relief valve that constricts pipeline flow to prevent surges that can cause a fire or explosion.

In one area, a unit in which gasoline octane is boosted, inspectors found two malfunctioning gauges and a blown rupture disk that had not been replaced.

State inspectors also cited the Whiting refinery for failing to update written maintenance and safety procedures. In several cases, the refinery was more than a year behind on self-inspection deadlines for various types of equipment.

In one case, a structural integrity test that was supposed to have been performed seven years earlier remained unfulfilled when the state's review began in May 2006.

The violations yielded 13 fines ranging from $2,125 to $70,000 that totaled $384,250.

"We've levied bigger, but not very often," said Jeff Carter, a deputy commissioner for the Indiana Department of Labor.

BP spokesman Tom Keilman said the Whiting refinery has corrected all of the safety hazards cited by IOSHA and is working with the state agency to resolve the fines. If the two sides do not reach an agreement by February, the case will go before an administrative hearing panel.

"The Whiting refinery has had a solid record on safety performance, showing continuous safety improvement over the past several years," he said.

Although the violations at the Whiting refinery are significant, state officials say the problems uncovered at BP's Texas City refinery are largely much more significant.

State inspectors classified five of the Whiting violations as knowing, or willful, the most severe category of workplace hazard under federal safety guidelines.

At BP's Texas City refinery, however, investigators found 301 willful violations in the wake of the March 2005 blast that killed 15 people and injured more than 170 others.

WEB Exhibit # 8-d

"I think it's fair to say that the (Whiting) refinery doesn't have the breadth of problems that Texas City had," said Carter, the deputy Indiana labor commissioner.

After the Texas City explosion, BP paid a $21 million fine, the largest in the 35-year history of the federal Occupational Safety and Health Administration.

Last week, the company agreed to plead guilty to a felony and pay an additional $50 million criminal fine stemming from federal Clean Air Act violations tied to the explosion.

WEB Exhibit # 8-e

SitNews Stories In The News
Ketchikan, Alaska www.sitnews.us

BP Pleads Guilty To Clean Water Act Violations in Alaska

October 31, 2007
Wednesday AM

(SitNews) - British Petroleum Exploration (Alaska), Inc., (BPXA) agreed on October 25th to plead guilty to a violation of the Clean Water Act to resolve its criminal liability relating to pipeline leaks of crude oil onto the tundra as well as a frozen lake in Alaska.

As part of the guilty plea BPXA has agreed to pay a $12 million criminal fine, $4 million in community service payments to the National Fish and Wildlife Foundation (NFWF) for the purpose of conducting research and activities in support of the arctic environment in the state of Alaska on the North Slope, and $4 million in criminal restitution to the state of Alaska, and serve three years of probation.

The Justice Department and State of Alaska have agreed not to bring further criminal charges against BPXA in connection with the March and August 2006 spills.

This investigation involved two different leaks from oil transit lines (OTLs) operated by BPXA. The leaks occurred in March and August of 2006, and were the result of BPXA's failure to heed many red flags and warning signs of imminent internal corrosion that a reasonable operator should have recognized. The first pipeline leak, discovered by a worker on March 2, 2006, resulted in more than 200,000 gallons of crude oil spreading over the tundra and reaching a nearby frozen lake, where oil spread out onto the ice along one shore. This spill was the largest spill to ever occur on the North Slope.

The second leak occurred in August of 2006, but was quickly discovered and contained after leaking approximately 1,000 gallons of oil. Nevertheless, the second leak led to the shut down of Prudhoe Bay oil production on the eastern side of the field. BPXA shut down production because it could not guarantee the condition of the line and whether it was fit for service.

The leak and the resulting 4,800 barrel spill impacted 1.9 acres and is the largest oil spill to ever occur at Prudhoe Bay. The plea agreement acknowledges that BPXA promptly and thoroughly cleaned up the discharged oil. No lasting harm to the surrounding environment is expected.

"This leak, and the spill that resulted from it, revealed a significant gap in our corrosion management program -- a gap that existed because our approach to assessing and managing corrosion risk in these lines was not robust or systematic enough," said BP America Chairman and President Bob Malone.

WEB Exhibit # 84

"We regret that our monitoring of these lines did not meet the expectations of the State of Alaska and the U.S. government," Malone said. "Since this incident we have worked with state and federal regulators to ensure the safe, reliable operation of critical Prudhoe Bay pipelines which deliver processed oil to the Trans Alaska Pipeline."

Following the March spill, BPXA said they worked with the U.S. Department of Transportation to make periodic maintenance and smart pigging part of BPXA's oil transit line corrosion inspection, monitoring and inhibition program.

BPXA said replacement of the 16-mile Prudhoe Bay oil transit line system will be completed in 2008. BPXA began construction of the $250 million project in early 2007.

During the investigation the United States obtained a section of pipe where the March 2006 leak occurred. Approximately six inches of sediment were found on the bottom of the thirty-four-inch-diameter pipe. When sediment builds up in a pipeline it forms an environment in which acid-producing bacteria can thrive undisturbed by the flow of oil and chemicals intended to protect the pipe from corrosion. The acid produced by these bacteria can cause corrosion, which causes pits or, if unchecked, holes in the wall of the pipe.

Knowing this the Justice Department said, BPXA should have cleaned the OTLs with a piece of equipment called a maintenance (or cleaning) pig and inspected the pipes for corrosion with a smart pig-- an inspection tool able to make a complete evaluation of a pipeline's integrity. A maintenance pig would have disturbed the bacteria and cleared out the stagnant water and sediment that harbor the acid-producing bacteria. A smart pig would have provided a clear picture of the corrosion activity that was occurring in both areas where leaks eventually occurred.

The case was prosecuted by Trial Attorneys J. Ronald Sutcliffe and Christopher J. Costantini of the Environmental Crimes Section of the

Department of Justice and Assistant U.S. Attorney Andrea T. Steward and Special Assistant U.S. Attorney Daniel Cheyette of the U.S. Attorney's Office for the District of Alaska.

The case was investigated by the EPA's Criminal Investigation Division and the FBI with assistance from and the Department of Transportation's Office of Inspector General. Technical assistance was provided by the Pipeline and Hazardous Materials Safety Administration and the Alaska Department of Environmental Conservation.

Sources of News:

U.S. Department of Justice
http://www.usdoj.gov

WEB Exhibit # 8-9

British Petroleum
http://www.bp.com/

Alyeska pipeline

Pipeline Quick Facts

- The Trans-Alaska Pipeline System was designed and constructed to move oil from the North Slope of Alaska to the northern most ice- free port- Valdez, Alaska.
- Length: 800 miles.
- Diameter: 48 inches.
- Crosses three mountain ranges and over 800 rivers and streams.
- Cost to build: $8 billion in 1977, largest privately funded construction project at that time.
- Construction began on March 27, 1975 and was completed on May 31, 1977.
- First oil moved through the pipeline on June 20, 1977.
- Over 14 billion barrels have moved through the Trans Alaska Pipeline System.
- First tanker to carry crude oil from Valdez: ARCO Juneau, August 1, 1977.
- Tankers loaded at Valdez: 16,781 through March 2001.
- Storage tanks in Valdez- 18 with total storage capacity of 9.1 million barrels total.
- The mission of Alyeska's Ship Escort Response Vessel System is to safely escort tankers through Prince William Sound

Last updated May 7, 2004

Basic information

- Maximum daily throughput — 2.136 million bbl., avg. (With 11 pump stations operating). Rates exceeding 1,440,000 bbl./day assume drag reduction agent (DRA) injection.
- Maximum daily throughput — 2000 (with 7 pump stations operating) — .99 million bbl., avg. Rates exceeding 1,000,000 bbl./day assume DRA injection
- Fuel required for all operations (fuel oil equivalent) — 210,000 gal/day (also see fuel requirements under Pump Stations, and Marine Terminal).
- Pressure —
    - Design, maximum — 1,180 psi
    - Operating, maximum — 1,180 psi
- Pump Station facilities in original design — 12 pump stations with 4 pumps each.
- Pump Stations operating, Nov. 1, 1998 — 7: PS 1, 3, 4, 5, 7, 9, 12. PS 5 is a relief station only. PS 11 is a security site. PS 8 placed in standby June 30, 1996. PS 10 placed in standby July 1, 1996. PS 2 placed in standby July 1, 1997. PS 6 placed in standby August 8, 1997.

Control system

- Basic function — Provides instantaneous monitoring, control of

WEB Exhibit # 9 - a

all significant aspects of operation, and pipeline leak detection. Operators in the Operations Control Center (OCC) at the Marine Terminal monitor the system 24 hours a day and control oil movement through the pipeline and loading of tankers.

- Computer type — Data general MV/20000 and various PCs
- Location — Computer hardware and controllers' consoles are located in the Operations Control Center at the Marine Terminal.

Points monitored —
  - Pipeline —
    3,047 Input points
    352 Control points
  - Marine Terminal —
    1,074 Input points
    461 Control points
- Remote data acquisition units —
  - Pipeline — 14 (each Pump Station, plus the North Pole Metering facility and Petro Star Refinery)
  - Marine Terminal — 24
  - Metering — 14
- Software programming functions —
  - Data acquisition and control
  - Alarm and data processing and display
  - Hydraulic modeling
  - Leak detection
  - Historical archiving and reporting
  - Seismic evaluation

Drag Reduction Agent (DRA)

Definition — A long chain hydrocarbon polymer injected into the oil to reduce the energy loss due to turbulence in the oil.

Chronology

- **1979 —**
  - **Apr 1** — First test of DRA in TAPS at PS 1
  - **Jul 1** — (6 p.m.) — Injection initiated at PS 1
  - **Aug 19** — Initiated at PS 6
  - **Oct 15** — Initiated at PS 4
  - **Oct 22** — Discontinued at PS 1 (PS2 on line)
  - **Nov 1** — Initiated at PS 10
- **1980 — Nov 5** — Discontinued at PS 6 (PS7 on line)
- **1985 — Jan 6** — Initiated at MP 203 (in support of MP 200 Reroute Project)
- **1987 — Sep 11** — Initiated at PS 1
- **1987 — Sep 11** — Initiated at PS 7
- **1990 — Dec 18** — Installed at PS 8

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- **1991 — Oct 3 —** Demobed MP203 (declining throughput)
- **1992 — Summer —** Installed at PS6
- **1992 — Oct 1 —** Decommissioned at PS7 (declining throughput)
- **1993 — June —** Test run at PS6
- **1994 — April —** Test run at PS6
- **1995 — Nov 1 —** Initiated at PS6 (PS7 shutdown for maintenance, three months)
- **1996 — Jun 15 —** Installed at PS7 and PS9
  - **Jul 1 —** Initiated at PS7 and PS9 (PS8 and PS10 placed in standby)
- **1997 — Summer —** Installed and initiated at PS1 and MP238 (PS2 and PS6 placed in standby)
- **1999/2000 —** Testing new DRA suspension technology at MP238 and PS9

  WEB Attachment 6A

- **2001 — Jun - Oct,** Used to bypass PS 12

- **2002 — Sep - Dec,** Used to bypass PS 12
  DRA Test Beds installed south of PS 9 at MP 554.74, MP 568.82, MP 602.66, MP 649.4, MP 709.48

Major mainline pipe repairs

- **1977 —**
  - **Jul 7** — MP 489.12 — approx. 20 ft. south of north block valve at PS 8; damage to 30° elbow and pipe from injection of super cooled nitrogen ahead of oil front during oil-in. Replaced with new elbow and two 6-ft. pups. Pipe reburied.
  - **Jul 8** — MP 489.24 — pump building at PS 8 destroyed in an explosion and fire, the pipeline was undamaged. The pump building was replaced, and recommissioned Mar. 7, 1978.
  - **September** – MP 388.00 — north of Lost Creek; two bullet indentations. Covered with 48-in. dia., 3-ft. welded split sleeve.
- **1978 —**
  - **February** – MP 457.53 — Steele Creek, 1-in. dia. hole (sabotage). Covered with 48-in. dia., 22-1/2 in. bolted split sleeve; subsequently covered with welded sleeve.
- **1979 —**
  - **June** – MP 166.43 — north side Atigun Pass. hairline crack caused by buckle. Covered with 56-in. dia., 6-ft. welded split sleeve, 19 steel supports installed. Pipe reburied.
  - **June** – MP 734.16 — 1 mi. north of PS 12, hairline crack caused by buckle in pipe. Covered with 56-in. dia., 6.1-ft. welded split sleeve, 7 steel supports installed. Pipe reburied.
  - **September** – MP 157.62 to MP 157.65 — instrumen

WEB Exhibit # 9-c

pig ("Super Pig") lodged in line at check valve 29. Stopple and bypass installed, valve bonnet lifted, pig removed. Pipe reburied.
- **October** – MP 166.41 — north side Atigun Pass; buckled pipe. Covered with 56-in. dia., 6-ft. welded split sleeve. Pipe reburied.

- 1980 —
  - **April** – MP 449.96 — indentation, possibly from bullet. Covered with 48-in. dia., 18-in. welded split sleeve.
  - **May** – MP 159.70 — construction damage from backhoe during monitor rod installation. Covered with 48-in. dia., 3.6-ft. welded split sleeve. Pipe reburied.
  - **June** – MP 416.00 — approx. 2 mi. south of PS 7; pipe settlement. Approx. 430-ft. excavation; 8 steel supports installed. Pipe not reburied.
  - **August** – MP 752.00 — flash flood; 900 ft. of overburden washed out; no damage. Pipe reburied.
  - **November** – MP 720.00 — pipe settlement. Approx. 200-ft. excavation; pipe lifted, concrete slurry added beneath pipe. Pipe reburied.
- 1982 —
  - **April** – MP 168.40 — south side Atigun Pass; pipe settlement. Approx. 300-ft. excavation; concrete slurry added beneath pipe. Pipe reburied.

  - **August** – MP 166.03 — north side Atigun Pass; pipe buckle. Covered with 56-in. dia., 6.5-ft. welded split sleeve. Pipe reburied.

- 1983 —
  - **March** – MP 730.29 — pipe settlement. Approx. 102-ft excavation; 9 concrete river weights removed, concrete slurry added beneath pipe. Pipe reburied.

  - **April** – MP 200.24 — Dietrich River channel; pipe buckle. River channel redirected temporarily; approx. 125-ft. excavation; 56-in. dia., 6-ft. welded split sleeve installed; 5 specially designed steel supports installed. Pipe reburied.
  - **October** – MP 45.97 — pipe settlement. Approx. 200-ft. excavation; concrete slurry added beneath pipe. Pipe reburied.
- 1984 —
  - **March** – removal of stuck scraper pig at CV4 and relocation of pig trap from PS 5 to PS4.
  - **November** – removal of stuck pig at PS 10.
- 1985 —
  - **January** – MP 200 temporary bypass tie-in, pipe settlement.
  - **April** – MP 200 final tie-in of 48-inch permanent.

WEB Exhibit # 9-d

reroute (404.7 ft. added to total pipeline length in MP 200 reroute, Apr 22, 1985) Reroute due to pipe settlement.

- **1986** —
  - **Oct 10** — Steele Creek, permanent welded sleeve installed over bolted split sleeve.
  - **Nov 18** — replaced damaged "Tee" at PS 10. "Tee" damaged by stuck scraper pig.
- **1987** —
  - **Sep 29** — replaced 234 ft. of buckled pipe, MP 166.41 — 166.43, Atigun Pass.
  - **Aug 25** — mechanical damage covered with 3 ft. welded sleeve.
- **1989** — total of 30 sleeves installed for corrosion repairs.
- **1990** — total of 86 sleeves installed for corrosion repairs.
  - **Nov 23** – dent covered by 6 ft. welded sleeve.
  - **Dec 3** – mechanical damage covered with bolted clamp, later covered with a split tee (part of Atigun Floodplain Pipe Replacement Project)
- **1991** — total 18 sleeves installed for corrosion repairs.
  - **Mar 8** – mechanical damage covered by 4 ft. welded sleeve, MP 779.47.
  - **Apr 6** – mechanical damage covered by 4 ft. welded sleeve, MP 756.80.
  - **September** – Atigun Floodplain Pipe Replacement Project completed, MP157-165.5. Permanent reroute of 8.5 miles of main line pipe. Replacement due to corrosion.
- **1993** — **Jun 6** – mechanical damage covered by 3 ft. welded sleeve, MP775.
- **1994** —
  - **Jul 22** — CV9 Bypass spool replacement and drain line repair.
  - **Jul 20** — CV86 bypass and drain line repair.
  - **Sep 30** —CV74 drain line repair.

- **1995**
  - **Mar 15** — Replace actuator on CV55
  - **Jun 8**— Replace actuator on CV89.
  - **Jul 14** — RGV system leak repair.
  - **Sep 15** — Extended Chena Hot Springs Road casing.
- **1996**
  - **Apr 25** — Replace bypass line on CV92.
- **1997**
  - **Feb 8** —Install "armadillo" sleeve at Wilbur Creek. Repair due to corrosion.
  - **Jun 20** — Mechanical damage covered by 2.5 ft. welded sleeve, MP 775.75.
  - **Oct 9** — Corrosion repair covered by 4.8 ft. welded sleeve, MP 799.68.

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- 1998
  - **Sep 25** — Replaced RGV 80 and and repaired CV122.
  - **Mar 19** — Constructed and started Tanker Vapor Control System at Valdez Marine Terminal
- 1999
  - **Apr 26** — Total of 2 sleeves installed for corrosion repair at MP 652
  - **Sep 11** — Replaced RGV 60.
- 2000
  - **May 26** — Completed reset and repair of tripped anchors at MP 170, a result of the collapse of vapor pocket after pipeline restart.
  - **June 1** — mechanical damage cover by two 2 ft welded sleeves, MP 710 76
  - **Sep 16** — Replaced CKV 74 and M-2 valve at PS 9.
- 2001
  - **Sep 22** — Pipeline shutdown for mainline valve maintenance and integrity test, and performance evaluation of two 48-inch mainline remote gate valves.
  - **Oct 4** — MP 400, bullet hole repaired with hydraulic clamp. Clamp later replace with Thor plug
- 2002
  - **Jul 25** — Pipeline shutdown to replace RGV 39.
  - **Nov** — MP 588, repaired or replaced damaged shoes and VSM crossbeams from 7.9 earthquake on November 3.

Shutdowns

- 1977 —
  - **Aug 2** — equipment malfunction — 40 min.
  - **Aug 15** — PS 9 sump overflow — 110 hrs., 11 min.
  - **Sep 20** — equipment malfunction — 59 min.
  - **Oct 9** — producer shutdown — 4 hrs., 14 min.

- 1978 —
  - **Jan 5** — equipment malfunction — 1 hr.
  - **Jan 10** — equipment malfunction — 4 hrs.
  - **Jan 16** — equipment malfunction — 4 hrs., 22 min.
  - **Jan 17** — equipment malfunction — 3 hrs., 41 min.
  - **Feb 15** — sabotage, Steele Creek — 21 hrs., 31 min.
  - **May 6** — equipment malfunction — 7 hrs., 18 min.
  - **May 30** — equipment malfunction — 2 hrs., 22 min.

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- Sep 4 — equipment malfunction — 3 hrs.
- Dec 17 — equipment malfunction — 2 hrs., 8 min.

- 1979 —
  - Jun 10 — Atigun Pass leak — 53 hrs., 37 min.
- 1980 —
  - May 12 — PS 10 crude tank valve leak — 3 hrs., 37 min.
  - Oct 17 — scheduled maintenance — 5 hrs., 16 min.
- 1981 —
  - Jan 1 — check valve 23 leak — 15 hrs., 38 min.
- Feb 8 — equipment malfunction — 3 hrs., 54 min.

- 1982 —
  - Jun 7 — equipment malfunction — 2 hrs., 48 min.
  - Dec 22 — equipment malfunction — 12 hrs.
- 1983 — 0 hrs. (no shutdowns)
- 1984 —
  - Mar 20 — Scraper pig stuck at check valve 4 — 18 hrs./PS 4 Trap relocation, 57 hrs., 40 min.
  - Jun 17 — equipment malfunction — 1 hr., 7 min.
  - Oct 5 — producer maintenance — 5 hrs.
- 1985 —
  - Jan 21 — MP 200 bypass tie in — 66 hrs.
  - Apr 22 — MP 200 final reroute tie-in of 48-in. pipe — 20 hrs., 40 min. (404.7 ft. added to total pipeline length in MP 200 reroute, Apr. 22, 1985).
  - Jun 26 — equipment malfunction — 42 min.
  - October – removed stuck pig at PS 10.
  - Nov 9 — PS 1 explosion and fire — 10 hrs., 15 min.
- 1986 —
  - Sep 26 — removed scraper pig at PS 10 — 31 hrs., 50 min.
  - Nov 18 — replaced "Tee" at PS 10 — 16 hrs., 54 min.
- 1987 —
  - Sept 29 — Atigun Pass pipe replacement — 24 hrs., 6 min.
- 1988 — 0 hrs. (no shutdowns)
- 1989 —
  - Feb 26 — total power failure. PS 1- hr., 31 min.; PS 1 block line - 32 min.
  - Oct 20 — repair corroded pipe at MP 144.2-5 hr., 16 min.
- 1990 —
  - Mar 21 — PS 3, broken nipple valve 320 - 4 hr., 10 min.
  - Jun 12 — PS 1, valve D2 pipe replacement - 12 hr., 39 min.
  - Jun 12 — PS 9 isolated station, valve M2 leak- 1 hr., 34 min.
  - Nov 20 — Corrosion repair, welding at MP 157.87 - 3hr., 17 min.
  - Dec 15 — high inventory and power failure at Valdez Terminal - 1 hr., 42 min.

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- **1991** — 0 hrs. (no shutdowns)
- **1992** —
  - **Aug 7** — uncommanded closure of RGV 73, electric short - 1 hr., 49 min.
  - **Oct 7** — segment 11 RGV intransit indication - 35 min.
  - **Oct 16** — segment 11 RGV intransit indication - 7 min.
- **1993** —
  - **May 20** — PS3 isolated gas building, broken fitting - 9 min.
  - **Jun 22** — RGV 98A false intransit indication, MLR2 project work - 38 min.
  - **Oct 29** — loss of communication with segment 12 RGV's - 20 min.
- **1994** —
  - **Jan 24** — Isolate station at PS10 caused by leaking nipple on 26" yard check valve — 1 hr., 26 min
  - **Feb 14** — Isolate gas building at PS1, faulty gas detector — 24 Min.
  - **Apr 15** — Replace 002 valve at Valdez and troubleshoot segement 4 RGVs — 24 hrs., 28 min.
  - **Apr 18** — Work on PS4 Systronics Master Panel — 7 hrs., 57 min.
  - **Jun 8** — Communications failure with RGV73, failed power converter — 1 hr.
  - **Jun 12** — Communications failure with RGV69, battery failure — 36 min.
  - **Oct 15** — Communications failure with RGV40 — 2 hrs., 20 min.
- **1995**
  - **Feb 22** — PS9 shutdown by high pressure shutdown switch — 19 min.
  - **Jun 16** — Communications failure to Segment 4 RGVs, RGVs 31-35 closed — 2 hrs., 25 min.
  - **Jul 10** — RGV 118 intransitt indication — 1 hr ,41 min.
  - **Jul 10** — Communications failure to Segment 10, RGV 95 — 29 min.
  - **Jul 11** — Communicabons failure with RGV 95 — 1 hr , 30 min.
  - **Sep 11** — Scheduled maintenance — 15 hrs , 45 min.
  - **Sep 12** — Completion of scheduled PS2 maintenance — 4 hrs., 51 min.
  - **Sep 18** — Communications failure with RGV 37 — 1 hr., 42 min.
  - **Nov 7** — Fire alarm in PS10 pump house building — 12 min.
- **1996**
  - **Feb 17** — Communications failure with RGV 113 — 2 hrs., 7 min.

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- **May 6** — Scheduled maintenance — 21 hrs., 45 min.
- **May 7** — PS8 valve seal repair, repair leaking PS4 M2 valve body drain valve — 7 hrs., 17 min.
- **Jul 12** — Scheduled maintenance, preparations for PS8 and PS10 standby — 10 hrs., 25 min.
- **Aug 1** — Scheduled maintenance as part of ramping down PS8 and PS10 — 8hrs., 40 min.
- **Aug 6** — scheduled maintenance as a part of ramping down PS8 and PS10 — 11 hrs., 2 min.

- **1997**
  - **Jan 12** — Communications failure with RGV 124 — 3 hrs., 24 min.
  - **Jan 13** — Communications failure at RGV 62, 65, 7 67 — 13 min.
  - **Jun 1** — False RGV indication at RGV 32-34, Segment 4 — 2 hrs., 9 min.
  - **Jun 26** — Communications failure with RGVs in Segment 12 — 5 hrs., 44 min.
  - **Jul 1** — Communications failure with RGV 31-33 — 1 hr., 45 min.
  - **Aug 1** — Scheduled maintenance for PS2 & PS6 ramp-down preparation— 17 hrs., 49 min.
  - **Aug 8** — Placed PS6 in standby — 19 hrs., 29 min.
  - **Aug 12** — False transit indication, PS11, M-1 valve — 25 min.
  - **Sep 19** — false tranisit indication, RGV 103 — 14 min.
  - **Nov 8** — Communications failure, RGV 45 — 1 hr., 17 min.
- **1998**
  - **May 18** — PS1 in-rush vapor test and vibration test of VMT incoming relief piping — 5 hrs., 9 min.
  - **Aug 5** — Segment 10 RGVs in invalid status — 24 min.
  - **Aug 14** — Communications failure, Segment 10 — 5 hrs., 4min.
  - **Sep 25** — Valve maintenance, replaced RGV 80 and repaired CKV 122 — 28 hrs., 40 min.
  - **Nov 15** — Communications failure to Segment 4 RGVs, relay failure — 3 hrs., 23 min.
- **1999**
  - **Feb 15** — Communications failure at RGV 60 — 15 mins.
  - **Feb 17** — Communications failure at RGV 105 — 1 hr., 25 mins.
  - **Feb 23** — Communications failure at RGV 32, battery failure — 2 hrs., 15 mins.
  - **Mar 20** — Communications failure at RGV 80 — 1 hr., 07 mins.
  - **Mar 25** — Communications failure at RGV 102 — 1

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hr., 57 mins.
Apr 3 — Communications failure at RGV 91 — 26 mins.
- **Apr 11** — Communications failure at RGV 69 — 56 mins.
- **Jun 8** — Communications failure with all Segment 4 RGVs — 1 hr., 13 mins.
- **Jun 17** — Communications failure at RGV 91 — 34 mins.
- **Jul 5** — Communications failure at RGV 43 — 34 mins.
- **Jul 5** — Maintenance at Tea Lake, repeater loss of communication to segment 4 RGVs — 1 hr., 52 mins.
- **Sep 11** — Valve maintenance, replaced RGV 60, tested 46 mainline valves and completed 165 other maintenance tasks — 25 hrs., 49 mins.
- **Oct 16** — Communications failure at RGV 67 — 1 hr., 10 mins.
- **Nov 9** — Communications failure at RGV 53 — 26 mins.
- **Nov 13** — Planned maintenance amd autologic testing — 8 hrs., 6 mins.
- **Dec 8** — False fire alarm is PS1 booster pump building — 2 hrs., 34 mins.
- **Dec 23** — Communications failure with RGVs 62 & 67 — 36 mins.
- **Dec 25** — Communications failure at RGV 121 — 4 hrs., 16 mins.

- **2000**
  - **Feb 10** — communications failure at RGV 42 — 1hr., 24 mins.
  - **Apr 17** — PS 4 unintended stop flow / close RGV initiated due to invalid state transmitted from RGV 35A while troubleshooting power failure — 1hr., 26 mins.
  - **Apr 22** — Loss of visibility of PS 11M-1 — 43 mins.
  - **Aug 28** — communications failure at RGV 121A, battery failure — 1hr., 39 mins.

WEB Attachment 6A
  - **Sept. 16** — Planned line-wide maintenance shutdown — 29hrs., 39 mins.
  - **Oct 7** — Planned line-wide shutdown for valve leak tests — 7 hrs., 31 mins.
- **2001**
  - **Feb 26** — PS 5 false fire alarm - 1 hr., 24 mins.
  - **Apr 3** — Communications failure at RGV 32 - 2 hrs., 59 mins.
  - **Apr 18** — Work on PS 4 Systronics Master Panel - 6 hrs., 38 mins.

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- **Jun 25** — Automatic controls activated during planned failover of Scada Host Computer - 1 hr., 10 mins.
- **Aug 16** — Communications failure at RGV 60 - 1 hr., 30 mins.
- **Aug 26** — Communications failure at RGV 123 - 58 mins.
- **Sep 5** — Communications failure at RGV 124 - 2 hrs., 59 mins.
- **Sep 22** — Planned maintenance shutdown - 21 hrs., 4 mins.
- **Oct 4** — Bullet puncture at MP 400 - 60 hrs., 30 mins.
- **Oct 18** — PS 4 false fire alarm indicator - 1 hr., 57 mins.
- **Oct 28** — Backbone communication system disruption - 4 hrs., 5 mins.
- **Nov 1** — Communications failure at RGV 44 - 2 hrs., 48 mins.
- **Dec 20** — Communications failure at RGV 44 - 2 hrs., 30 mins.

- **2002**
  - **Jan 5** — Segment 10 to 11 RGVs closed due to Copper Valley Electric Association power failure - 2 hrs., 6 mins.
  - **May 9** — Communications failure at RGV 108 - 1 hr., 10 mins.
  - **Jun 11** — Communications failure at RGV 97 - 2 hrs.
  - **Jul 27** — Planned maintenance shutdown - 29 hours, 57 mins.
  - **Sep 16** — Seismic system testing - 35 mins.
  - **Oct 12** — Planned maintenance at PS 4 - 3 hrs., 20 mins.
  - **Nov 3** — 7.9 earthquake at MP 588 - 66 hrs., 33 mins.
  - **Nov 27** — Communications failure in segment 4 - 1 hr., 49 mins.

Leaks

Record of system crude oil leaks and spills of 100 bbl. or more on land or water*

	Location	bbl.	Cause
1977			

WEB Exhibit # 9-K

	July 8	PS 8	300	Explosion
	July 19	CV7	1,800	Construction damage
1978				
	Feb 15	Steele Creek	16,000	Sabotage
1979				
	June 10	Atigun Pass	1,500	Pipe settlement, hairline crack
	June 15	MP 734	4,000	Pipe settlement, hairline crack
1980				
	Feb 11	Terminal/V746	3,200	Leaking valve, east tank farm
	May 12	PS 10	238	Tank valve
1981				
	Jan 1	CV 23	1,500	Drain connection failure
1989				
	Jan 3	*Thompson Pass*	1,700	Hull crack
	March 24	*Exxon Valdez*	260,000	Vessel ran aground
1996				
	April 20	CV 92	880	Loose thread fitting on buried piping
2001				
	Oct 4	MP 400	6,800	Bullet Hole

System crude oil leaked or spilled* by year, number and amount

WEB Exhibit # 9-L

Year	No.	Amount
1977	34	93,778 gal/2,232 bbls
1978	24	672,576 gal/16,013 bbls
1979	43	233,800 gal/5,566 bbls
1980	55	149,495 gal/3,531 bbls
1981	32	63,371 gal//1,508 bbls
1982	30	1,653 gal/39 bbls
1983	17	174 gal/4 bbls
1984	32	3,260 gal/77 bbls
1985	31	1,138 gal/27 bbls
1986	40	1,607 gal/38 bbls
1987	37	172 gal/4 bbls
1988	35	600 gal/14 bbls
1989	26	10,572,207 gal/258,855 bbls
1990	31	277 gal/6 bbls
1991	54	460 gal/11 bbls
1992	55	822 gal/19 bbls
1993	65	361 gal/8 bbls
1994	44	13,610 gal/324 bbls
1995	06	90 gal/2 bbls
1996	12	34,185 gal/814 bbls
1997	05	80 gal/2 bbls
1998	05	22 gal/0.5 bbls
1999	08	16 gal/0.39 bbls
2000	06	165 gal/4 bbls
2001	15	287,980 gal/6,856 bbls
2002	09	16 gal/.39 bbls

Last updated June 23, 2004

WEB Exhibit # 9.m

PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 07/31/2007

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986	210	4	32	$16,077,846	282,791	220,317
1987	237	3	20	$13,140,434	395,854	312,794
1988	193	2	19	$32,414,912	198,397	114,251
1989	163	3	38	$8,813,604	201,758	121,179
1990	180	3	7	$15,720,422	124,277	54,663
1991	216	0	9	$37,788,944	200,567	55,774
1992	212	5	38	$39,146,062	137,065	68,810
1993	229	0	10	$28,873,651	116,802	57,559
1994	245	1	7[1]	$62,166,058	164,387	114,002
1995	188	3	11	$32,518,689	110,237	53,113
1996	194	5	13	$85,136,315	160,316	100,949
1997	171	0	5	$55,186,642	195,549	103,129
1998	153	2	6	$63,308,923	149,500	60,791
1999	167	4	20	$86,355,560	167,230	104,487
2000	146	1	4	$180,155,745	108,652	56,953
2001	130	0	10	$25,346,751	98,348	77,456
2002	147	1	0	$47,410,656	95,642	77,269
2003	131	0	5	$49,981,280	80,112	50,523
2004	144	5	16	$146,333,176	88,237	68,558
2005	138	2	2	$102,623,201	137,017	45,814
2006	110	0	2	$55,063,317	136,033	53,788
2007	60	0	2	$20,471,574	55,927	40,768
Totals [2]	**3764**	**44**	**276[1]**	**$1,204,033,762**	**3,404,699**	**2,012,947**

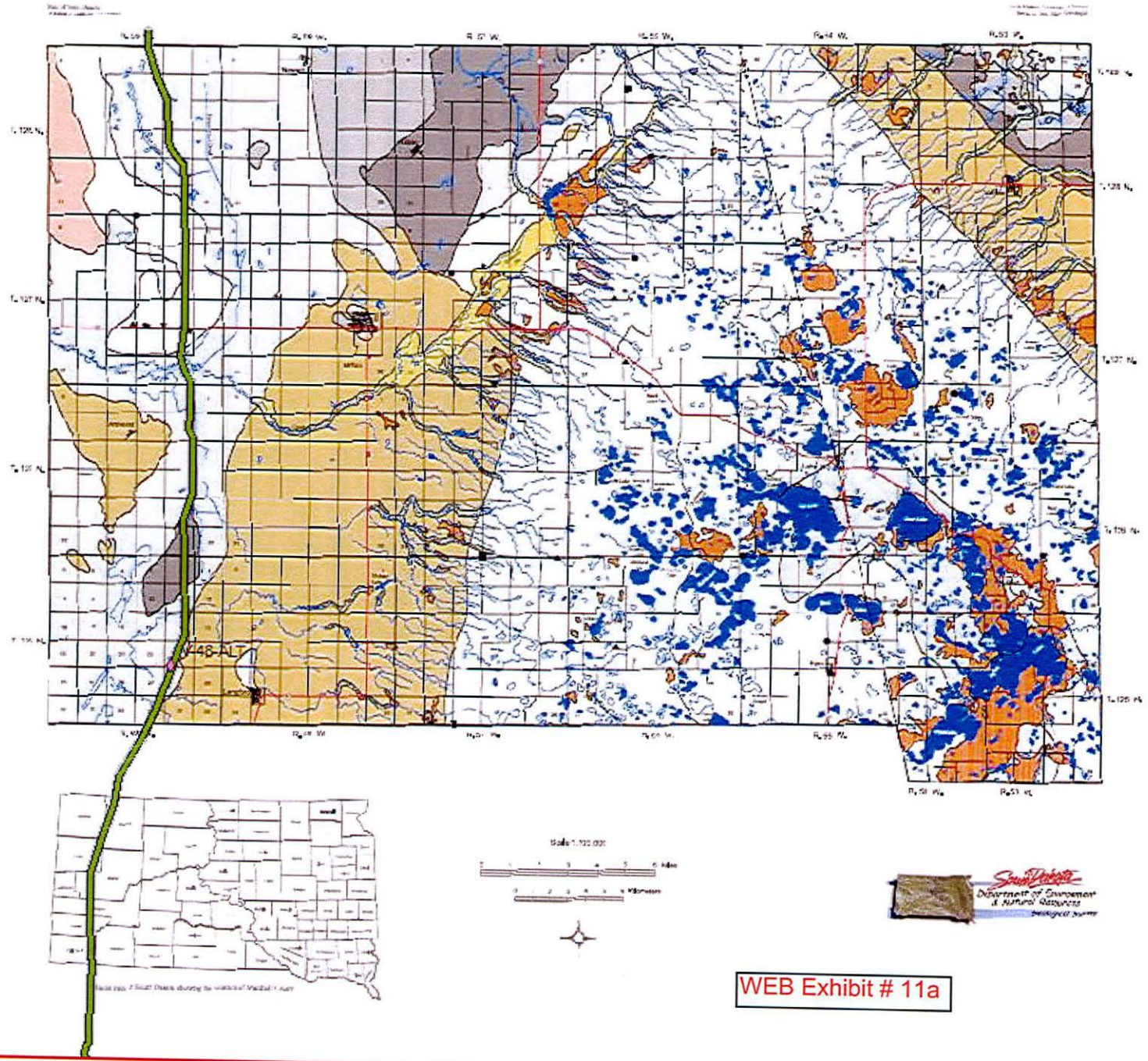
Historical totals may change as PHMSA receives supplemental information on incidents.

3,404,699 barrels of oil lost x 42 gallons per barrel = **142,997,358 gallons /oil leaks in 2007**

WEB Exhibit # 10

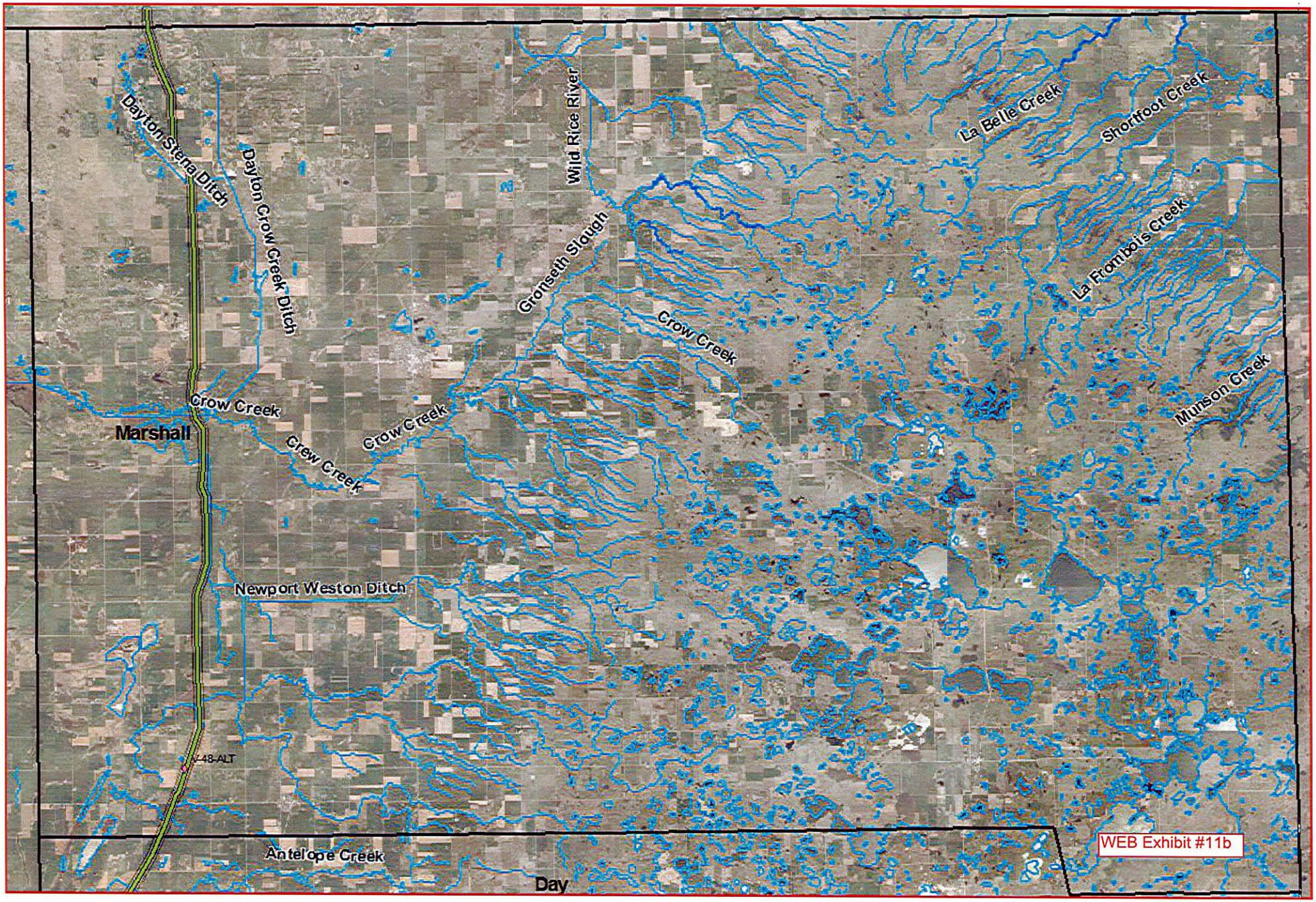
First Occurrence of Aquifer Materials in Marshall County, South Dakota

Department of Environment and Natural Resources
Division of Financial and Technical Assistance
Geological Survey
Aquifer Materials Map 3
Ann R. Jensen, 2001

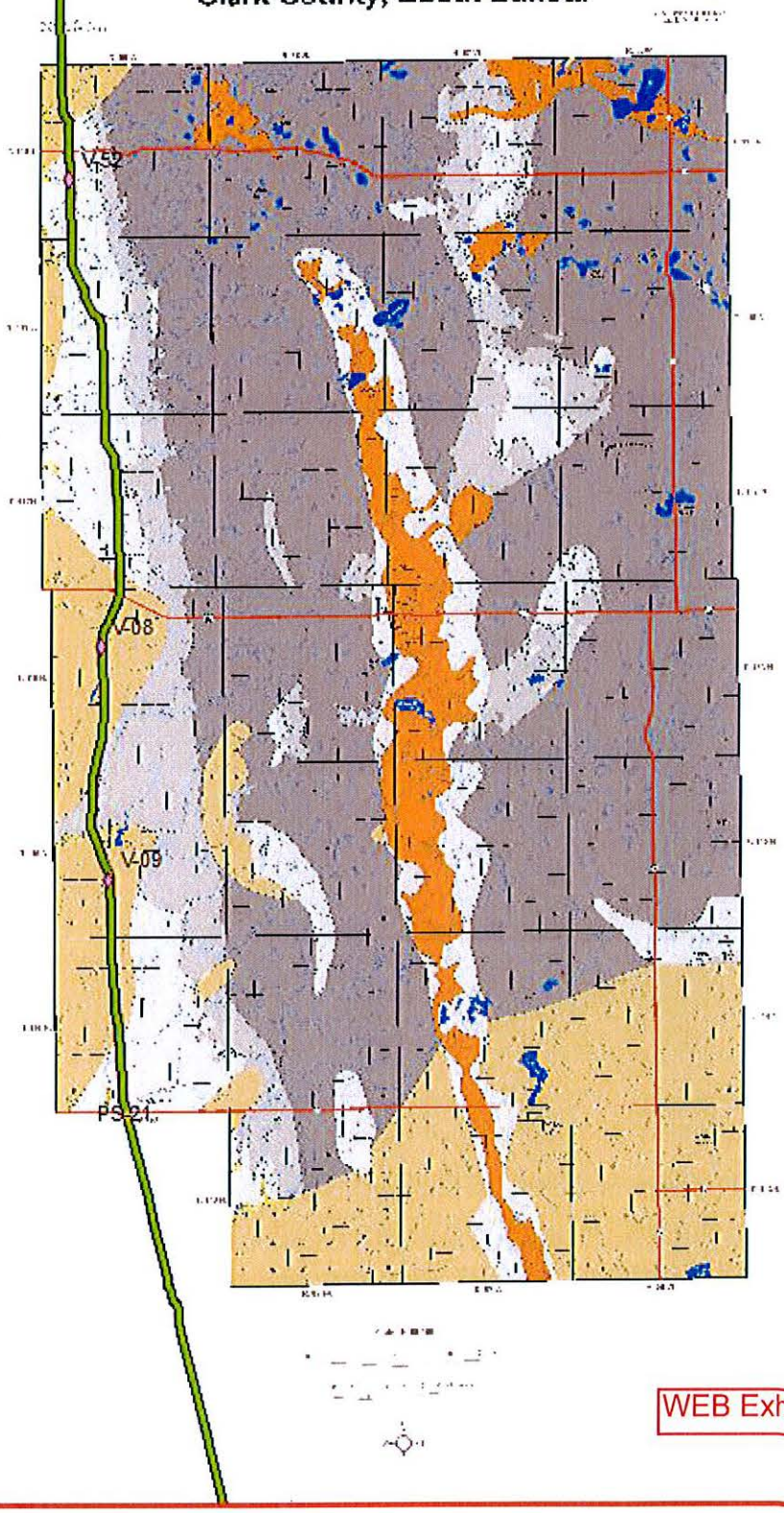


Explanation

WEB Exhibit # 11a

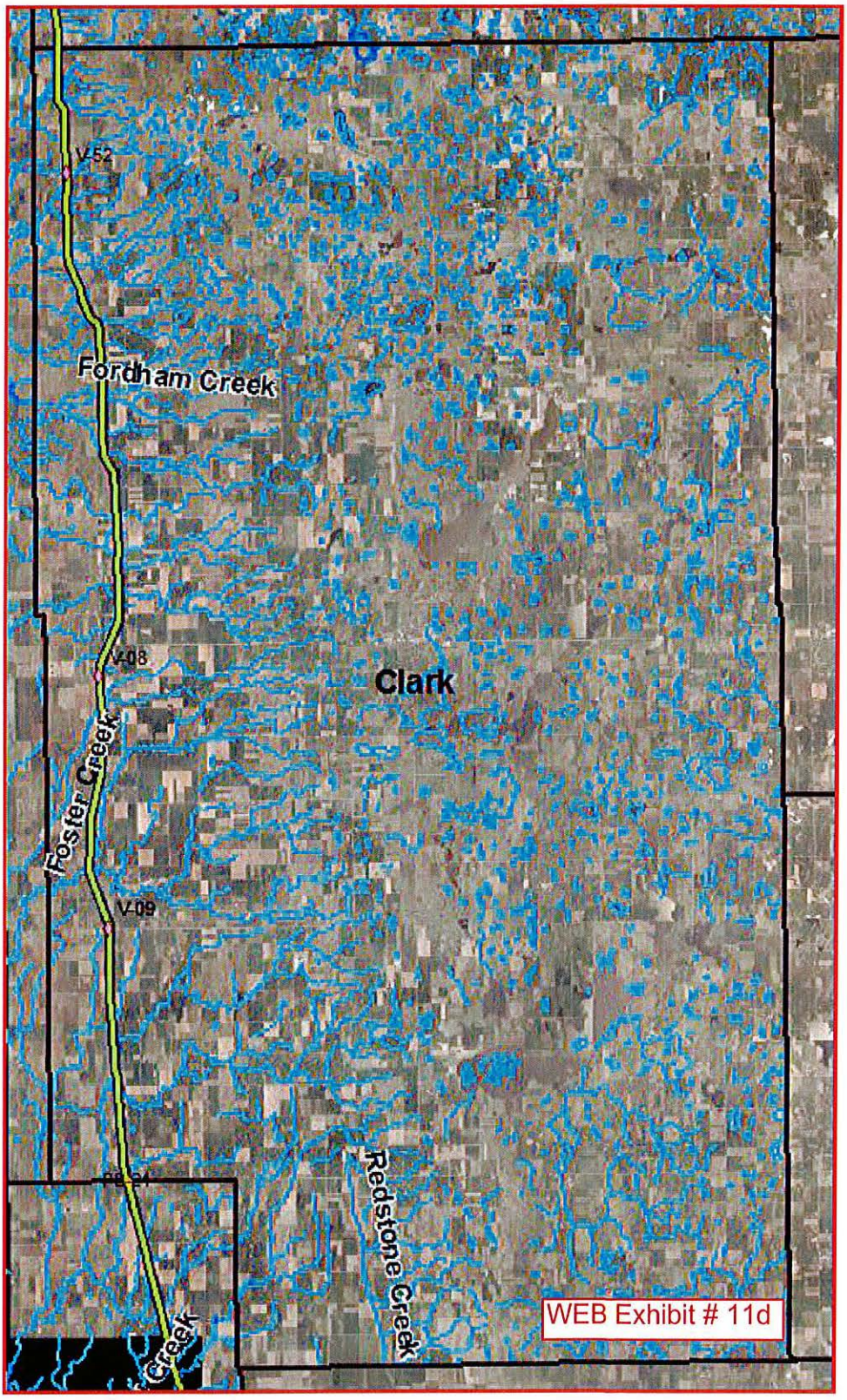

Dayton Stena Ditch
Dayton Crow Creek Ditch
Wild Rice River
La Belle Creek
Shortfoot Creek
Gronseth Slough
La Framboi's Creek
Crow Creek
Munson Creek
Marshall
Crow Creek
Crow Creek
Crew Creek
Newport Weston Ditch
V-48-ALT
Antelope Creek
Day
WEB Exhibit #11b

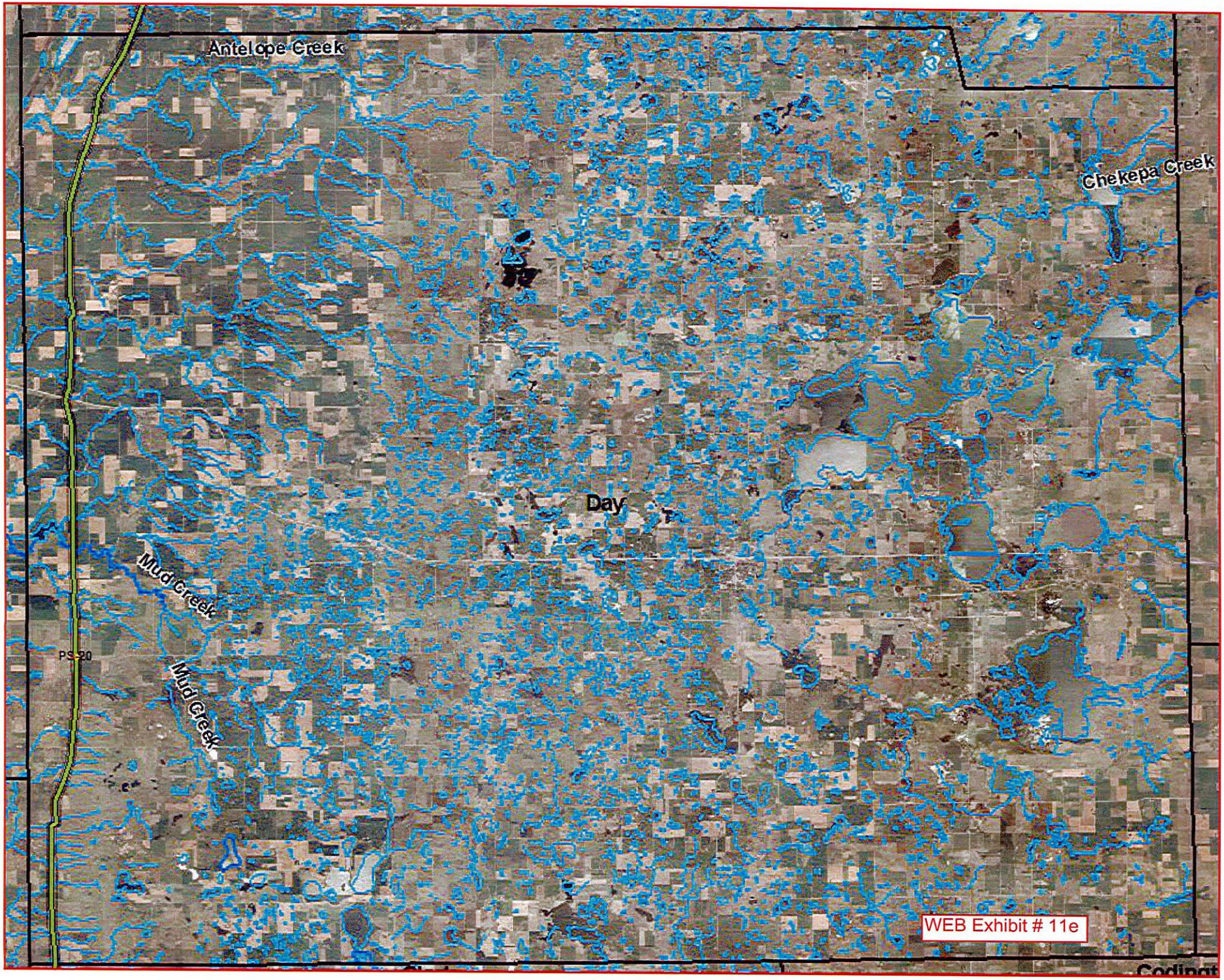
First Occurrence of Aquifer Materials in Clark County, South Dakota



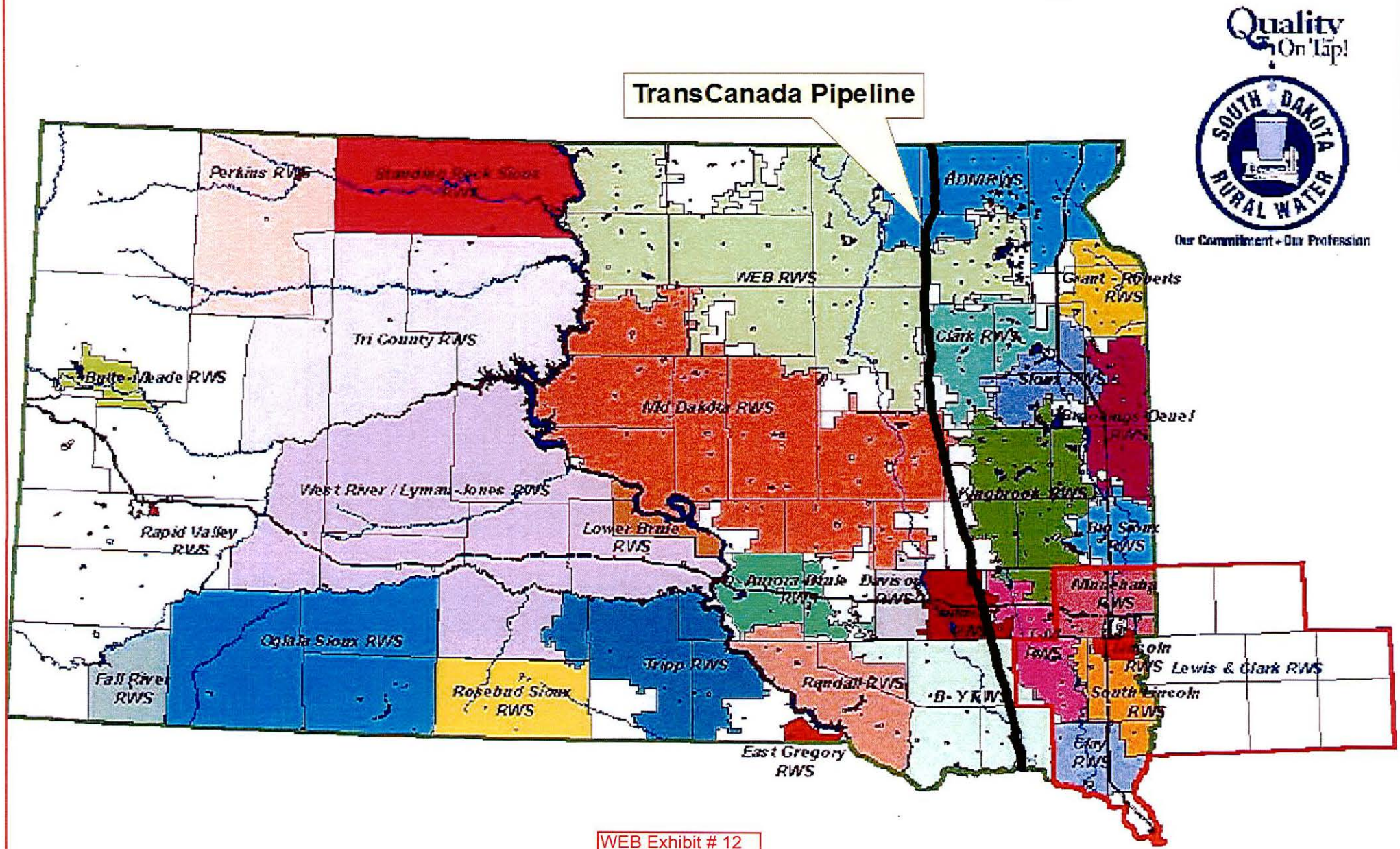
Explanation

WEB Exhibit # 11c


V-52
Fordham Creek
V-08
Clark
Foster Creek
V-09
Redstone Creek
Creek
WEB Exhibit # 11d


Antelope Creek
Chekepa Creek
Day
Mud Creek
Mud Creek
PS-20
WEB Exhibit # 11e

South Dakota Rural Water Systems



WEB Exhibit # 12

Official: Pipeline, refinery not linked

By Bob Mercer
American News Correspondent

PIERRE — The Keystone crude-oil pipeline that TransCanada wants to build through South Dakota is not intended to serve the Hyperion oil refinery project proposed near Elk Point, according to sworn testimony filed with the state Public Utilities Commission.

Robert Jones, vice president for TransCanada Pipelines, said Keystone has firm contracts to deliver 495,000 barrels per day to customers at Wood River and Patoka, Ill., and Cushing, Okla.

"Hyperion is not included as a firm shipper. Keystone has not negotiated any shipping contracts or connection contracts with the proposed Hyperion project or any other proposed refinery," Jones said in his prefiled testimony.

Jones said there are sufficient commitments to lead TransCanada to increase the pipeline's capacity to 591,000 barrels per day.

"Keystone is not dependent on the construction of the Hyperion

See OIL, *Page 10A*

Oil: Cost estimated at $300 million

Continued *from Page 1A*

refinery or any other proposed refinery," he added.

Opponents of the pipeline have charged that TransCanada and Hyperion are linked.

The PUC will have a hearing in December on whether to grant TransCanada the necessary state permit to construct the pipeline through South Dakota. The 220-mile route would cross 10 counties.

Interstate 29: A project consultant said TransCanada never considered running the pipeline down the Interstate 29 corridor because such a route wouldn't be allowed for safety reasons.

The consultant, Michael Troski, said TransCanada also rejected the option of running the pipeline on property adjacent to I-29 because that route would need to loop around interchanges, overpasses and residential and commercial areas of development.

Opponents have urged the project be relocated from the James River Valley to the I-29 corridor.

Jones in his testimony said Keystone will have three full-time employees in South Dakota after construction is complete, along with 50 to 60 part-time contractual positions.

TransCanada wants to start construction in 2008 and have the project in operation by late 2009.

Cost, tax revenue: Jones said the estimated cost of construction in South Dakota is $300 million. He said sales and use taxes would normally be about $18 million, but a state law allows a 75 percent refund that would result in TransCanada paying about $4.5 million.

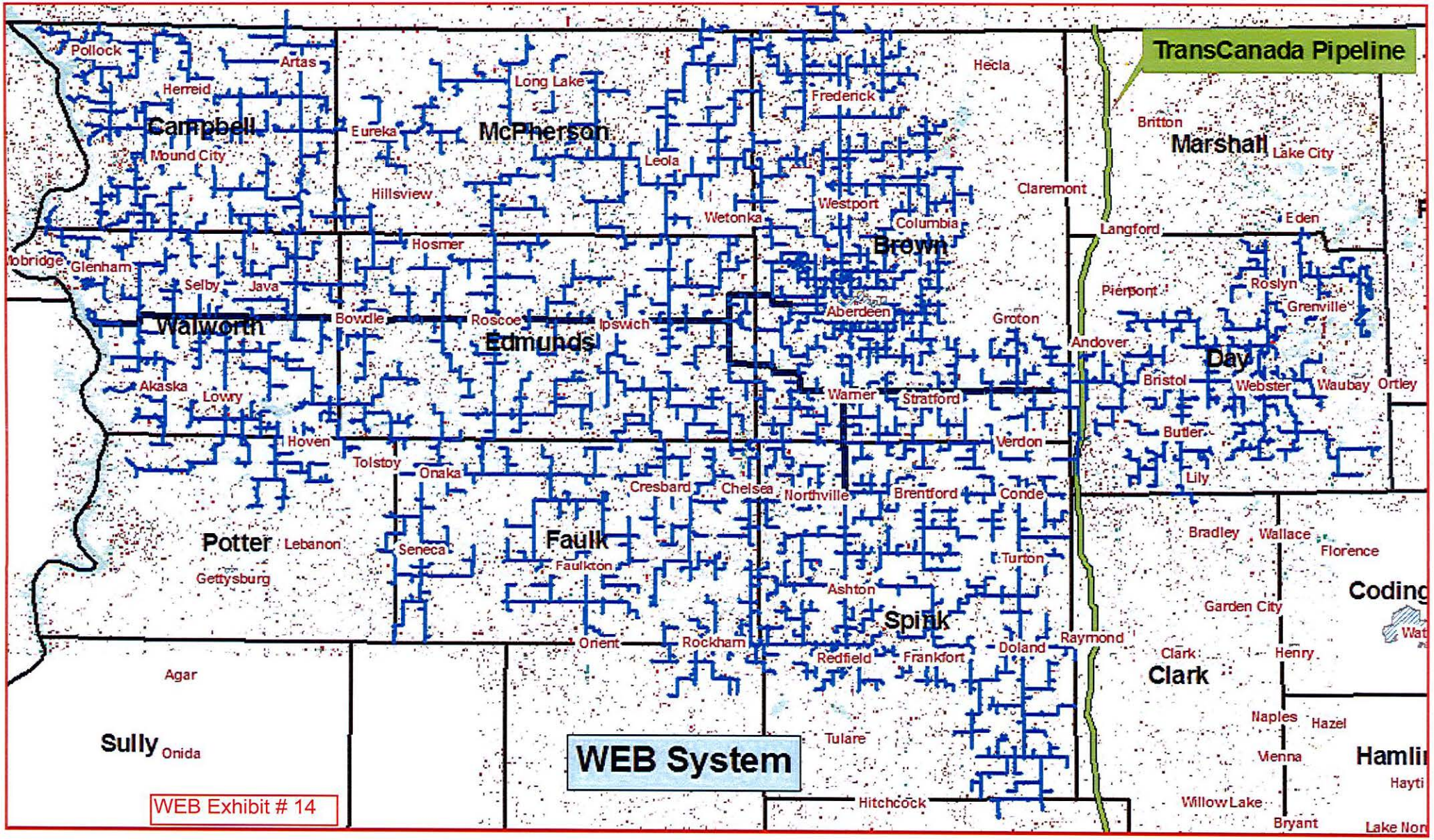
He expects the pipeline to generate about $6.5 million in taxes in the first year after construction.

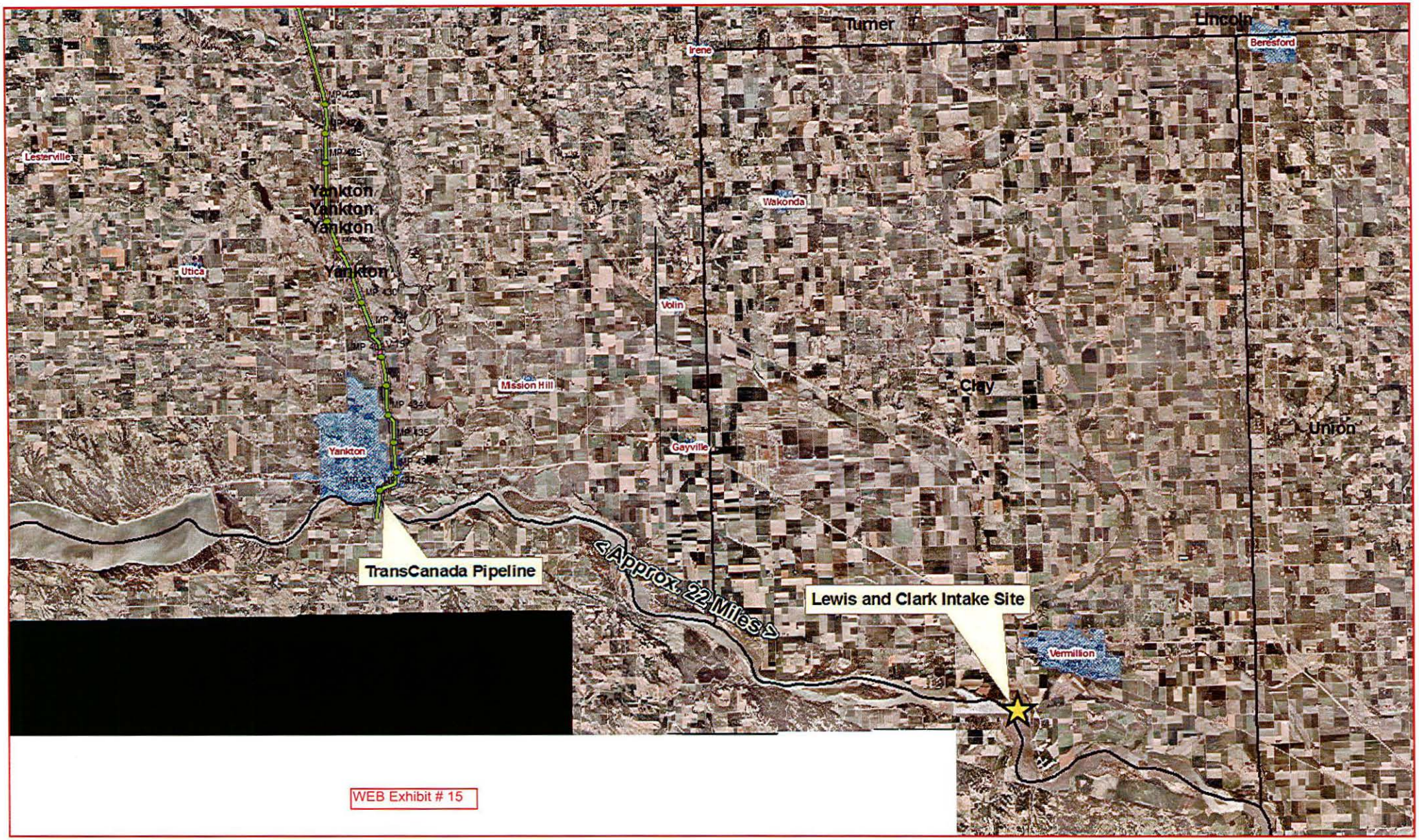
The pre-filed testimony from TransCanada officials is the first step in the process leading up to the December hearing. Opponents will prefile their testimony next, followed by rebuttals from each side.

The purpose of the prefiled testimony is to allow the three PUC members to better consider the written statements and to accelerate the hearing process.

WEB Exhibit # 13

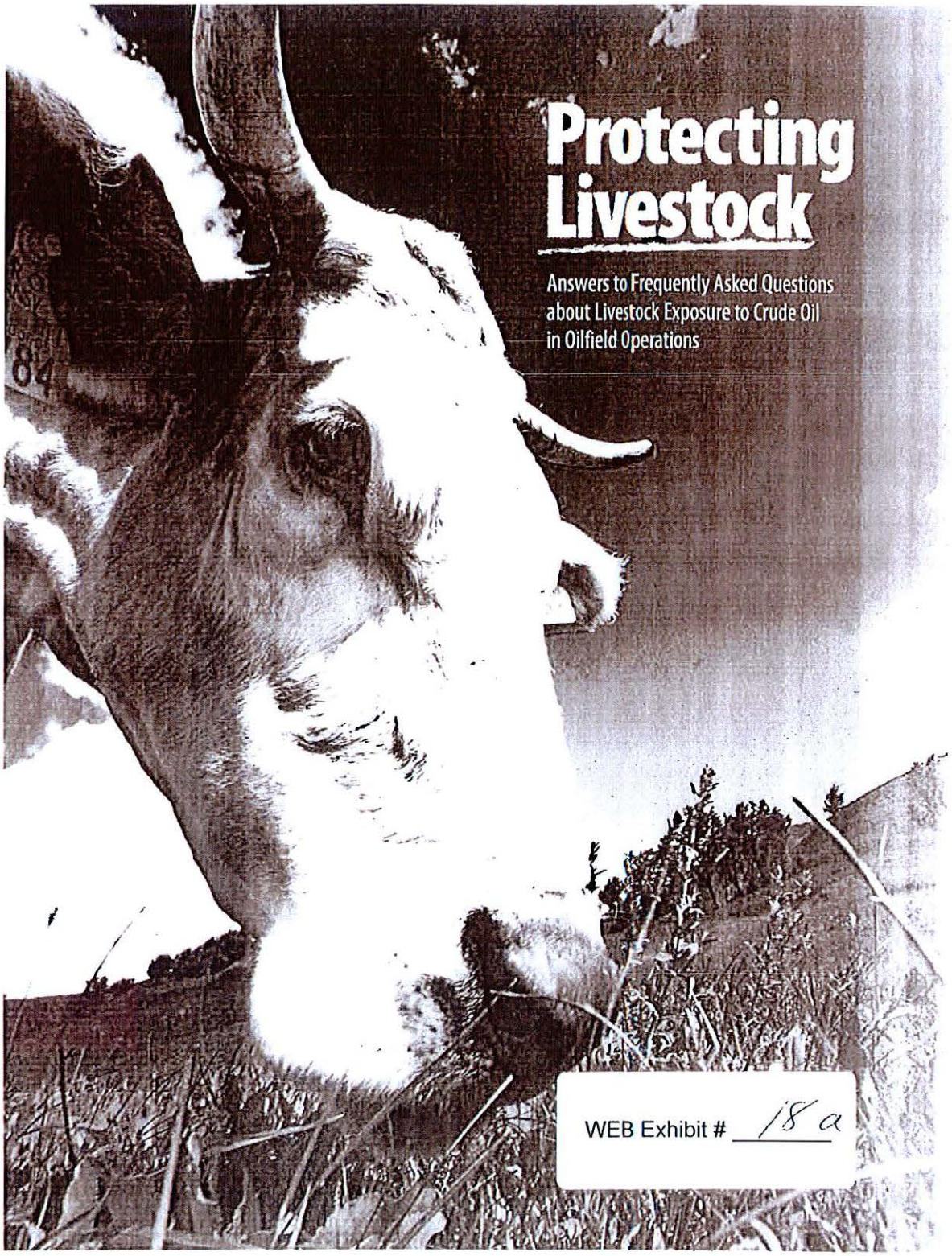
010294


TransCanada Pipeline
WEB System
WEB Exhibit # 14
Campbell
McPherson
Brown
Marshall
Walworth
Edmunds
Potter
Faulk
Spink
Day
Clark
Sully
Coding
Pollock
Artas
Herreid
Eureka
Mound City
Long Lake
Frederick
Hecla
Britton
Lake City
Claremont
Hillsview
Leola
Wetonka
Westport
Columbia
Langford
Eden
Hosmer
Glenham
Selby
Java
Pierpont
Roslyn
Grenville
Bowdle
Roscoe
Ipswich
Aberdeen
Groton
Andover
Akaska
Lowry
Warner
Stratford
Bristol
Webster
Waubay
Ortley
Hoven
Tolstoy
Onaka
Verdon
Butler
Lily
Cresbard
Chelsea
Northville
Brentford
Conde
Bradley
Wallace
Florence
Lebanon
Seneca
Faulkton
Turton
Gettysburg
Ashton
Garden City
Orient
Rockham
Redfield
Frankfort
Doland
Raymond
Henry
Agar
Naples
Hazel
Onida
Tulare
Vienna
Hayti
Hitchcock
Willow Lake
Bryant
Lake Nor


Turner
Lincoln
Irene
Beresford
Lesterville
Yankton
Yankton
Yankton
Yankton
Utica
Wakonda
Volin
Mission Hill
Clay
Union
Yankton
Gayville
TransCanada Pipeline
< Approx. 22 Miles >
Lewis and Clark Intake Site
Vermillion
WEB Exhibit # 15


WEB Exhibit # 16


WEB Exhibit # 17



Protecting Livestock

Answers to Frequently Asked Questions about Livestock Exposure to Crude Oil in Oilfield Operations

WEB Exhibit # 18a

Introduction

Livestock may be exposed to accidental releases of petroleum hydrocarbons at or near oil and natural gas exploration and production sites. Under certain circumstances, it may be necessary to evaluate the *risk* posed to livestock.

In *Risk-Based Screening Levels for the Protection of Livestock Exposed to Petroleum Hydrocarbons* by Pattanayek and DeShields [2004], and referred to herein as "API (2004)," API developed toxicity values and screening guidelines for evaluating risks to livestock from exposure to petroleum hydrocarbons. The report addressed how to: (1) determine whether livestock should be included in a risk evaluation and (2) estimate risks of petroleum hydrocarbon exposures to livestock.

This booklet summarizes the key results of API (2004), describing ways livestock might be significantly exposed to petroleum hydrocarbons via a conceptual site model, and outlines how to make a screening level determination of whether or not livestock are at risk from the exposure.

Screening levels for livestock protection have been developed by other agencies (e.g., Canadian Council of Ministers of the Environment [CCME] and Alberta Environment). These values are either region-specific or cover limited constituents of petroleum hydrocarbons. API (2004) used a more generalized approach to develop conservative screening levels for petroleum hydrocarbons. The screening levels can be used to characterize risks to livestock across a variety of conditions. API (2004) describes the differences among API, CCME, and Alberta Environment and also provides an uncertainty analysis of the API approach.

A glossary provided on page 14 describes terms shown in italic throughout this booklet.

Conceptual Site Models

This booklet refers to the use of a **conceptual site model (CSM)** to identify potential sources, exposure pathways, and receptors. CSMs may be graphical or text-based; at a minimum, however, CSMs must identify a complete or potentially complete linkage between a source and a receptor to be considered in a risk assessment.

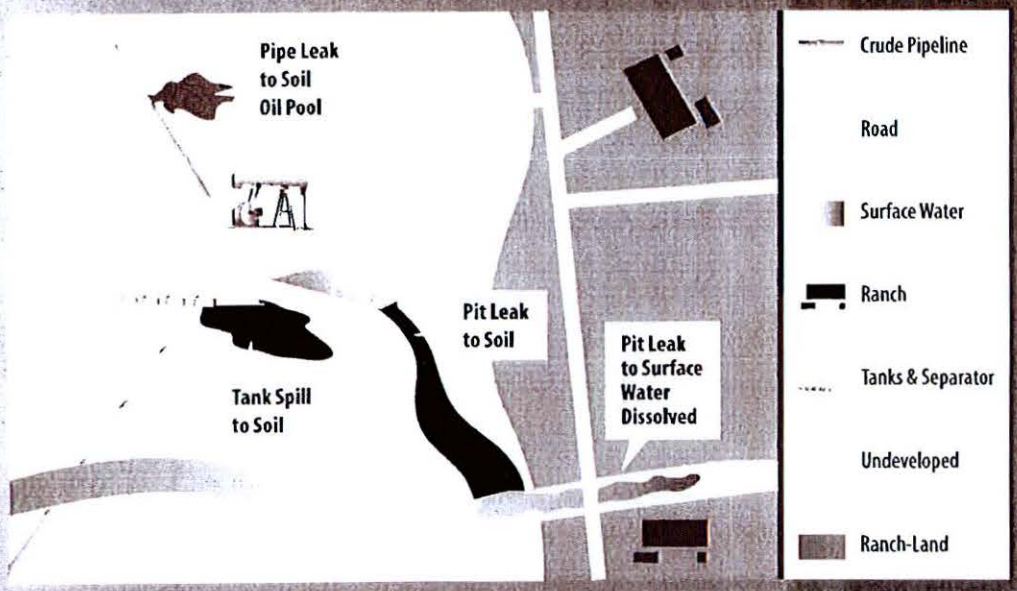
PATHWAY

If a complete exposure pathway is not indicated by the CSM then further assessment is not necessary. If the linkage leads to an insignificant exposure, i.e. source concentrations less than the *risk-based screening levels (RBSLs)* for soil or water, the assessment indicates no unacceptable risk to the receptor. If constituent values are greater than RBSLs, further actions are taken to protect the receptor. The path forward could include a site-specific risk assessment, source treatment, source removal, source isolation, or land-use change.

Image provided by Dreamstime.com

WEB Exhibit # 186

Figure 1
Aerial view of a site with primary and secondary contaminant sources



What type(s) of animals are considered livestock?

API (2004) addresses dairy cattle, beef cattle, calves, sheep, goats, camels, and horses as receptors; therefore, they are considered livestock in this document. These are animals that forage in pasture areas. Species that are raised in more confined and controlled conditions, such as chickens or pigs, have less chance of exposure to petroleum hydrocarbons. Other species, such as llamas and oxen, could also be evaluated by following the approach outlined in API (2004). (Also, see text box: "Can Livestock RBSLs be Used for Wildlife?" on page 8).

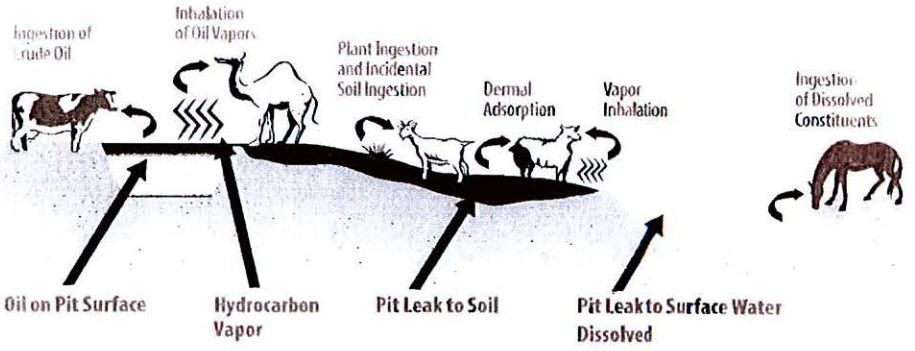
WEB Exhibit # 18-C

How are livestock typically exposed to crude oil?

Crude oil may be released to soil or water through accidental leaks and spills from primary sources such as equipment, pipelines, storage vessels, and transport vehicles. The resulting secondary sources are pools of crude oil, oil mixed in soil, dissolved constituents in water, and vapors in air (Figure 1).

Livestock can be exposed to petroleum hydrocarbons through incidental soil ingestion, water ingestion, direct ingestion of crude oil, inhalation, skin contact (dermal absorption), and indirectly through ingestion of contaminated plants (Figure 2). Based on information available in the scientific literature, the significant *exposure pathways* are incidental soil ingestion, water ingestion, and direct petroleum ingestion.

Figure 2
Potential source, pathways, and receptors addressed in API (2004)



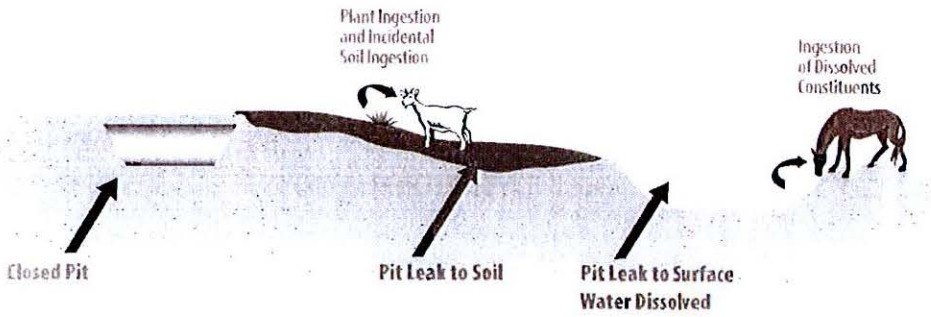
Livestock may consume soil inadvertently during grazing (Zach and Mayoh 1984; CCME 2000) or may intentionally ingest salty-tasting soil (Coppock *et al.* 1995). According to the CCME (2000), most of the petroleum hydrocarbon exposure in cattle is a result of contaminated surface-soil ingestion.

Chronic exposure through drinking water can be a significant exposure pathway for livestock (CCME 2000). The amount of water ingested by cattle varies according to age, physiological status (growth, fattening, pregnancy, lactation), diet composition, breed, size, and, for all animals, temperature (Agriculture and Agri-Food Canada 2001; National Research Council [NRC] 1988).

Cattle may directly ingest crude oil and other petroleum compounds because of curiosity (particularly young calves; Edwards 1985), i.e., drinking from pools created by piping failures (Edwards and Zinn 1979; Coppock et al. 1995; CCME 2000). Oil and natural gas industry guidance (API 1997) and many regulatory agencies (e.g., the Railroad Commission of Texas, 1993) stress the importance of removing free oil from the soil surface to prevent animal exposure.

WEB Exhibit # 18-d

Figure 3
Example conceptual site model showing significant exposure pathways at a site



How do I determine if livestock are at risk at a site?

The best way to start is to develop a *conceptual site model* (CSM). The CSM identifies complete and potentially complete exposure pathways (Fig. 3). If a complete significant pathway(s) does not exist for exposure of livestock to petroleum hydrocarbons, a screening-level risk evaluation for livestock is not necessary. By definition, if there is no significant exposure to a potentially toxic compound, there is no likelihood of significant unacceptable risk to the receptor from that compound.

If a significant exposure pathway exists, further screening-level assessment may be appropriate. A screening-level risk assessment uses a conservative approach to characterize potential risk to livestock exposed to petroleum hydrocarbons at a site. In short, concentrations of petroleum hydrocarbons in soil in milligrams per kilogram (mg/kg) and water in milligrams per liter (mg/L) at a site can be compared to *risk-based screening levels (RBSLs)* protective of livestock shown in Table 1.

WEB Exhibit # 18-e

Table 1
Risk-Based Screening Levels for Livestock

(Note: Depending on the composition of the oil, some RBSLs may exceed water solubility limits, therefore indicating that contaminated water cannot present a health risk unless free oil is present on the water.)

Livestock	Drinking Water Risk-Based Screening Levels (RBSLs; mg/L)						
	Crude Oil	Benzene	Toluene	Ethylbenzene	Xylene	LMW[1] PAH	HMW[2] PAH
Dairy Cattle	1,200	32.4	202	26.4	162	4.53	0.907
Beef Cattle	1,110	31.4	196	25.6	157	4.40	0.880
Calves	293	14.3	89.5	11.7	71.7	2.01	0.402
Sheep	855	40.5	253	33.1	203	5.68	1.14
Goats	622	34.8	217	28.4	174	4.87	0.974
Camels	7,670	202	1,260	165	1,000	28.3	5.65
Horses	2,760	74.3	464	60.6	371	10.4	2.08

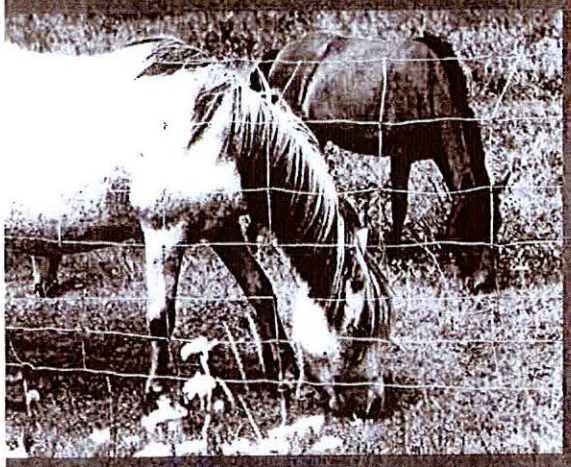
Livestock	Soil Risk-Based Screening Levels (RBSLs; mg/kg)						
	Crude Oil	Benzene	Toluene	Ethylbenzene	Xylene	LMW PAH	HMW PAH
Dairy Cattle	47,200	1,270	7,950	1,040	6,370	178	35.7
Beef Cattle	44,900	1,270	7,900	1,030	6,330	177	35.5
Calves	44,900	2,200	13,700	1,790	11,000	308	61.5
Sheep	20,100	953	5,950	778	4,770	133	26.7
Goats	17,600	982	6,130	802	4,910	138	27.5
Camels	69,500	1,830	11,400	1,490	9,140	256	51.2
Horses	28,100	756	4,720	617	3,780	106	21.2

[1] Low molecular weight polycyclic aromatic hydrocarbons (LMW PAHs) are defined as PAHs with less than or equal to 3 rings.

[2] High molecular weight polycyclic aromatic hydrocarbons (HMW PAHs) PAHs are defined as PAHs with greater than or equal to 4 rings.

WEB Exhibit # 18 f

010304



In general, what are livestock RBSLs and how are they developed?

RBSLs are threshold concentrations in soil and water, at or below which little-to-no likelihood of significant unacceptable risks to livestock are expected. API (2004) developed soil and drinking water RBSLs for crude oil, benzene, toluene, ethylbenzene, and xylenes (BTEX), low molecular weight polycyclic aromatic hydrocarbons (LMW PAHs), and high molecular weight polycyclic aromatic hydrocarbons (HMW PAHs) (see Table 1).

RBSLs for animals such as livestock are generally developed based on a risk assessment model integrating livestock exposures and toxicity values (i.e., *toxicity reference values* or TRVs). A description of how RBSLs were determined is provided on page 10 **"How are livestock RBSLs calculated?"** and covered in detail in API (2004).

How do I use RBSLs?

To use the RBSLs, site data are first evaluated to quantify the *Exposure Point Concentration* (EPC) to which livestock may be exposed under reasonable maximum exposure (RME) conditions. EPCs are concentrations of chemicals in site media (e.g., soil, water) to which livestock may be exposed. EPC can be calculated using USEPA guidelines (Section 6.5 of EPA 1989; EPA 2002) which outline the statistical methods that can be used and the considerations involved in choosing the appropriate statistical representation of exposure. The RME scenario represents an upper-bound estimate of exposure. As livestock generally graze over large areas, appropriate EPCs for the RME scenario could be the mean of the site data or the 95 percent upper confidence limit (95% UCL) of the mean concentration. According to the USEPA (EPA 1989), estimates of the RME EPC necessarily involve the use of professional judgment.

Next, soil or water EPCs for petroleum hydrocarbons can be compared to the media-specific and receptor-specific RBSLs (i.e., soil or drinking water) in Table 1 (see Example 1). If EPCs do not exceed RBSLs, then little to no likelihood of significant unacceptable risks can be expected. Conversely, if EPCs exceed RBSLs then a potential for unacceptable risks to livestock may be present and further assessment may be necessary.

WEB Exhibit # 18-9

Example 1
Application of RBSLs

Figure 3 is a graphical CSM for a site contaminated with weathered crude oil from previous exploration and production activities.
Analysis of the soil and groundwater provided upper confidence limit (UCL) constituent concentrations as shown in Tables A-1 and A-2, respectively.

Table A-1
Comparing UCL Water Sample Analytical Result with RBSLs for Livestock Drinking Water

	Results Compared with Drinking Water RBSLs (mg/L)						
	Crude Oil	Benzene	Toluene	Ethylbenzene	Xylene	LMW PAH	HMW PAH
H_20 Sample	122	0.051	0.023	0.003	0.003	ND (0.001)	ND (0.001)
Goat RBSL	622	34.8	217	28.4	174	4.87	0.974
Horse RBSL	2,760	74.3	464	60.6	371	10.4	2.08
ND = Non-detect No Exceedances							

Table A-2
Comparing UCL Soil Sample Analytical Result with RBSLs for Livestock Soil Ingestion

	Results Compared with Soil RBSLs (mg/kg)						
	Crude Oil	Benzene	Toluene	Ethylbenzene	Xylene	LMW PAH	HMW PAH
Soil Sample	**25,600**	256	521	108	470	**51**	**33.0**
Goat RBSL	17,600	982	6,130	802	4,910	138	27.5
Horse RBSL	28,100	756	4,720	617	3,780	106	21.2
Exceedances are bold							

No further action is required for the drinking water exposure pathway because RBSLs were not exceeded.

The soil ingestion exposure pathway RBSL for crude oil was exceeded for horses and for HMW PAHs for goats and horses.

These results must be considered in the next step of decision-making. Exceeding a RBSL does not mean cleanup is required. It indicates that further risk assessment or some form of exposure mitigation is necessary.

WEB Exhibit # 18-h

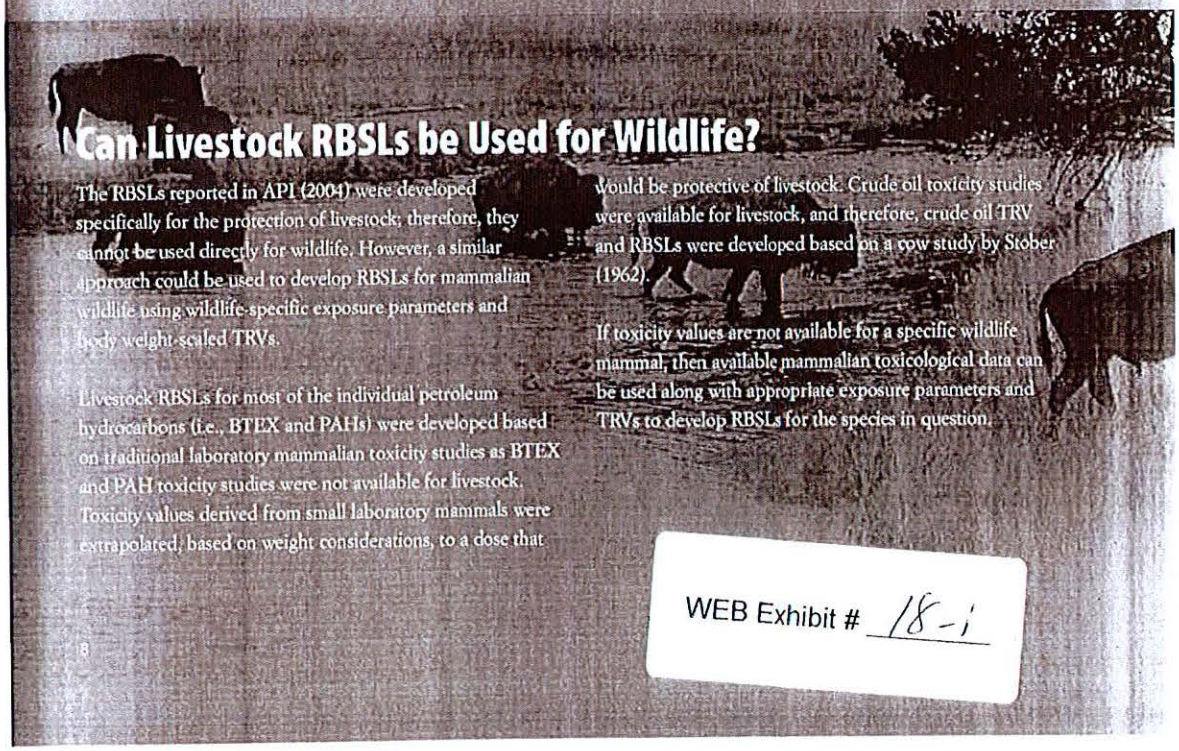
010306

Are livestock petroleum hydrocarbon RBSLs applicable to all types of crude oil releases?

For a screening level risk assessment for any crude oil release, the RBSLs developed in API (2004) can be directly compared to crude oil concentrations, generally expressed as total petroleum hydrocarbon (TPH), at that site. TRVs for crude oil used to calculate the RBSLs were developed based on whole fresh, unweathered crude oil. TRVs and RBSLs for unweathered crude oil can be used for evaluating fresh spills and can be considered conservative screening values for weathered crude oil.

How can I obtain site-specific RBSLs?

The RBSLs developed for petroleum hydrocarbons in API (2004) were based on a generalized approach using conservative exposure parameters to characterize risks for a variety of livestock across a variety of conditions. However, site-specific RBSLs (also known as site-specific target levels or SSTLs) can be developed by substituting known site-specific site use factors (SUF) or exposure parameters (such as body weights, or ingestion rates for soil and water) in a subsequent evaluation if there is a need to refine the conservative assumptions used to calculate the RBSLs. Example 2 on the next page illustrates this procedure.



Can Livestock RBSLs be Used for Wildlife?

The RBSLs reported in API (2004) were developed specifically for the protection of livestock; therefore, they cannot be used directly for wildlife. However, a similar approach could be used to develop RBSLs for mammalian wildlife using wildlife-specific exposure parameters and body weight-scaled TRVs.

Livestock RBSLs for most of the individual petroleum hydrocarbons (i.e., BTEX and PAHs) were developed based on traditional laboratory mammalian toxicity studies as BTEX and PAH toxicity studies were not available for livestock. Toxicity values derived from small laboratory mammals were extrapolated, based on weight considerations, to a dose that would be protective of livestock. Crude oil toxicity studies were available for livestock, and therefore, crude oil TRV and RBSLs were developed based on a cow study by Stober (1962).

If toxicity values are not available for a specific wildlife mammal, then available mammalian toxicological data can be used along with appropriate exposure parameters and TRVs to develop RBSLs for the species in question.

WEB Exhibit # 18-1

010307

Example 2
SSTL Calculation

The previous example (Example 1) indicated that the soil ingestion exposure pathway RBSL for crude oil was exceeded for horses and for HMW PAHs for goats and horses. In this example, the development of a site-specific site use factor (SUF) is used to illustrate the calculation of site-specific target levels (SSTLs). The SUF represents the fraction of the exposure area for the receptor represented by the contamination area. API (2004) assumes a SUF of 1, i.e., the contaminated area is as large as the effective grazing area. In reality, only a portion of a total grazing area would be contaminated.

A field survey indicates that only 0.25 acre of these livestock's 2-acre range is affected by petroleum-related activities. Thus, the SUF is 0.125 instead of the default value of 1. Using the equations on page 10, **"How are livestock RBSLs calculated?"**, SSTLs are determined using the site-specific SUF (i.e., RBSLs divided by the SUF). Likewise, other justifiable changes to default parameters could be used to calculate SSTLs.

Table B-1
Comparing UCL Soil Sample Analytical Result with Livestock Soil Ingestion SSTLs

	Results Compared with Soil SSTLs (mg/kg)						
	Crude Oil	Benzene	Toluene	Ethylbenzene	Xylene	LMW PAH	HMW PAH
Soil Sample	**25,600**	**256**	**521**	**108**	**470**	**51**	**33**
Goat RBSL	141,000	7,860	49,000	6,420	39,300	1,100	220
Horse RBSL	225,000	6,050	37,800	4,940	30,300	848	170
No Exceedances							

No further action is required for the livestock incidental soil ingestion exposure pathway because the SSTLs were not exceeded.

What if chemicals other than hydrocarbons (including BTEX and PAHs) are released?

This report focused on whole crude oil and its toxicologically important constituents (i.e., benzene, toluene, ethylbenzene, toluene [BTEX], and polycyclic aromatic hydrocarbons [PAHs]). Other chemicals, such as metals, can also be present in crude oil but are generally not found at high enough concentrations to provide a significant human health and ecological risk (Magaw et al., 1999).

Thus, metals were not addressed in API (2004). However, risks to livestock from metal exposure can be evaluated using a similar approach to that described on page 10 **"How are Livestock RBSLs Calculated?"** Toxicity values and RBSLs can be developed for metals to estimate potential risks to livestock using a similar approach to that described for petroleum hydrocarbons in API (2004).

WEB Exhibit # 18-j

010308

How are Livestock RBSLs Calculated?

Livestock screening levels are risk-based and are developed based on the standard hazard quotient (HQ) equation used for estimating risks to human health and other ecological receptors (EPA 1997).

$$HQ = \frac{Dose}{TRV} \qquad \text{(Equation 1a)}$$

where:

TRV = Toxicity reference value in milligrams per kilogram body weight per day (mg/kg-bw/day)
Dose = estimated daily dose of petroleum related hydrocarbons from ingestion (mg/kg-bw/day); and calculated using the following equation:

$$\frac{[(IRsoil \times Csoil) + (IRwater \times Cwater)] \times SUF}{BW} \qquad \text{(Equation 1b)}$$

where:

IR_{soil} = amount of soil incidentally ingested per day in dry weight (kg/day)
IR_{water} = amount of water ingested per day (L/day)
C_{soil} = concentration of constituent in soil or sediment (mg/kg dry weight)
C_{water} = concentration of constituent in water (mg/L)
SUF = site use factor (unitless)
BW = body weight (kg)

Substituting Equation 1b for "Dose" in Equation 1a:

$$HQ = \frac{[(IRsoil \times Csoil) + (IRwater \times Cwater)] \times SUF}{BW \times TRV} \qquad \text{(Equation 1c)}$$

or

$$HQ = \frac{(IR \times C) \times SUF}{BW \times TRV} \qquad \text{(Equation 1d)}$$

To calculate RBSLs for a single medium (i.e., drinking water or soil), Equation 1d should be rearranged as shown in Equations 2a and 2b. Instead of estimating a HQ associated with a chemical concentration in water or soil and using the toxicity and exposure assumptions presented in Table 1 of the technical background report (API 2004), Equations 2a and 2b estimate a protective drinking water or soil concentration associated with a target HQ of 1.

Assuming target HQ = 1, SUF = 1, and rearranging Equation 1d, "C" becomes defined as the corresponding RBSL

WEB Exhibit # 18-K

010309

Drinking-water RBSLs for livestock were calculated using the following equation:

$$dwRBSL = \frac{1 \times BW \times TRV}{IRwater} \qquad \text{(Equation 2a)}$$

where:

1	=	target hazard quotient; unitless
dwRBSL	=	drinking water RBSL in milligrams per liter (mg/L)
IR_{water}	=	water ingestion rate in liters per day (L/day); to be conservative, the summer IRwater value from Table 1 is used
BW	=	Body weight in kilograms (kg)
TRV	=	Toxicity reference value in milligrams per kilogram body weight per day (mg/kg-bw/day)

Incidental soil ingestion RBSLs for livestock were calculated using the following equation:

$$soilRBSL = \frac{1 \times BW \times TRV}{IRsoil} \qquad \text{(Equation 2b)}$$

where:

1	=	target hazard quotient; unitless
soilRBSL	=	soil RBSL in milligrams per kilogram dry weight (mg/kg)
IR_{soil}	=	soil ingestion rate in kilograms per day (kg/day)
BW	=	body weight in kilograms (kg)
TRV	=	toxicity reference value in milligrams per kilogram body weight per day (mg/kg-bw/day)

The TRVs developed in API (2004) are summarized as follows:

Livestock	Soil Risk-Based Screening Levels (RBSLs; mg/kg)						
	Crude Oil	Benzene	Toluene	Ethylbenzene	Xylene	LMW PAH	HMW PAH
Dairy Cattle	211	5.70	35.6	4.65	28.5	0.798	0.160
Beef Cattle	211	5.95	37.1	4.86	29.8	0.833	0.167
Calves	211	10.30	64.5	8.43	51.7	1.450	0.289
Sheep	211	10.00	62.5	8.17	50.1	1.400	0.280
Goats	211	11.80	73.6	9.62	58.9	1.650	0.330
Camels	211	5.55	34.6	4.53	27.8	0.777	0.155
Horses	211	5.67	35.4	4.63	28.4	0.794	0.159

11

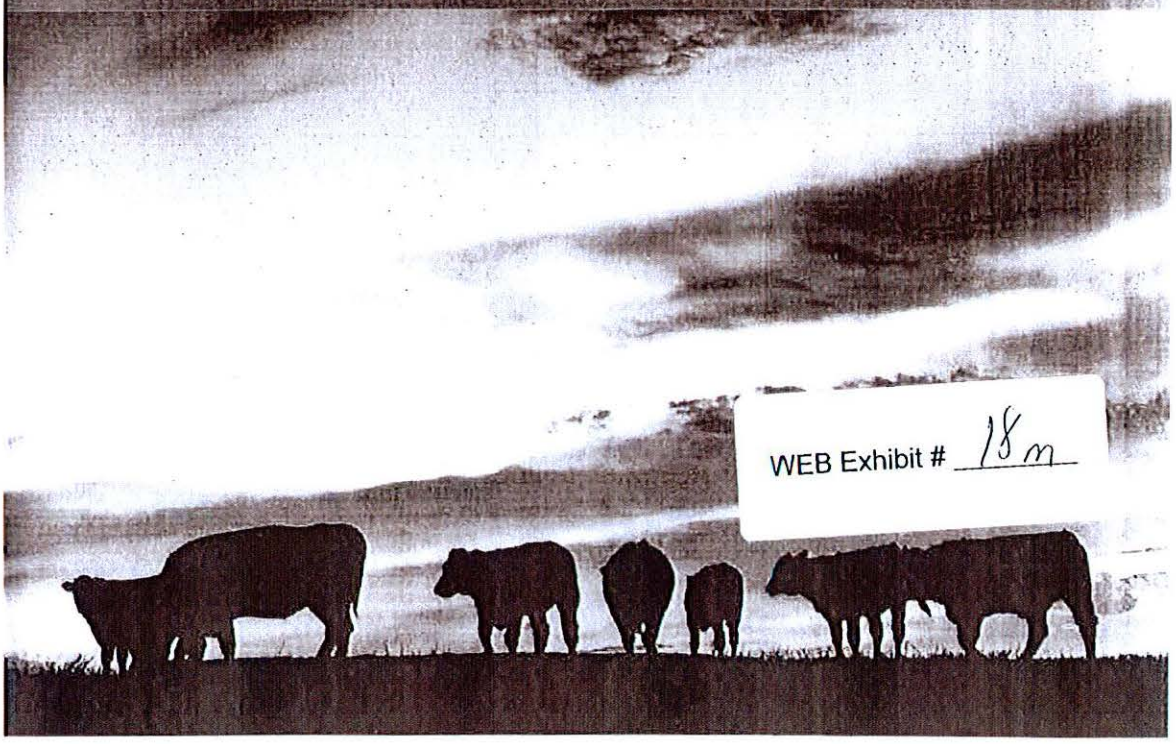
WEB Exhibit # 18 b

How do livestock RBSLs compare to human health RBSLs?

The toxicity values and guidelines for crude oil developed by API (2004) for soil ingestion in livestock are comparable to the recommended human health RBSLs for sites affected with crude oils. The suggested RBSLs for human residential and non-residential scenarios are the 95th percentile values (for all exposure pathways) of 2,800 mg/kg and 41,300 mg/kg, respectively (McMillen et al., 2001). Similarly, a comparable TPH screening level of 10,000 parts per million (ppm) is generally accepted as protective of plants (Hamilton et al., 1999).

How do API livestock RBSLs differ from levels calculated by other groups?

TRVs, drinking water and soil screening levels for the protection of livestock exposed to petroleum compounds have been developed by two agencies, the Canadian Council of Ministers of the Environment (CCME) and Alberta Environment. Differences between calculated API and Canadian screening levels result from selection of constituents and guidelines considered, calculation errors, and the Canadian agencies' use of uncertainty, "protection," and "allocation" factors. Differences among the Canadian guidelines (including constituents and guidelines considered) and their limitations are described in the text box "CCME Canada-Wide Standards (CWS; CCME 2000) and Alberta Environment (2001)."



WEB Exhibit # 18m

CCME Canada-Wide Standards (CWS; CCME 2000) and Alberta Environment (2001)

The Canada-Wide Standards for petroleum hydrocarbons present TRVs (referred to as Daily Threshold Effects Dose" or DTED) and drinking water RBSLs (referred to as "ReferenceConcentration" or RfC) for only whole oil and four fractions of crude oil (CCME 2000). These guidelines present levels that CCME considers protective under four generic land uses: agricultural, residential, commercial, and industrial. TRVs for livestock were developed based on Stober (1962), in an approach similar to that used by API. CCME and API used a similar approach to calculate drinking water RBSLs as well. However, a calculation error by CCME resulted in an order of magnitude, lower drinking-water screening level than that developed by API.

Alberta Environment set water RBSLs (referred to as "watering guidelines") and soil RBSLs (referred to as "soil quality guidelines" or SQG) for petroleum hydrocarbons (crude oil fractions and BTEX) considered to be protective of livestock health (Alberta Environment 2001*a*; 2001*b*). Crude oil TRVs for livestock were adopted from CCME. For BTEX, TRVs were developed using an approach similar to that described in API (2004). Soil and water RBSLs reflect exposure parameters and "other" protection factors specific to Alberta.

CCME and Alberta Environment toxicity values and guidelines are presented in Table 8 of API (2004).

Differences between the CCME and Alberta Environment and the API approach as well as limitations to these approaches are summarized below.

Differences/Limitations	CCME Canada Wide Standards	Alberta Environment
TRV Development	TRVs for whole oil and four crude oil fractions were developed.	Crude oil TRVs were adopted from CCME BTEX TRVs were developed.
Chemical Constituents	Only drinking water screening levels for whole oil and four crude oil fractions were developed for one livestock receptor (cattle).	Added soil and drinking water screening levels for BTEX and PAHs and soil screening levels for crude oil for one livestock receptor (cattle).
Uncertainty and Other Factors	An allocation factor (AF) of 0.2 was used to adjust toxicity values to account for multiple exposure pathways and media (air, soil, water, food, and consumer products), whereas the guideline values are for single pathways. The AF of 0.2 assumed that livestock can be equally exposed by all five potentially complete exposure pathways. However, dermal and inhalation pathways are expected to be minor. Additionally, not all sites will have both water and soil exposures. This likely results in an overly conservative RBSL.	In addition to the use of an AF of 0.2, a protection factor of 0.75 was used to prevent livestock from being exposed to more than 75% of the TRV. This is likely overly conservative.
Fractionation Approach	The fractionation approach used by CCME is not necessarily applicable or appropriate at all sites.*	The fractionation approach used by CCME and carried over by Alberta Environment is not necessarily applicable or appropriate at all sites.*
Additional Guidelines Developed	None	Two types of water quality guidelines were developed: *exposure point guidelines* for water to which receptors are actually exposed and *groundwater quality guidelines* to assess acceptable concentrations of chemicals in groundwater were also developed using fate and transport models.
Mathematical Errors	There was an order of magnitude error in calculating the RfC value by CCME. the RfC value should actually be 231 mg/L instead of 23 mg/L (this error was acknowledged by CCME; personal communication with Ted Nason September 10, 2002).	The error in the CCME RfC calculation is propagated in the Alberta Environment document.

* In this report, a toxicity value was developed for whole (i.e. fresh) crude oil. As fresh crude oil is more toxic than weathered oil, these values can be considered conservative screening values for weathered products.

WEB Exhibit # 18M

Glossary

Chronic exposure: A long term contact between a receptor and a chemical that could result in a sub-lethal or permanent adverse effect.

Conceptual site model (CSM): A written description and/or visual representation of predicted relationships between receptors and the chemicals and/or stressors to which they may be exposed.

Exposure pathway: How a receptor comes in contact with a chemical and/or media.

Exposure point concentrations (EPC): The concentration of a chemical that a receptor is exposed to over a chronic exposure period.

Hazard quotient (HQ): The chemical-specific ratio of the dose to the toxicity value.

Receptor: The species, population, community, habitat, etc. that may be exposed to a chemical.

Risk: The likelihood of a harmful effect to a receptor based on the existence and magnitude of a hazard and exposure of the receptor to the hazard.

Risk assessment: A method to evaluate the potential adverse effects of chemicals or other stressors on receptors.

Risk-based screening levels (RBSLs): Chemical-specific concentrations in environmental media that are considered protective of health. Usually they are derived from the generally accepted risk equations by specifying an acceptable target risk level and rearranging the equations to determine the chemical concentration in the environmental medium of interest that achieves this risk level.

Site-specific target levels (SSTLs): RBSLs calculated using site-specific values rather than generally accepted defaults.

Toxicity reference value (TRV): A dose of a chemical at or above which a toxic response occurs in the receptor.

WEB Exhibit # 18-0

010313

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WEB Exhibit # 18-9

010315

WEB Exhibit # 19

American News

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Our Voice

TransCanada should slow down process

Slow down and give us some respect.

This is our message to TransCanada officials.

TransCanada wants to build a 1,830-mile pipeline that would haul crude oil from Hardisty, Alberta, Canada, to Patoka, Ill., and, eventually, Cushing, Okla. The $2.1 billion project would cut through the very western parts of Marshall and Day counties in northeast South Dakota. TransCanada wants to start work next year and have the pipeline finished by late 2009.

In July, we said the proposed TransCanada pipeline was a good idea and that it deserved public support. Our reasoning went something like this: Though in the wide spectrum of things one new pipeline is a small piece of the modern oil industry picture, we should remember that building a new pipeline is one way of increasing the infrastructure of the U.S. oil industry and decreasing our reliance on Mideast oil.

We also said that there were concerns ranging from environmental to quality of life and many, many areas in between. We hoped that the concerns would be thoroughly addressed and resolved.

That didn't happen. Instead, TransCanada began pushing its plan through the state like the proverbial bull in the china closet.

Though we still support the overall purpose of the project, we have a problem with the way it is being implemented — and the way in which state and company officials are handling it.

First, company officials announced that TransCanada would be using a different type of pipeline than was originally planned; a less expensive, thinner pipe — with a slightly lower safety factor.

Company officials claim there are never any problems, and that citizens shouldn't worry. Well, pat answers that include words like "never" and "always" have a tendency to throw up red flags — and they should.

This is all perfectly legal and as been approved by the federal Pipeline and Hazardous Materials Safety Administration, but it still begs the question: Why? Was South Dakota chosen because we are a rural, relatively poor, sparsely populated state that wouldn't put up too much of a fight?

Here's another concern: State officials have been uncharacteristically quiet about this whole process — and not nearly as protective of the interests of this state's citizens and environment as they should be. We are not aware of a single state official who publicly questioned the lower quality pipe.

And then there is the issue of eminent domain. South Dakota hasn't even officially approved the pipeline yet, and TransCanada is already pushing eminent domain lawsuits on landowners who are reluctant to give permanent easements for the pipeline to go under their land.

Many South Dakotans would like to see TransCanada pursue the I-29 bypass option. But a project consultant said TransCanada never considered running the pipeline down the Interstate 29 corridor because such a route wouldn't be allowed for safety reasons.

So we are just supposed to ignore safety considerations, sign the easements and pray everything goes OK, because TransCanada says so? We think not.

Maybe what TransCanada really needs right now is a good public relations firm to address the issues, not lawyers to file lawsuits.

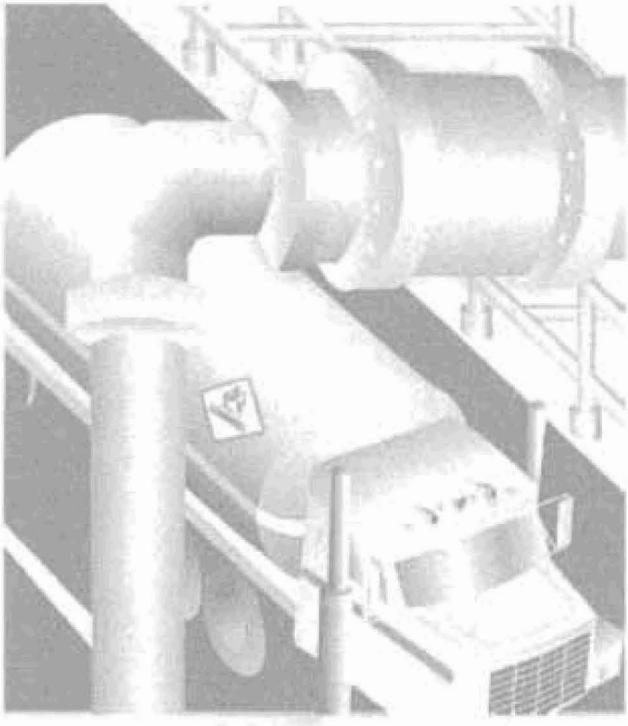
And what South Dakotans need right now are state officials who are willing to step up to the plate to make sure the state's interests are protected.

South Dakotans need — and deserve — more respect and consideration than this company is giving. South Dakotans also need — and deserve — more support and advocacy than we are getting from our state officials.

WEB Exhibit # 20

010317

Rupture of Enbridge Pipeline and Release of Crude Oil near Cohasset, Minnesota
July 4, 2002



Pipeline Accident Report

NTSB/PAR-04/01

PB2004-916501
Notation 7514A

WEB Exhibit # 21

Pipeline Accident Report

Rupture of Enbridge Pipeline and Release of Crude Oil near Cohasset, Minnesota July 4, 2002

WEB Exhibit # 21 A

NTSB/PAR-04/01
PB2004-916501
Notation 7514A
Adopted June 23, 2004

National Transportation Safety Board
490 L'Enfant Plaza, S.W.
Washington, D.C. 20594

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Adopted: June 23, 2004

WEB Exhibit # 21B

Chairman Ellen Engleman Conners did not participate in the adoption of this report.

Executive Summary

About 2:12 a.m., central daylight time, on July 4, 2002, a 34-inch-diameter steel pipeline owned and operated by Enbridge Pipelines, LLC ruptured in a marsh west of Cohasset, Minnesota. Approximately 6,000 barrels (252,000 gallons) of crude oil were released from the pipeline as a result of the rupture. The cost of the accident was reported to the Research and Special Programs Administration Office of Pipeline Safety to be approximately $5.6 million. No deaths or injuries resulted from the release.

The National Transportation Safety Board determines that the probable cause of the July 4, 2002, pipeline rupture near Cohasset, Minnesota, was inadequate loading of the pipe for transportation that allowed a fatigue crack to initiate along the seam of the longitudinal weld during transit. After the pipe was installed, the fatigue crack grew with pressure cycle stresses until the crack reached a critical size and the pipe ruptured.

The following safety issues were identified during this investigation:

- The effectiveness and application of line pipe transportation standards.
- The adequacy of Federal requirements for pipeline integrity management programs.

As a result of its investigation of this accident, the Safety Board issues safety recommendations to the Research and Special Programs Administration, the American Society of Mechanical Engineers, and the American Petroleum Institute.

WEB Exhibit # 21C

010321

Factual Information

Accident Synopsis

About 2:12 a.m., central daylight time, on July 4, 2002, a 34-inch-diameter steel pipeline owned and operated by Enbridge Pipelines (Lakehead), LLC[1] ruptured in a marsh west of Cohasset, Minnesota. (See figure 1.) Approximately 6,000 barrels (252,000 gallons) of crude oil were released from the pipeline as a result of the rupture. No deaths or injuries resulted from the release.

Figure 1. Enbridge pipeline system.

Accident Narrative

The crude oil pipeline involved in the accident originated at Edmonton, Alberta, Canada, and terminated at Superior Terminal in Superior, Wisconsin. The 34-inch-diameter pipeline, designated line no. 4 at the time of the accident, was operated by pipeline controllers in the Enbridge control center in Edmonton using a supervisory control and data acquisition (SCADA) system.[2] About 2:12 a.m. on July 4, 2002, the

[1] Enbridge Pipelines (Lakehead), LLC is the operator of the pipeline system formerly named Lakehead Pipe Line Company.

[2] Pipeline controllers use a computer-based SCADA system to remotely monitor and control movement of oil through pipelines. The system makes it possible to monitor operating parameters critical to pipeline operations, such as flow rates, pressures, equipment status, control valve positions, and alarms indicating abnormal conditions.

WEB Exhibit # 22
010322

controller operating the line observed a SCADA system indication of a loss of suction and discharge pressure at the Deer River pump station. (See figure 2.) At 2:13 a.m., the Floodwood pump station suction pressures began dropping, and then audible and visual alarms were received for an invalid suction pressure. The controller initially suspected an inaccurate pressure transmitter at Floodwood, because the suction pressure had gone to zero. Subsequently, he noticed that the discharge pressure for Floodwood was also dropping and realized that he had an abnormal condition. The controller showed the shift coordinator the situation, and, suspecting a possible leak, they agreed at 2:14 a.m. to shut the pipeline down. At 2:15: a.m., the controller initiated closure of the pipeline injection valve at the Clearbrook Terminal and began shutting down pumps and remotely closed valves to isolate the suspected leak. The upstream valve at Deer River and the downstream sectionalizing valve at milepost (MP) 1017.9 were remotely closed by 2:21 a.m., which isolated the ruptured section. All remotely controlled valves on the pipeline from Clearbrook to Superior Terminal were closed by 2:32 a.m.

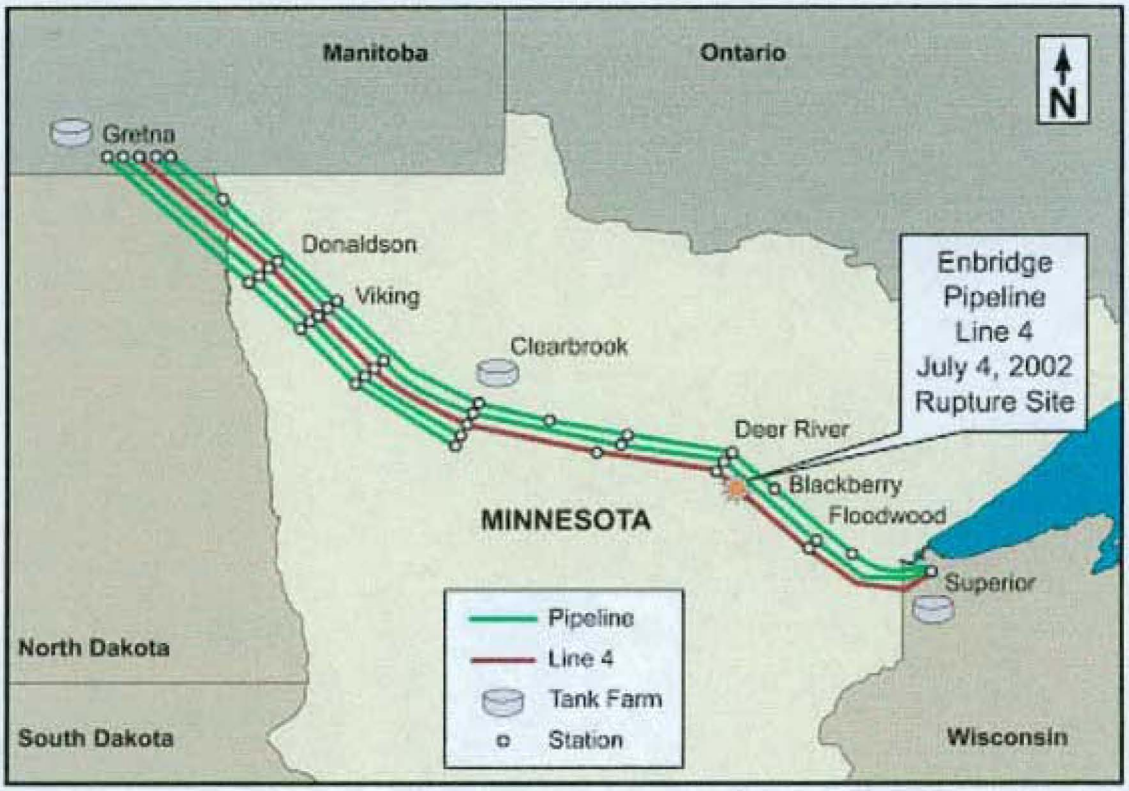

Figure 2. Enbridge pipeline facilities and rupture site.

About 2:25 a.m., the Enbridge control center notified the Deer River and Floodwood police departments of the suspected leak, and about 2:30 a.m., Enbridge field personnel were notified. About 5:20 a.m., Enbridge field personnel dispatched to investigate along the pipeline right-of-way detected the odor of crude oil in a marshy area near Blackwater Creek and manually closed the closest valve to the failure. This valve was near MP 1007.32, about 4 1/2 miles downstream (east) of the rupture

WEB Exhibit # 23
010323

At 7:00 a.m., after Enbridge field employees verified the release, Enbridge notified the National Response Center of a crude oil leak in the company's 34-inch pipeline. This notification indicated that an unknown amount of crude oil had been released. The pipe was found to have ruptured at MP 1002.73, about 7 miles downstream of the Deer River pump station. The company then contacted local, State, and Federal officials, as well as Enbridge spill response contractors, who proceeded to the spill site. Enbridge also had right-of-way representatives contact landowners in the vicinity of the spill. At 12:09 p.m., Enbridge called the National Response Center again and updated the spill volume to 6,000 barrels of crude oil. At the time of the accident, Enbridge had not designated the area where the rupture occurred as a high-consequence area[3] based on the criteria defined in 49 *Code of Federal Regulations* (CFR) Part 195, "Transportation of Hazardous Liquids by Pipelines."

Emergency Response

Booms were placed in Blackwater Creek as a precaution to prevent crude oil from moving away from the spill site toward nearby waterways, including the Mississippi River. Enbridge started building a 1/4-mile-long road along the right-of-way to the spill site using wood mats. With heavy rain forecast, responders were concerned that the crude oil might spread farther and contaminate the Mississippi River. The unified command for the accident response was established and included the Cohasset Fire Department, Enbridge, the Minnesota Pollution Control Agency, the Minnesota Department of Emergency Management, and the Forestry Division of the Minnesota Department of Natural Resources.

The unified command decided that the best way to prevent the crude from entering nearby waterways was to perform a controlled burn. As a precaution, the command designated 12 homes in the local area to be evacuated, and seven residents were evacuated. Later in the afternoon, the Minnesota Department of Natural Resources coated the spill's perimeter with chemical fire retardant from tanker planes. After the chemical was placed, flares were shot into the crude oil to ignite the oil.

The controlled burn was ignited about 4:45 p.m. (See figure 3.) The burn created a smoke plume about 1 mile high and 5 miles long. (See figure 4.) The controlled burn lasted until about 5:00 p.m. the next day, July 5. While they monitored the fire, Enbridge personnel, firefighters, and environment authorities also monitored the spill perimeter to ensure that no crude was getting into area waterways. Reportedly, no free-flowing product reached any of the boomed areas.

[3] *High-consequence area* refers to commercially navigable waterways, high population areas, concentrated population areas, or unusually sensitive areas that might be affected by an accident involving the pipeline in that area. Title 49 CFR 195.450, 195.452, and 195.6 contain the criteria for designating an area a high-consequence area for hazardous liquid pipelines.

Figure 3. Controlled burn surrounded by white fire retardant.

Figure 4. Smoke plume 1 mile high and 5 miles long.

WEB Exhibit # 25

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inch of the 0.297-inch measured wall thickness.[7] Measurement and testing of the pipe showed that it met thickness and strength requirements. The pipe fracture beyond the fatigue crack contained features typical of overstress fracture.

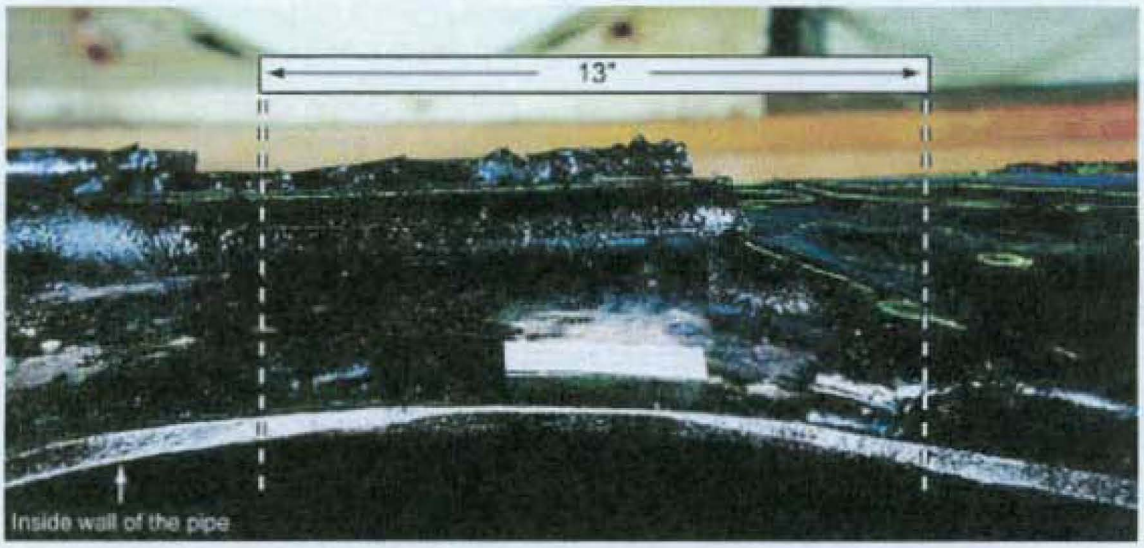

Figure 6. View of top fracture surface of 13-inch-long crack, showing penetration nearly through pipe wall in center.

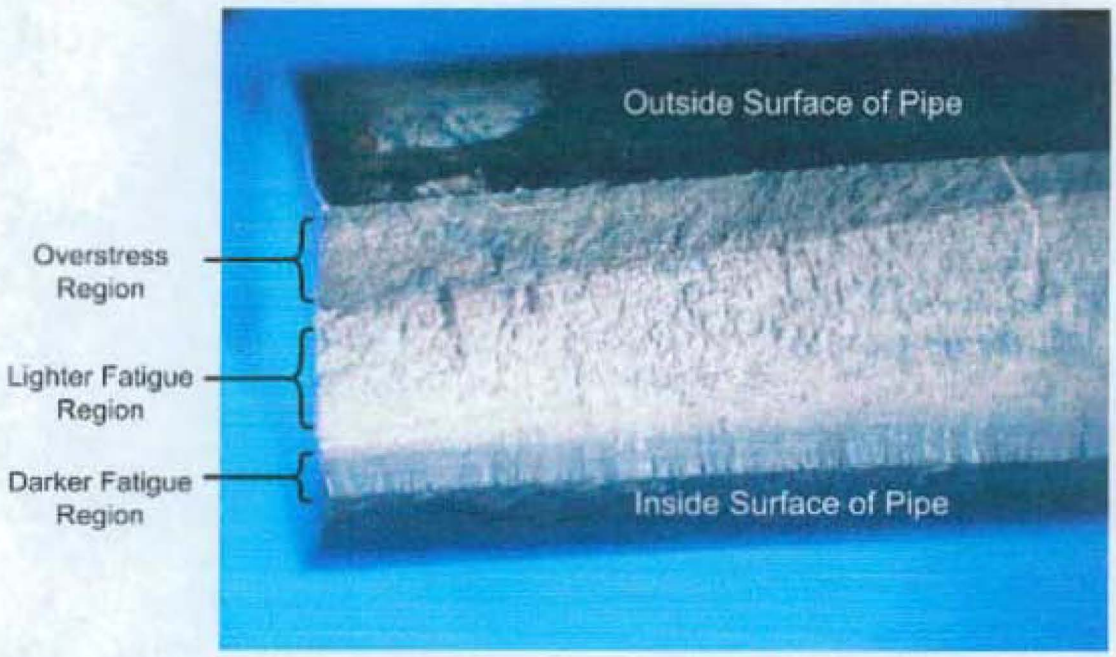

Figure 7. Face of fracture in accident pipe.

[7] The 0.297-inch measured wall thickness is within the allowable range for a pipe with 0.312-inch specified nominal wall thickness.

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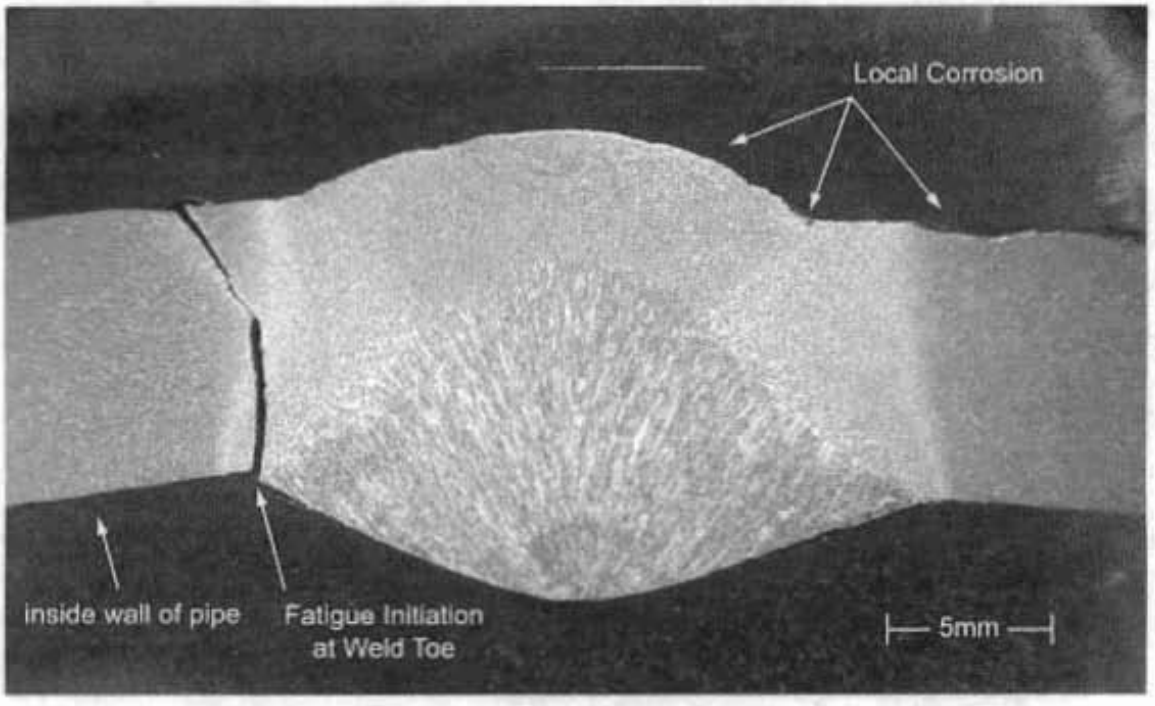

Figure 8. Fatigue initiating at toe of weld on interior surface of pipe.

Preaccident Events

Fatigue Cracking in Enbridge Pipe Manufactured by U.S. Steel

Enbridge's 34-inch U.S. Steel DSAW pipe had a documented history of longitudinal seam weld failures due to fatigue cracks. Metallurgical analysis reports of longitudinal seam weld failures in Enbridge's U.S. Steel pipe in 1974, 1979, 1982, 1986, 1989, and 1991 identified the causes as fatigue cracking at the toe of the weld. Enbridge's 34-inch pipeline system also used A.O. Smith flash-welded pipe, Canadian Phoenix electric resistance welded pipe, and Kaiser Steel submerged arc welded (SAW) pipe. All of the longitudinal seam weld failures caused by fatigue cracks in this pipeline have occurred in pipe manufactured by U.S. Steel.

Operational Reliability Assessments of the Pipeline

After the 1991 pipe rupture at the toe of the weld in the 34-inch pipeline resulted in the release of 40,500 barrels (1,701,000 gallons) of crude oil, Enbridge signed a consent order with RSPA's Office of Pipeline Safety to conduct an operational reliability assessment of the 34-inch pipeline from Gretna, Manitoba, Canada, to Superior, Wisconsin. The assessment was to include a review of pipeline operating conditions and an analysis of the previous pipe failures. The operator was also required to restrict

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The D/t ratios that could lead to fatigue cracking during transportation were changed in the 1990 edition of API RP 5L1. The ratio was reduced from 70:1 to 50:1 because fatigue cracking had been reported in pipe with D/t ratios lower than 70:1. The latest edition of API RP 5L1, issued in July 2002, also states that pipe with D/t ratios well below 50:1 may suffer fatigue in transit under some circumstances.

No statistics on transportation damage were specifically tracked before RSPA instituted a change in 2002 to gather more detailed accident statistics. However, RSPA is now gathering information on whether an accident is caused by pipe damage sustained during transportation and whether the failure is a longitudinal tear or crack.

Railroad Transportation of Accident Pipe

The section of pipeline where the rupture occurred was constructed in 1967. The Enbridge 1966 purchase specification for the pipe included a requirement that pipe loading details be provided subject to its approval. In its quotation, U.S. Steel provided a diagram for railroad car loading (see figure 9), which Enbridge subsequently approved. The railcar loading instructions consisted of a drawing with notes specifying the blocking supports and banding to be used under and around the pipe and the required positioning of the longitudinal weld. U.S. Steel also noted in its specifications that the purchaser would spot-check railcar loadings at the mill before transportation. U.S. Steel transported the pipe by railcar to its storage facility near the mill, where it was unloaded and stored. Later, U.S. Steel loaded the pipe for transportation by rail. Finally, the pipe was loaded on trucks for transportation to the construction sites.[17] Enbridge had arranged with Moody Engineering Company (Moody) to inspect the manufacturing of the pipe. The handling and loading of the pipe for transportation from the mill to storage was a part of that inspection. These activities were summarized in Moody's final report. The Moody report indicates that the pipe was periodically inspected at a nearby storage facility to ensure that the pipe was being handled and unloaded with care. The report indicates that the pipe was accepted for shipment subject to the operator's shipping instructions. U.S. Steel did not document inspections of pipe loading. No records were found to indicate that the engineering company or the pipeline operator inspected the loading of the pipe on railroad cars for transportation from the U.S. Steel storage facility.

[17] Records related to the production activities at U.S. Steel's McKeesport pipe mill were destroyed several years ago after the mill was closed for a period of time.

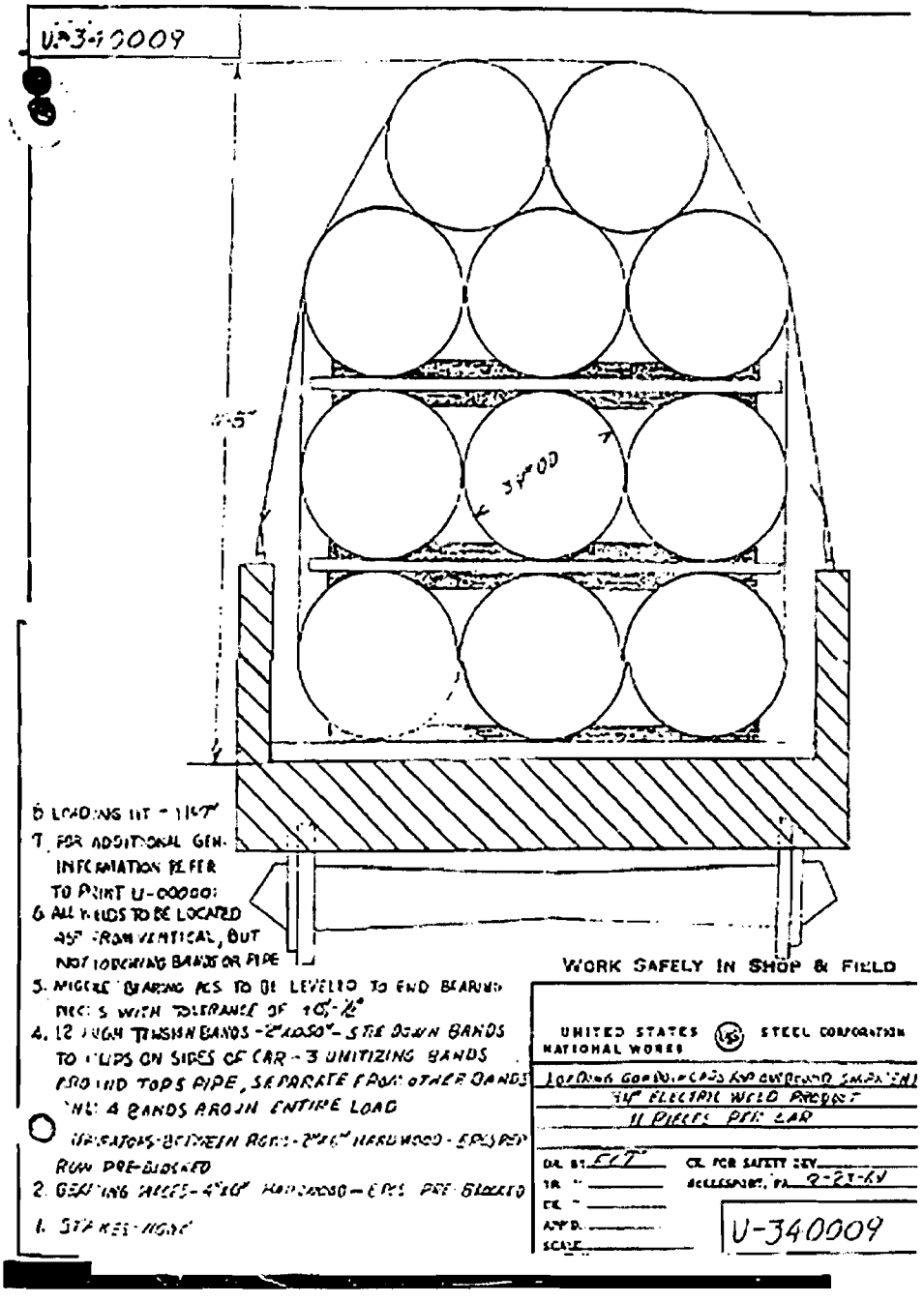


Figure 9. U.S. Steel loading diagram for railcars.

The U.S. Steel employees who had loaded the 1966 DSAW pipe order could no longer be found. According to a former shipping department employee (who was not present at the time of the Enbridge pipe loading), a typical pipe loading practice before and after this pipe order was to position the longitudinal weld at the 2, 4, 8, or 10 o'clock position so the pipe weld would not touch lumber, bands, or other pipe. If a 40-foot joint

of pipe was not loaded in this position, it was to be rotated as necessary to attain one of these positions. Except for the loading diagram, there were no written procedures for loading pipe, nor did U.S. Steel use checklists or other methods to confirm that the pipe was loaded according to specifications.

U.S. Steel does not currently manufacture DSAW or SAW pipe. U.S. Steel Tubular Products does produce seamless and electric resistance weld pipe, and the current loading procedures for the pipe are described in the company's *Pack, Mark, and Load Manual.* The procedures to be used for each order are entered into the order entry system from the purchase order and are designated on the mill order sent to the production mill. All pipe manufactured to API standards and destined for railroad transportation from the pipe mill is to be loaded to the requirements of the Association of American Railroads' *Open Top Loading Rules Manual*[18] and the supplementary recommended practices in API RP 5L1. Any additional transportation requirements are referenced in the mill order for the shipping department personnel and, if applicable, are attached to the mill order. A preproduction meeting is held at the mill to review the order and shipment requirements.

At pipe mills currently producing tubular products for U.S. Steel, shipping department workers are trained in the department's standard operating procedures. The group leader in the loading area discusses the loading requirements for each order with the crew. A load tally sheet is created that shows the length of each pipe joint with the referenced heat number for the material. The yard foreman checks the railcars periodically to confirm that the pipe is loaded according to the written requirements.

Before 1991, Enbridge specified that the manner of loading pipe for rail transportation should be provided in the pipe manufacturer's quotation, which was subject to Enbridge's approval. Currently Enbridge includes the use of API RP 5L1 in its specification for purchase of pipe transported by rail from a pipe mill. Enbridge also inspects the pipe during loading at the pipe mill to confirm that the requirements of API RP 5L1 are being met.

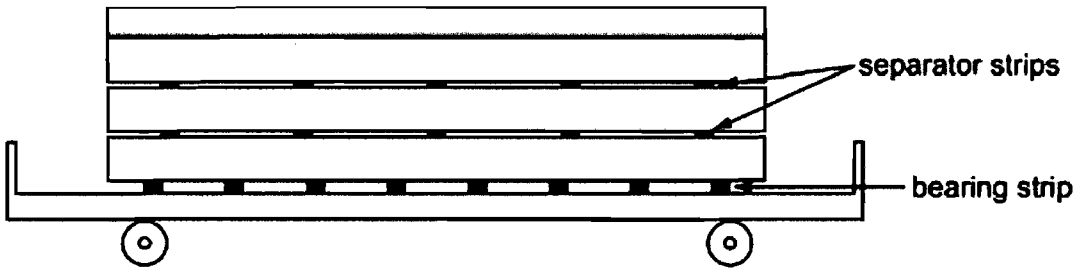
Safety Board Materials Laboratory Study

The Safety Board performed a finite element study of the U.S. Steel loading practice to determine the static stresses in pipe loaded for rail transportation. The study showed that the peak circumferential tensile stresses would have been highly localized to the areas in contact with the bearing and separator strips and that the stresses would have occurred at the inner surface of the pipe.

The length of the fatigue crack in this accident was similar to the length over which the peak circumferential tensile stress was predicted in the finite element model, and the fatigue crack initiated at the inner surface of the pipe. The finite element model

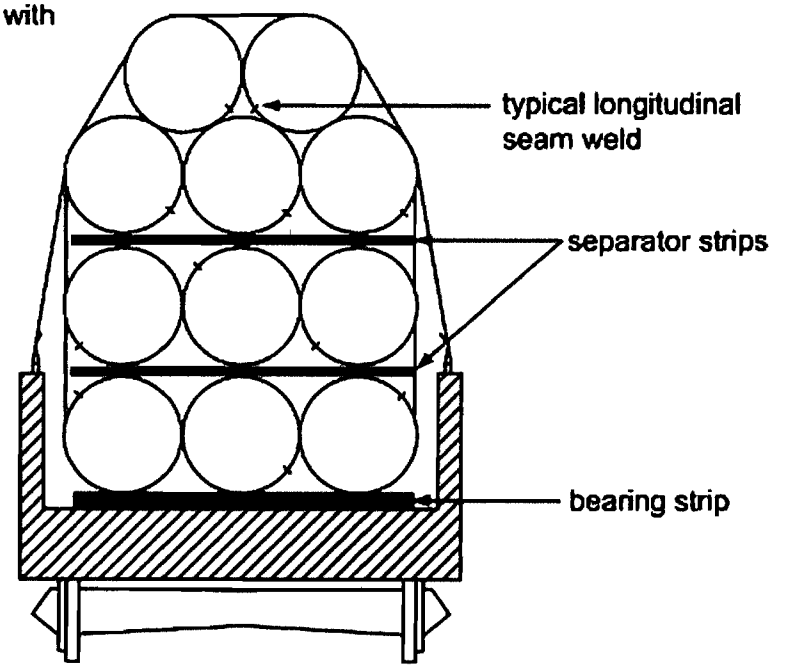
[18] The Association of American Railroads' *Open Top Loading Rules Manual* includes Section 1, General Rules Manual for Loading all Commodities, and Section 2, Loading Metal Products Including Pipe.

indicated that the circumferential tensile stresses decreased rapidly away from the bearing or separator strips. Aligning the welded seams at 45° to the vertical results in very small levels of circumferential tensile stress at the welds during transport. (See figure 10.) The results of the finite element model also indicate that aligning the welds at the 2, 4, 8, or 10 o'clock positions instead of exactly 45° from vertical does not increase the stress levels significantly.



Side View

Note:
Pipes randomly loaded with longitudinal seam weld at 45° to the vertical.



Cross Section

Not to scale

Figure 10. Typical pipe configuration on railroad car.

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The Safety Board also studied API loading practices for rail transportation to determine the static stresses in pipe loaded for transportation. API RP 5L1 provides an equation for calculating the peak circumferential tensile stress in a pipe at a bearing strip as a function of the geometry of the loading. API RP 5L1 does not indicate the source of the equation. The purpose of this equation is to calculate the number of flat bearing strips needed to keep the stress below a specified level. The stress determined from the finite element model was compared to the stress calculated by the equation from API RP 5L1 under the same conditions. For a 40-foot-long, 34-inch-diameter, 0.300-inch-wall thickness pipe, the comparison indicates that the equation from API RP 5L1 underestimates the peak circumferential tensile stress by a factor of approximately 2.

The API has also published guidelines for loading pipe for transport onboard marine vessels, API RP 5LW, *Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels*. API RP 5LW also includes an equation for calculating the peak circumferential tensile stress in a stack of pipe supported by bearing strips. However, this equation differs significantly from the API RP 5L1 equation, and no source is given for the equation. The stress determined from the finite element model was also compared to the stress calculated by the equation from API RP 5LW under the same conditions. For a 40-foot-long, 34-inch-diameter, 0.300-inch-wall thickness pipe, the comparison indicates that the equation from API RP 5LW also underestimates the peak circumferential tensile stress by a factor of approximately 2.

The Safety Board also evaluated the pipe movement attributed to the nearby excavation on February 5, 2002. The pipeline moved down and laterally a maximum of 18 inches. The deflection of the pipe led primarily to longitudinal tension and compression stresses that would not have affected the fatigue crack (oriented on a plane radially outward along the welded seam). Circumferential tensile stresses and shear stresses associated with the pipe deflection were calculated to be in the range of 1 to 10 psi in comparison to the circumferential tensile stress of 29,750 psi caused by the internal pressure of the oil in the pipe at the time of the rupture.

RSPA Postaccident Corrective Action Order

On July 5, 2002, RSPA issued to Enbridge a corrective action order that required the pipeline operator to conduct a detailed metallurgical analysis of the July 4 failure to determine the cause and contributing factors. The corrective action order also prohibited Enbridge from operating the pipeline until it had submitted a return-to-service plan, which was to incorporate a program to verify the integrity of the 34-inch pipeline from the Deer River Pump Station to Superior Terminal. The plan was to include, if relevant, an in-line inspection survey using a technologically appropriate tool capable of assessing the type of failure that had occurred, including the detection of longitudinal cracks, and remedial action. If relevant, the return-to-service plan was to include an evaluation of the pipeline coating system, a hydrostatic pressure test of the line segment, and a review of all available pipeline data and records.

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Conclusions

Findings

1. Enbridge's pipeline control center personnel responded in a timely manner to the indications of a pipeline leak.

2. After storage, the accident pipe was likely inadequately loaded for transportation, which led to the initiation of fatigue cracking along a longitudinal seam weld before the pipe was placed in service.

3. After installation the preexisting fatigue crack grew with pressure cycle stresses until the crack reached a critical size and the pipe ruptured.

4. The American Petroleum Institute recommended practice 5L1, *Recommended Practice for Railroad Transportation of Line Pipe,* and American Petroleum Institute recommended practice 5LW, *Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels,* may significantly underestimate the stresses in the pipe at the bearing or separator strips.

5. Hydrostatic pressure testing of a pipeline is insufficient to expose all transportation fatigue cracks that may eventually cause pipe failure.

6. There is a potential risk of pipe damage due to fatigue crack initiation during marine vessel transportation of pipe, similar to the risk during rail transportation, for both hazardous liquid and natural gas pipelines.

7. The absence of industry loading standards for truck transportation of pipe might create risks to the integrity of both natural gas and hazardous liquid pipelines.

8. The Elastic Wave in-line inspection conducted before the accident recorded an indication at the point where the pipe eventually failed; however, preaccident and postaccident interpretations of the recorded data found that the indication did not meet the feature selection criteria to identify it as a crack.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the July 4, 2002, pipeline rupture near Cohasset, Minnesota, was inadequate loading of the pipe for transportation that allowed a fatigue crack to initiate along the seam of the longitudinal weld during transit. After the pipe was installed, the fatigue crack grew with pressure cycle stresses until the crack reached a critical size and the pipe ruptured.

WEB Exhibit # 33A
010333

Recommendations

As a result of its investigation of the July 4, 2002, pipeline rupture near Cohasset, Minnesota, the National Transportation Safety Board makes the following safety recommendations:

To the Research and Special Programs Administration:

Remove the exemption in 49 *Code of Federal Regulations* 192.65 (b) that permits pipe to be placed in natural gas service after pressure testing when the pipe cannot be verified to have been transported in accordance with the American Petroleum Institute recommended practice 5L1. (P-04-01)

Amend 49 *Code of Federal Regulations* to require that natural gas pipeline operators (Part 192) and hazardous liquid pipeline operators (Part 195) follow the American Petroleum Institute recommended practice 5LW for transportation of pipe on marine vessels. (P-04-02)

Evaluate the need for a truck transportation standard to prevent damage to pipe, and, if needed, develop the standard and incorporate it in 49 *Code of Federal Regulations* Parts 192 and 195 for both natural gas and hazardous liquid line pipe. (P-04-03)

To the American Society of Mechanical Engineers:

Amend American Society of Mechanical Engineers B31.8, *Gas Transmission and Distribution Piping Systems*, section 816, to remove the provision that pressure testing may be used to verify the integrity of pipe that may not have been transported in accordance with the American Petroleum Institute recommended practices for transportation of pipe by railroad or marine vessels. (P-04-04)

Amend American Society of Mechanical Engineers B31.4, *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids*, section 434.4, to require the use of the American Petroleum Institute recommended practice 5LW for marine transport of pipe. (P-04-05)

To the American Petroleum Institute:

Review the equations in American Petroleum Institute recommended practice 5L1, *Recommended Practice for Railroad Transportation of Line Pipe*, and American Petroleum Institute recommended practice 5LW, *Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels*, for calculating the static load stresses at the bearing or separator strips and revise the recommended practices based on that review. (P-04-06)

WEB Exhibit # 35B

010334

Recommendations

As a result of its investigation of the July 4, 2002, pipeline rupture near Cohasset, Minnesota, the National Transportation Safety Board makes the following safety recommendations:

To the Research and Special Programs Administration:

Remove the exemption in 49 *Code of Federal Regulations* 192.65 (b) that permits pipe to be placed in natural gas service after pressure testing when the pipe cannot be verified to have been transported in accordance with the American Petroleum Institute recommended practice 5L1. (P-04-01)

Amend 49 *Code of Federal Regulations* to require that natural gas pipeline operators (Part 192) and hazardous liquid pipeline operators (Part 195) follow the American Petroleum Institute recommended practice 5LW for transportation of pipe on marine vessels. (P-04-02)

Evaluate the need for a truck transportation standard to prevent damage to pipe, and, if needed, develop the standard and incorporate it in 49 *Code of Federal Regulations* Parts 192 and 195 for both natural gas and hazardous liquid line pipe. (P-04-03)

To the American Society of Mechanical Engineers:

Amend American Society of Mechanical Engineers B31.8, *Gas Transmission and Distribution Piping Systems*, section 816, to remove the provision that pressure

WEB Exhibit # 34

Draft Resolution
TransCanada-Keystone Pipeline

9/6/07

Whereas, on April 19, 2006 TransCanada Pipeline Limited of Calgary, Alberta, Canada filed an application on behalf of TransCanada-Keystone Pipeline LLC with the U.S. State Department for a Presidential permit to cross the border and build a 1,078 mile 30-inch buried steel pipeline for the purpose of moving crude oil from the oil sands area of Hardisty, Canada through North Dakota and South Dakota to refineries in Illinois, Oklahoma and eventually Texas, and

Whereas, on April 27, 2007 TransCanada Pipelines Limited of Calgary, Alberta, Canada filed an application with the South Dakota Public Utilities Commission (SDPUC) for a permit to construct and operate the TransCanada-Keystone Pipeline LLC, 220 miles 30-inch buried steel pipeline for the purpose of moving crude oil from the oil sands area of Hardisty, Canada through North Dakota and South Dakota to refineries in Illinois, Oklahoma and eventually Texas, and

Whereas, as currently planned, the TransCanada-Keystone Pipeline route will cross the service areas of seven (7) rural water systems in South Dakota, including: Brown-Day-Marshall RWS, WEB RWS, Clark RWS, KingBrook RWS, Mid-Dakota RWS, Hanson RWS, and B-Y RWS and could impact water systems which draw water supply from the Missouri River downstream of Yankton, SD; all of which provide quality drinking water to towns, farms, homes, businesses, dairies, schools, and ethanol plants in eastern South Dakota, and if the oil line is extended to the oil refinery being proposed at Elk Point, SD a branch pipeline could cross the Clay RWS, and

Whereas, based on information filed with the South Dakota PUC and the U.S. State Department, as currently designed, the TransCanada-Keystone Pipeline will operate at pressures ranging from 1,400 psi to 1,700 psi and will transport 435,000 to 591,000 barrels of oil per day, which at 42 gallons per barrel equals 18,270,000 to 24,822,000 gallons of crude oil per day, and that the crude oil will be heated up to 80 degrees so that the thick crude can be pumped and moved through the pipeline, and will contain Benzene, Hydrogen Sulfide, Toluene and other chemicals and elements which are consider toxic and pollutants by the US Environmental Protection Agency if released into

the environment, which are elements rural water systems test for as part of the Safe Drinking Water Act requirements, and

Whereas, on August 23, 2007 TransCanada Pipeline informed the SDPUC and interveners that April 30, 2007 TransCanada had secured a "Special Permit" from the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) to operate the Keystone Pipeline at pressures 11% higher than other oil pipelines in the U.S.A. The special permit allows TransCanada to operate the Keystone Pipeline at 80% of the pipes design factor while other oil pipelines in the U.S.A. that have operated at 72% or less of pipe design factor and which even at lower operating pressures than TransCanada is proposing, have had some history of leaks and pipeline failures, including the TransAlaska Pipeline which had a leak or leaks every year for the 25 years of operation, and (80 – 72 = 8 : 72 = 11%)

Whereas, during public information meetings held in 2007, TransCanada-Keystone engineers stated that in order to secure the more than 1,078 miles of steel pipe needed to construct the TransCanada-Keystone Pipeline in 2008 so that it will operational in 2009, that some of the steel pipe will be purchased from manufacturing companies located in China and that TransCanada will attempt to have their own inspectors inspect the pipe during the manufacturing and shipping process, and that the pipe wall thickness proposed by TransCanada-Keystone will be 0.375 inch thick, and a thicker walled pipe would provide greater safety and protection for South Dakota , and

Whereas, when asked in public meetings about liability and cleanup of oil spills TransCanada-Keystone officials have said that if for any reason TransCanada doesn't cleanup an oil spill the U.S. federal government would take charge and cleanup the site as part of the "super fund" program, and

Whereas, in the event of a petroleum spill or oil leak on this high pressure crude oil pipeline, it is very likely that the crude oil will come in contact with the PVC plastic pipelines that are used by all rural water systems, and that such contact will do damage to PVC water lines and oil products could enter the pipelines and pollute and contaminate drinking water supplies, as confirmed by an

engineering study completed by Iowa State University, commissioned by the AWWA (American Water Works Association); and

Whereas, pages 1 and 19 of a report dated May 1, 2006, prepared by DNV Consultants, a risk consultant for TransCanada, filed with the SDPUC shows that oil leaks of less than 1.5% pipe volume may not be noticed or detected by the SCADA computer control systems TransCanada will be using and may not be found for as long as 90 days, which could result in oil leaks of 369,847 gallons per day (8,806 barrels per day) which figures out to 11 million gallons of crude oil per month or 33 million gallons of crude oil over 3 months, and

Whereas, the TransCanada-Keystone Pipeline is routed through and across aquifers identified by groundwater studies completed by the SD Geological Survey and the US Geological Survey, and through and across shallow aquifers located in Marshall, Day, Clark, Beadle and other counties of South Dakota, and

Whereas, a leak or oil spill from a high pressure oil pipeline like TransCanada-Keystone Pipeline could pollute and damage underground aquifers that are the only reliable water source and water supply for farms, towns and rural water systems, and

Whereas, the TransCanada-Keystone Pipeline is proposing to cross the Missouri River immediately south of Yankton, SD which if it were to leak or fail could impact the scenic designated section of the Missouri River and could impact or increase the risk of impact to water quality of that stretch of the river which serves as an indirect water source for the Lewis & Clark Regional Water System which supplies water to Sioux Falls, SD and a number of rural water systems, cities and towns in south eastern South Dakota, northwest Iowa, and southwest Minnesota; and

Whereas, land acquisition agents have been contacting the 660 landowners along the proposed 220 mile pipeline route in South Dakota, asking for a 100 ft easement which includes wording asking for "one or more pipelines", often cutting across or through the middle of quarter sections or half sections of farm land and not going along the fence line or quarter line, and TransCanada is offering a one time payment ranging from $1,700 to $2,600 per acre (in Marshall and Day County)

depending on land use, which figures out to around $34 to $52 per acre over 50 years, and cash rent in the area currently runs around $100 to $140 per acre per year and doesn't carry with it the liability or risk of an oil leak that a high pressure oil pipeline like TransCanada-Keystone places on the land, and

Whereas, even though the SDPUC has scheduled formal hearings on the permit application starting on December 3, 2007 and may not reach a decision until as late as April 27, 2008, and even thought the U.S. State Department is conducting an Environmental Impact Statement (EIS) review required by federal law and for which written comments are due September 31, 2007 and a final report is expected to be issued in early 2008; on August 23, 2007 TransCanada sent letters to landowners along the proposed Keystone Pipeline route informing them that if they didn't sign TransCanada's easement and accept their easement payment offer by August 31, 2007, that TransCanada would proceed with eminent domain and condemnation of privately owned lands, even though no permit has yet been issued by the SD PUC, and TransCanada has no right or authority under South Dakota law to claim the right of "eminent domain" until such time as a permit has been issue and the deadline for appeals in Circuit Court have passed; and

Whereas, while counties, cities, utilities and rural water systems in South Dakota that serve the community have the right of eminent domain as a last resort, they use it sparingly and landowners can appeal to local boards of directors and commissions for relief or negotiation, which is not an option available to landowners in the case of TransCanada which is a private investor owned foreign oil company located in Calgary, Alberta, Canada, and

Therefore, Be It Resolved, that the South Dakota Association of Rural Water Systems (SDARWS) does hereby urge the SD Public Utilities Commission, Department of Environment and Natural Resources, South Dakota Legislature, the Governor, the Attorney General of South Dakota, and the South Dakota Congressional Delegation to protect rural water systems, ground water supplies and communities they serve by imposing conditions on any permit issued to Keystone Pipeline that will assure every protection possible under federal and state laws against oil leaks and "spills" and in the event of an oil leak or spill, that TransCanada-Keystone Pipeline LLC, TransCanada Pipeline LP, TransCanada Corporation, Conoco-Phillips and other investors be held financially and legally

liable for all costs incurred to South Dakota landowners, communities, counties and rural water systems, and

Further, that SDARWS would ask for a pipe wall thickness greater than the 0.375 inch being proposed by TransCanada-Keystone, up to as much as 0.75 inch wall thickness when crossing through shallow aquifer areas, rural water systems and near schools, creeks, rivers, homes, road crossing and highway systems, and

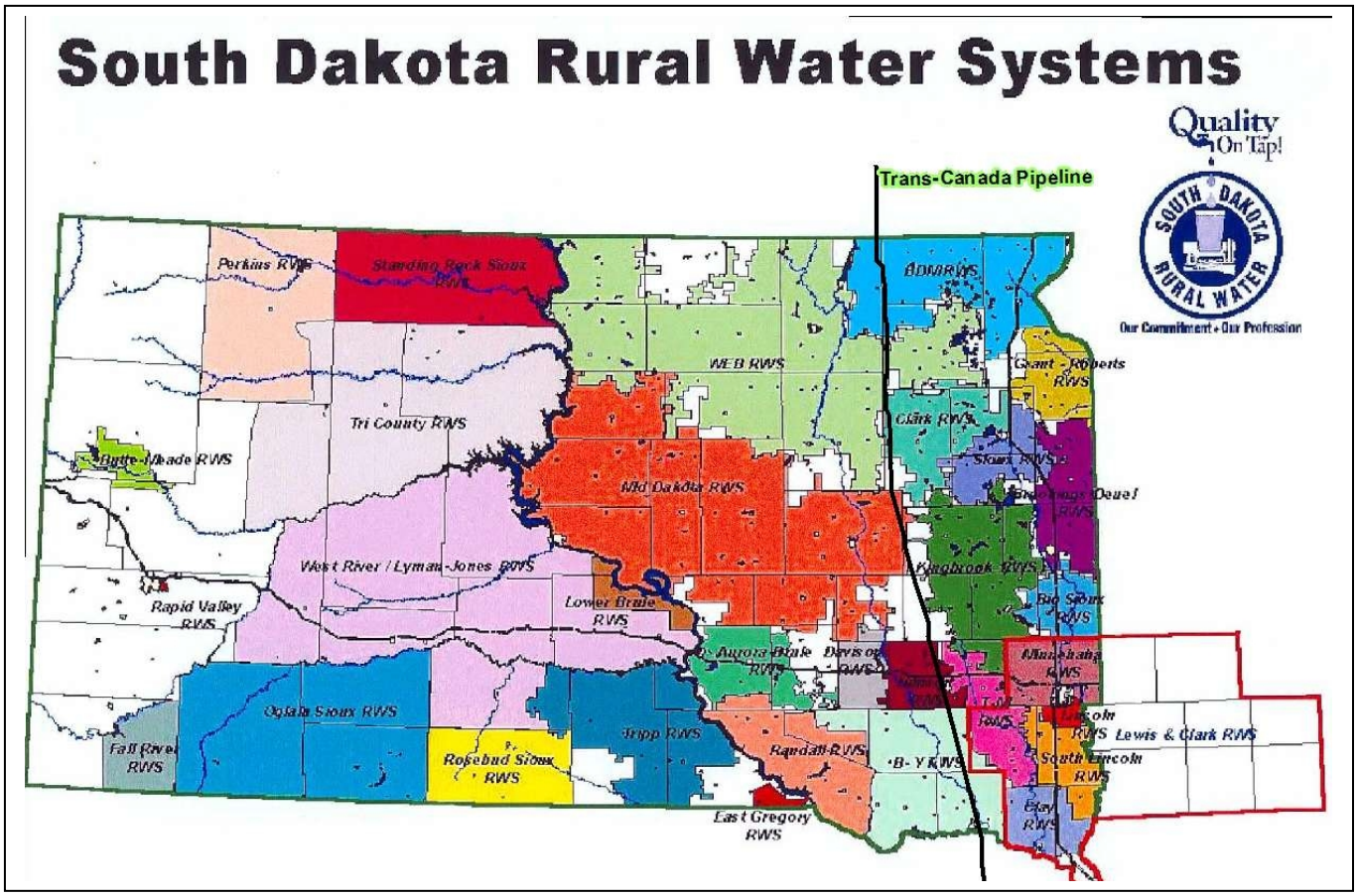
Further, that one of the conditions imposed on the permit by the SD Public Utilities Commission and the State of South Dakota be a fee or tariff on each barrel of oil that passes through South Dakota on the TransCanada-Keystone Pipeline in the amount of $0.15 per barrel which would amount to $23,816,250 per year at 435,000 barrels per day and $32,357,250 per year at 591,000 barrels per day. That high quality and accurate metering device be installed at TransCanada's expense where the pipeline enters the state at the North Dakota Line and leaves the state at Yankton, SD, which will be monitored and maintained by the SD Revenue Department which will be charged with collection of the fee or tariff with the funds collected to be placed in an interest bearing reserve fund to be used to cover the cost of oil spill cleanup, damage to private property, impact to groundwater supplies, impacts to rural water systems, and other costs related to the operating on the TransCanada-Keystone Pipeline, and

Further, that the PUC, the Governor, Attorney General and the SD Congressional Delegation are hereby asked to send letters to TransCanada Pipeline LP and TransCanada-Keystone Pipeline LLC admonishing that they stop threatening condemnation when they don't yet have the authority or right under the law to do so, and stop all land acquisition until after the PUC hearing process and the EIS process have been completed and a permit decision has been made and the process has been allowed to run its course, including any appeals, and that they be asked to negotiate in good faith with South Dakota landowners, farmers and taxpayers, and

Further, that in the interest of the publics right to know, that the SDARWS ask the SD PUC to release all information filed on April 27, 2007 and filed since that date as part of the TransCanada-Keystone Pipeline permit application and that the PUC hearings process be delayed at least 90

days because of the delay TransCanada caused in release of this information, to give the people of South Dakota time to review the information filed and that the information be placed on file with the County Auditor of each county crossed by the proposed project and that the SDPUC hold hearings out along the pipeline route at Yankton, Alexandria, Clark and Britton to make it easier and less costly for landowners, farmers and the public to participate in the formal hearing process, and

Now therefore, be it resolved that SDARWS has serious reservations and concerns with the TransCanada-Keystone Pipeline and asks that state approvals be withheld and decision reserved until such time as the issues raised herein have been resolved to the satisfaction of the rural water systems and communities that would be crossed by the TransCanada-Keystone Pipeline.



WEB Exhibit # 35

The Athabasca Oil Sands in Alberta, Canada.

The **Athabasca Oil Sands** are a large deposit of oil-rich bitumen located in northern Alberta, Canada. These oil sands consist of a mixture of crude bitumen (a semi-solid form of crude oil), silica sand, clay minerals, and water. The Athabasca deposit is the largest of three oil sands deposits in Alberta, along with the Peace River and Cold Lake deposits. Together, these oil sand deposits cover about 141 000 km² of sparsely populated boreal forest and muskeg (peat bogs). The Athabasca oil sands are named after the Athabasca River which cuts through the heart of the deposit, and traces of the heavy oil are readily observed on the river banks. Historically, the bitumen was used by the indigenous Cree and Dene Aboriginal peoples to waterproof their canoes. The oil deposits are located within the boundaries of Treaty 8, and several First Nations of the area are involved with the sands. The oil sands were first seen by Europeans in 1788.

The key characteristic of the Athabasca deposit is that it is the only one shallow enough to be suitable for surface mining. About 10% of the Athabasca oil sands are covered by less than 75 metres (250 feet) of overburden. The mineable area as defined by the Alberta government covers 37 contiguous townships (about 3400 square kilometres or 1300 square miles) north of the city of Fort McMurray. The overburden consists of 1 to 3 metres of water-logged muskeg on top of 0 to 75 metres of clay and barren sand, while the underlying oil sands are typically 40 to 60 metres thick and sit on top of relatively flat limestone rock. As a result of the easy accessibility, the world's first oil sands mine was started by Great Canadian Oil Sands (now Suncor) back in 1967. The Syncrude mine (the biggest mine in the world) followed in 1978, and the Albian Sands mine (operated by Shell Canada) in 2003. All three of these mines are associated with bitumen upgraders that convert the unusable bitumen into synthetic crude oil for shipment to refineries in Canada and the United States.

The Athabasca oil sands are primarily located in and around the city of Fort McMurray which was still, in the late 1950s, primarily a wilderness outpost of a few hundred people whose main economic activities included fur trapping and salt mining. Since the energy crisis of the 1970s, Fort McMurray has been transformed into a boomtown of 80,000

people struggling to provide services and housing for migrant workers, many of them from Eastern Canada, especially Newfoundland.

Contents

[hide]

[edit] Estimated oil reserves

Alberta Government calculates that about 28 billion cubic metres (174 billion barrels) of crude bitumen are economically recoverable from the three Alberta oil sands areas at current prices using current technology. This is equivalent to about 10% of the estimated 1,700 and 2,500 billion barrels of bitumen in place.[1]. Alberta estimates that the Athabasca deposits alone contain 5.6 billion cubic metres (35 billion barrels) of surface mineable bitumen and 15.6 billion cubic metres (98 billion barrels) of bitumen recoverable by in-situ methods. These estimates of Canada's oil reserves caused some astonishment when they were first published but are now largely accepted by the international community. This volume places Canadian proven oil reserves second in the world behind those of Saudi Arabia.

The method of calculating economically recoverable reserves that produced these estimates was adopted because conventional methods of accounting for reserves gave increasingly meaningless numbers. They made it appear that Alberta was running out of oil at a time when rapid increases in oil sands production were more than offsetting declines in conventional oil, and in fact most of Alberta's oil production is now non-conventional oil. Conventional estimates of oil reserves are really calculations of the geological risk of drilling for oil, but in the oil sands there is very little geological risk because they outcrop on the surface and are extremely easy to find. One risk is economic risk of low oil prices and with the oil price increases of 2004-2006, this economic risk evaporated.

The Alberta estimates in some ways are extremely conservative, since they assume a recovery rate of around 20% of bitumen in place, whereas oil companies using the new steam assisted gravity drainage method of extracting bitumen report that they can recover over 60% with little effort. These much higher recovery rates probably mean that the ultimate production could be several times as high as the already very large government estimates.

At rate of production projected for 2015, about 3 million barrels per day, the Athabasca oil sands reserves would last over 400 years. [2] However, production cannot increase to those levels without a huge influx of workers into northern Alberta, which by 2006 was already occurring. This need created a severe labor shortage in Alberta, which by 2007

drove unemployment rates in Alberta and adjacent British Columbia to the lowest levels in history. Even as far away as the Atlantic Provinces, where workers were leaving to work in Alberta, unemployment rates fell to levels not seen for over 100 years.[3] These manpower limitations imply that, while Alberta is capable of being a major player on the world oil market for the rest of this century, it does not have enough population to replace the Middle East as the main source of American, European and Asian supply.[citation needed]

The Venezuelan Orinoco tar sands site may contain more oil sands than Athabasca (see tar sands article). However, while the Orinoco deposits are less viscous and more easily produced using conventional techniques (the Venezuelan government prefers to call them "extra-heavy oil"), they are too deep to access by surface mining.

Minesite at Syncrude's Mildred Lake plant

[edit] Economics

Despite the large reserves, the cost of extracting the oil from the sand has historically made production of the oil sands unprofitable - the cost of selling the extracted crude would not cover the direct costs of recovery; labour to mine the sands and fuel to extract the crude.

In mid-2006, the National Energy Board of Canada estimated the operating cost of a new mining operation in the Athabasca oil sands to be $9 to $12 per barrel, while the cost of an in-situ SAGD operation (using dual horizontal wells) would be $10 to $14 per barrel. This compares to operating costs for conventional oil wells which can range from less than $1 per barrel in Iraq and Saudi Arabia to $6 and up in the United States and Canada.

In addition, the capital cost of the equipment, such as the huge machines required to mine the sands and the dump trucks used to haul it to processing make capital costs a major consideration in starting production. The NEB estimates that capital costs raise the total cost of production to $18 to $20 per barrel for a new mining operation and $18 to $22 per barrel for a SAGD operation. This does not include the cost of upgrading the crude bitumen to synthetic crude oil, which makes the final costs $36 to $40 per barrel for a new mining operation.

Therefore, although high crude prices make the cost of production very attractive, sudden drops in price leaves producers unable to recover their enormous capital costs - although the companies are well financed and can tolerate long periods of low prices since the capital has already been spent and they can almost always cover incremental operating costs.

However, the development of commercial production is made easier by the fact that exploration costs are virtually nil. Such costs are a major factor when assessing the economics of drilling in a traditional oil field. The location of the oil deposits in the tar sands are well known and an estimate of recovery costs can usually be made easily. Most important, the oil sands are in a politically stable area - there is not another region in the world with energy deposits of

this magnitude where it would be less likely that these expensive installations would be confiscated by a hostile national government, or be endangered by a war or revolution.

As a result of the Oil price increases of 2004-2006, the economics of oil sands have improved dramatically. At a world price of $50 per barrel, the NEB estimates an integrated mining operation would make a rate return of 16 to 23 percent, while a SAGD operation would return 16 to 27 percent. Prices in 2006 have been considerably higher than that. As a result, capital expenditures in the oil sands announced for the period 2006 to 2015 exceed $100 billion, which is twice the amount projected as recently as 2004. However, due to an acute labour shortage which has developed in Alberta, it is not likely that all these projects can be completed.

At present the area around Fort McMurray, Alberta, has seen the most effect from the increased activity in the oil sands. However, although jobs are plentiful, housing is in short supply and expensive. People seeking work often arrive in the area without arranging accommodation, driving up the price of temporary accommodation. The area is isolated, with only a two-lane road connecting it to the rest of the province, and there is pressure on the government of Alberta to improve road links as well as hospitals and other infrastructure.[4]

Despite the best efforts of companies to move as much of the construction work as possible out of the Fort McMurray area, and even out of Alberta, the shortage of skilled workers is spreading to the rest of the province.[5]. Even without the oil sands, the Alberta economy would be very strong, but development of the oil sands has resulted in the strongest period of economic growth ever recorded by a Canadian province and driven Alberta's unemployment rates to the lowest levels in history.[6]

[edit] Oil Sands Production

The Athabasca oil sands first came to the attention of European fur traders in 1719 when Wa-pa-su, a Cree trader, brought a sample of the oil sands to the Hudson's Bay Company post at Fort Churchill. In 1778, fur trader Peter Pond became the first white man to see the outcroppings along the Athabasca River and he noted that the native people used it to waterproof their canoes. In 1883, C. Hoffman of the Geological Survey of Canada tried separating the bitumen from oil sand with the use of water, and reported that it separated readily. However, it was nearly a century before extracting it became commercially viable. Dr. Karl Clark of the University of Alberta, perfected a steam separation process for the tar sands in 1926.

Commercial production of oil from the Athabasca oil sands began in 1967, when Great Canadian Oil Sands (now Suncor) opened its first mine, producing 30,000 barrels per day of synthetic crude oil. Development was inhibited by declining world oil prices, and the second mine, operated by the Syncrude consortium, did not begin operating until 1978, after the 1973 oil crisis sparked investor interest. However, the price of oil subsided afterwards, and although the 1979 energy crisis caused oil prices to peak again, introduction of the National Energy Program by Pierre Trudeau caused the oil companies and the Alberta government under Premier Peter Lougheed to pull the plug on new developments. Once more, prices declined to very low levels, causing considerable retrenchment in the oil industry, and the third mine, operated by Shell Canada, did not begin operating until 2003. However, with Oil price increases of 2004-2006, the existing mines have been greatly expanded and new ones are being planned.

According to the Alberta Energy and Utilities Board, production of crude bitumen in the Athabasca oil sands was as follows:

2005 Production	m^3/day	bbl/day
Suncor Mine	31,000	195,000
Syncrude Mine	41,700	262,000
Shell Canada Mine	26,800	169,000
In Situ Projects	21,300	134,000

TOTAL	120,800	760,000

This was despite a major fire at the Suncor operation, a major turnaround at Syncrude, and operational problems at the Shell operation. Combined oil production in all three Alberta oil sands areas was 169,100 m3/day or 1,065,000 barrels per day

With planned projects coming on stream, by 2010 oil sands production is projected to reach 2 million barrels per day or about two thirds of Canadian production. By 2015 Canadian oil production may reach 4 million barrels per day, of which only 15% will be conventional crude oil. The Canadian Association of Petroleum Producers predicts that by 2020 Canadian oil production will reach 4.8 million barrels per day, of which only about 10% will be conventional light or medium crude oil, and most of the rest will be crude bitumen and synthetic crude oil from the Athabasca oil sands.

[edit] Extraction of oil

See main article on Oil sands extraction

The original process of extraction used at the oil sands was developed by Dr. Karl Clark, working with the Research Council of Alberta in the 1920s.[7] Historically (since the 1960s), the oil sands have been mined in huge open pit mines and extracted from the sand by variations of the Clark water-based extraction process, which separates aerated bitumen from the other oil sand components in gravity settling vessels. More recently, new in-situ methods have been developed to extract bitumen from deep deposits by injecting steam to heat the sands and reduce the bitumen viscosity so that it can be pumped out like conventional crude oil.

The standard extraction process also requires huge amounts of natural gas. Currently, the oil sands industry uses about 4% of the Western Canada Sedimentary Basin natural gas production. By 2015, this may increase by a factor of 2.5 times.[8]

According to the National Energy Board, it requires about 0.4 million cubic feet of natural gas to produce one barrel of synthetic crude oil, which is the energy equivalent of 6 million cubic feet of gas, so the process produces a substantial net gain in energy. That being the case, it is likely that in the short term exports of natural gas to the United States will be reduced to provide fuel to the oil sands plants. In the long term, however, oil upgraders will likely turn to bitumen gasification to generate their own fuel. In much the same way the bitumen can be converted into synthetic crude oil, it can also be converted to synthetic natural gas.

In-situ extraction on a commercial scale is just beginning. A project nearing completion, the Long Lake Project,[9] is designed to provide its own fuel, by on-site cracking of the bitumen mined.[10] It is supposed to start extracting bitumen in 2006, and "upgrading" of bitumen to liquid oil in 2007, producing 60,000 bbl/day of usable oil. If it works, the natural gas problem becomes less of an issue and the problem of disposing of tailings disappears.

[edit] Geopolitical importance

The Athabasca Oil Sands are now featured prominently in international trade talks, with energy rivals China, India and the United States negotiating with Canada for a bigger share of the oil sands' rapidly increasing output. Output at the oil sands is expected to quadruple between 2005 and 2015, reaching 4 million bbl/day, increasing their political and economic importance. Although most of the oil sands production is currently exported to the United States, that could change.

An agreement has been signed between PetroChina and Enbridge to build a 400,000 barrel-per-day pipeline from Edmonton, Alberta to the west-coast port of Kitimat, British Columbia to export synthetic crude oil from the oil sands to China and elsewhere in the Pacific, plus a 150,000-barrel-per-day pipeline running the other way to import condensate to dilute the bitumen so it will flow. Sinopec, China's largest refining and chemical company, and China National Petroleum Corporation have bought or are planning to buy shares in major oil sands development.

India has announced plans to invest $1 billion in the Athabasca Oil Sands in 2006. As many as four different Indian oil companies, such as Oil and Natural Gas Corporation and Indian Oil Corporation, are involved.[11]

[edit] Indigenous peoples of the area

Indigenous peoples of the area include the Fort McKay First Nation and the Fort McMurray First Nation. The oil sands themselves are located within the boundaries of Treaty 8, signed in 1899. The Fort McKay First Nation has formed several companies to service the oil sands industry, and will be developing a mine on their territory.[12] However, support within the First Nation for such development is not unanimous.

[edit] Environmental impacts

Some critics contend that government and industry measures taken to minimize environmental and health risks posed by large-scale mining operations are inadequate, potentially causing damage to the natural environment.

The open-pit mining of the Athabasca oils sands destroys the boreal forest and muskeg, as well as changing the natural landscape. The Alberta government does not require companies to restore the land to "original condition" but only to "equivalent land capability". This means that the ability of the land to support various land uses after reclamation is similar to what existed, but that the individual land uses will not necessarily be identical.[13] Since the government considers agricultural land to be equivalent to forest land, oil sands companies have reclaimed mined land to use as pasture for buffalo, rather than restoring it to the original boreal forest and muskeg.

For every barrel of synthetic oil produced in Alberta, more than 80 kg of greenhouse gases are released into the atmosphere and between 2 and 4 barrels of waste water are dumped into tailing ponds that have replaced about 50 km² of forest. The forecast growth in synthetic oil production in Alberta also threatens Canada's international commitments. In ratifying the Kyoto Protocol, Canada agreed to reduce, by 2012, its greenhouse gas emissions by 6% with respect to [1990]. In 2002, Canada's total greenhouse gas emissions had increased by 24% since 1990.

"A cubic metre of oil, mined from the tar sands, needs two to 4.5 cubic metres of water. Approved oil sands mining operations -- not the in situ kind that extract oil from tar sands far below the surface -- will take twice the annual water needs of the City of Calgary. The water will come from the Athabasca River, from which 359-million cubic metres will be diverted."[14] However, the Athabasca River is much bigger than the small rivers that flow through Calgary, and current oil sands water license allocations are only for about 1% of the flow of the river.[15] The Alberta government sets strict limits on how much water oil sands companies can remove from the Athabasca River, and during low-flow conditions orders them to reduce their withdrawals.[16]

Ranked as the world's eighth largest emitter of greenhouse gases[17], Canada is a relatively large emitter given its population. The United States, which has not signed the Kyoto Protocol, is the world's largest emitter at a fluctuating 25% of the total. China is the second largest emitter at 20%, but as a developing country is exempt from controls. Its economy has been growing rapidly, and as a result the International Energy Agency expects it to exceed the U.S. as the world's largest emitter of carbon dioxide by about 2008. Other developing countries in Asia and Africa have also been increasing their emissions rapidly. However, it is developed nations that are responsible for the vast majority of historic emissions which are now causing climate change. Most European countries have missed their reduction targets, as is Canada. Against this background, Canada's developments in the oil sands are regrettable given the urgent need to reduce global emissions and meet Canada's Kyoto commitments.

[edit] Oil sand companies

There are currently three large oil sands mining operations in the area run by Syncrude Canada Limited, Suncor Energy and Albian Sands owned by Shell Canada, Chevron, and Western Oil Sands Ltd.

Major producing or planned developments in the Athabasca Oil Sands include the following projects:[18]

- Suncor Energy's Steepbank and millennium mines currently produce 263,000 barrels per day and its Firebag in-situ project produces 35,000 bpd. It intends to spend $3.2 billion to expand its mining operations to 400,000 bpd and its in-situ production to 140,000 bpd by 2008.
- Syncrude's Mildred Lake and Aurora mines currently can produce 360,000 bpd.
- Shell Canada currently operated its Muskeg River mine producing 155,000 bpd and the Scotford Upgrader at Fort Saskatchewan, Alberta. Shell intends to open its new Jackpine mine and expand total production to 500,000 bpd over the next few years.
- Nexen's in-situ Long Lake SAGD project is on schedule to produce 70,000 bpd by late 2007, with plans to expand it to 240,000 bpd over the next 10 years.
- CNRL's $8 billion Horizon in-situ project is planned to produce 110,000 bpd on startup in 2008 and grow to 300,000 bpd by 2010.
- Total S.A.'s subsidiary Deer Creek Energy is operating a SAGD project on its Joslyn lease, producing 10,000 bpd. It intends on constructing its mine by 2010 to expand its production by 100,000 bpd.
- Imperial Oil's $5 to $8 billion Kearl Oil Sands Project is projected to start construction in 2008 and produce 100,000 bpd by 2010. Imperial also operates a 160,000 bpd in-situ operation in the Cold Lake oil sands region.
- Synenco Energy and SinoCanada Petroleum Corp., a subsidiary of Sinopec, China's largest oil refiner, have agreed to create the $3.5 billion Northern Lights mine, projected to produce 100,000 bpd by 2009.

etc.

Country/Region	Lowest estimate	Highest estimate
North America	50.7	222.9
Canada	16.5	178.8
United States	21.3	29.3
Mexico	12.9	14.8
Central & South America	76	401.1

Venezuela	52.4	361.2
Brazil	10.6	11.2
Western Europe	16.2	17.3
United Kingdom	4.1	4.5
Norway	7.7	8.0
Eastern Europe & Former USSR	79.2	121.9
Russia	60	72.4
Kazakhstan	9	39.6
Middle East	708.3	733.9
Iran	125.8	132.7
Iraq	115	115
Kuwait	99	101.5
Qatar	15.2	15.2
Saudi Arabia[1]	261.9	264.3
UAE	69.9	97.8
Africa	100.8	113.8

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Algeria	11.4	11.8
Libya	33.6	39.1
Nigeria	35.3	35.9
Asia and Oceania	36.2	39.8
China	15.4	16.0
Australia	1.5	4
India	4.9	5.6
Indonesia	4.3	4.3
World total	1082	1650.7

[1]This reserve number cannot be verified.

[edit] See also

- Canadian Centre for Energy Information
- History of the petroleum industry in Canada, part two
- Mackenzie Valley Pipeline

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15. ^ Canadian Association of Petroleum Producers - Environmental Aspects of Oil Sands Development
16. ^ Alberta Environment - Athabasca River Water Management Framework
17. ^ Reuters Top 50 countries by greenhouse gas emissions
18. ^ projects Oilsands Discovery - Oil Sands Projects

[edit] External links

- Hugh McCullum, Fuelling Fortress America: A Report on the Athabasca Tar Sands and U.S. Demands for Canada's Energy (The Parkland Institute)--Executive SummaryDownload report
- Oil Sands History - Syncrude Canada
- Oil Sands Discovery Centre - Fort McMurray Tourism
- The Trillion-Barrel Tar Pit - Article from December 2004 Wired.
- Oil Sands Review - Sister publication to Oilweek Magazine
- Alberta's Oil Sands - Alberta Department of Energy
- Alberta's Reserves 2005 and Supply/Demand Outlook 2006-2015 - Alberta Energy and Utilities Board
- Canada's Oil Sands - Opportunities and Challenges to 2015: An Update - June 2006 - National Energy Board of Canada
- Oilsands overview- Canadian Centre for Energy Information
- Alberta Plan Fails to Protect Athabasca River

Coordinates: 57.02° N 111.65° W

ANNALS OF ECOLOGY

UNCONVENTIONAL CRUDE

Canada's synthetic-fuels boom.

BY ELIZABETH KOLBERT

The town of Fort McMurray occupies a set of irregularly spaced hillsides on either side of the Athabasca River, in northern Alberta. It has a dozen check-cashing joints, a roughly equal number of hotels, and a gaming center called the Boomtown Casino. It also has a museum, which is devoted to the region's most important resource, the Alberta tar sands. Exhibits include an eight-foot-long rotor, half of a hundred-and-fifty-ton truck, and a pump of Brobdingnagian proportions. Near the entrance to the museum sits a black mound covered by a clear plastic dome. A sign invites visitors to scratch around in the mound with a little retractable rake, then lift up a flap and take a sniff. Tar sands look like dirt and smell like diesel fuel.

The tar sands begin near the border of Saskatchewan, around the latitude of Edmonton, and extend, in three major deposits, north and west almost to British Columbia. All in all, they cover—or, more accurately, underlie—some fifty-seven thousand square miles, an area roughly the size of Florida. It is believed that they were pushed into their present location seventy million years ago by the uplift of the Rocky Mountains.

For the most part, the tar sands consist of quartzite, clay, and water. The other ingredient—the "tar"—is a mixture of very heavy hydrocarbons known as bitumen. Bitumen can be used as a sealant—supposedly the word "mummy" is derived from the term in ancient Persian—and as a paving material. With the right technology, it can also be converted into a form of petroleum known as synthetic crude.

There are two ways to assess the world's oil supply. One is to consider only conventional reserves—the sort of oil that comes gushing out of the ground. Estimates of conventional reserves vary widely, but most analyses suggest that their output will begin to decline sometime in the next few decades (if it hasn't already)—a development that so-called "peak oilers" predict will lead to a variety of gruesome consequences, including blackouts, food shortages, and general economic collapse. The second way is to look beyond conventional reserves to unconventional ones, like the tar sands.

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Suncor's Millennium Mine. The shift to new sources of oil could significantly increase greenhouse-gas emissions.

JIRI REZAC/POLARIS

It is estimated that there is enough bitumen in Alberta to yield 1.7 trillion barrels of synthetic crude. Assuming that only ten per cent of this is actually recoverable, it still represents the second-largest oil reserve in the world, after Saudi Arabia's, and more oil than is contained in the reserves of Kuwait, Norway, and Russia put together. Unconventional crude

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can be found in many other parts of the globe besides Canada; these include eastern Venezuela, which is home to a huge tar-sandslike deposit called the Faja Petrolífera del Orinoco, and portions of Colorado, Utah, and Wyoming, where there's a thick layer of oil shale known as the Green River Formation. Even coal can be converted into liquid fuel. During the Second World War, the Nazis employed a technique called the Fischer-Tropsch process; the same process is now in use in several countries, most notably South Africa, which invested heavily in coal-to-liquids technology during the apartheid era. Build enough coal-to-liquids plants and places like Montana and West Virginia could one day become major petroleum producers.

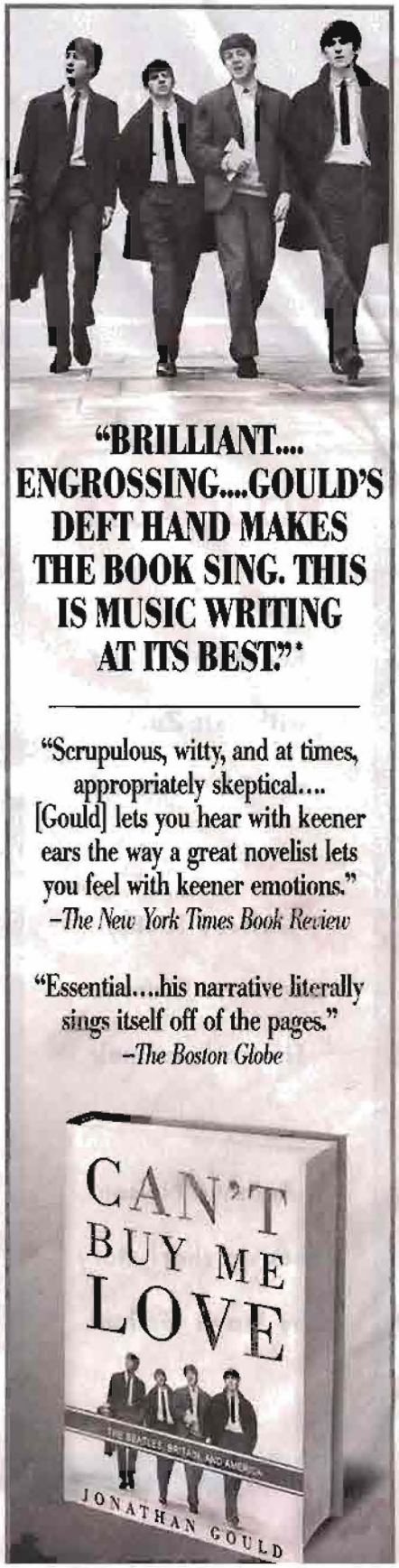
In Fort McMurray, what might be called the world's first unconventional oil boom is already under way. Since 2002, Shell, ConocoPhillips, Chevron, and Imperial Oil, which is primarily owned by ExxonMobil, have all received approval to construct major projects in the tar sands; Total has announced its intention to follow suit. Over the next five years, investment in the Fort McMurray area is expected to amount to more than seventy-five billion dollars. Residents of the town have taken to calling it Fort McMoney.

Thanks in large part to what's happening in the tar sands—output now tops a million barrels a day—Canada has become America's No. 1 source of imported oil; the country supplies the United States with more petroleum than all of the nations of the Persian Gulf combined. (If you have bought gas recently in Colorado, Ohio, or Indiana—states where tar-sands oil is refined—you are probably driving around with a piece of northern Alberta in your tank.) By 2010, the tar sands' yield is expected to double, and by 2015 to triple. Crude from the tar sands and other unconventional sources could keep oil flowing well into the middle of the century, and perhaps beyond. Depending on how you look at things, this is either a heartening prospect or a terrifying one.

The company that has been producing oil from the tar sands the longest is known as Suncor. (Suncor used to be a part of Sun Oil, now Sunoco, but today it is owned and operated independently.) One day this summer, I went to take a tour of its operations, which sprawl across several hundred square miles. I was picked up at the entrance to the site by a grandmotherly guide named Gloria Jackson, and together we went to fetch another Suncor official, named Darin Zandee. "There's no blasts today, so that's good," Zandee said, referring to the charges that are periodically set off to loosen the sands. We drove up to a lookout, from which we could see, spread before us, Suncor's newest mine, the Millennium. Rings of jet-black earthworks were scattered across an enormous pit, an arrangement that might have been based on a blueprint from the Inferno.

The Millennium Mine opened in 2002. Suncor expects to continue to pull tar sands out of it for the next twenty-five years. By then the pit, which is now roughly two miles in diameter, will be six miles across. We drove over the edge of the mine and slowly made our way down to the bottom. There a huge, Mike Mulligan-esque shovel was standing idle. Its bucket hung in midair, steel teeth glinting. Zandee said that to lift one of the teeth would require thirty men—"That gives you a sense of the scale." A gargantuan truck rumbled by. Zandee estimated that it was carrying about three hundred tons. "That's some of our smaller equipment," he said. The largest truck in the mine—the Caterpillar 797B—can haul more than four hundred tons. It has twelve-foot-tall tires, and its cab sits twenty-one feet off the ground. Driving one, I was told, is like trying to steer a house while peering out the window of the upstairs bathroom.

At the Millennium, the tar sands start at a depth of roughly a hundred feet and extend down in a more or less continuous layer, known as the "feed," for about a hundred and fifty feet. Before mining begins, everything above the feed—trees, bushes, grass, soil, rocks, wildlife—gets scooped up and carted away. (The material is delicately referred to as "overburden.") Below the tar sands, there's a thick layer of limestone, the remains of an ancient ocean that once covered Alberta. Suncor mines some of the limestone, too, and uses it to shore up the roads in the pit. What with the overburden and the tar sands and the limestone, Zandee said, "We try to move a million tons a day." He pointed out a truck in the distance that was dumping a load of tar sands onto what looked like a large platform. The platform was actually a grate, through



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which the sands were being fed into a giant tank of hot water.

In any given load of sands, only about ten per cent is bitumen; to produce synthetic crude, the other ninety per cent has to be separated out. In the hot-water tank, the sands get spun around; the liberated bitumen is then siphoned off. For every barrel of synthetic crude that Suncor eventually produces, forty-five hundred pounds of tar sands have to be dug up and separated.

We made our way out of the pit and headed on, following the bitumen to its next stop, the upgrader. Along the way, we passed a murky expanse of water with oily scum on the surface. A few dozen scarecrow-like creatures, fixed to empty barrels, were bobbing on top. This, Gloria Jackson explained, was a tailings pond; it held water that had been used in the separation process and was too contaminated with mercury and other toxins to be released back into the Athabasca. (Suncor has nine such ponds, which collectively cover an area of eleven square miles.) The scarecrows, known as "bitu-men," were supposed to discourage birds from landing on the pond and poisoning themselves. Every minute or so, a dull boom filled the air. This was the sound of a propane cannon, another bird-intimidation device.

The primary difference between bitumen and ordinary crude is the size of the hydrocarbon molecules: in liquid oil, these molecules contain between five and twenty carbon atoms, while in bitumen they contain more than twenty. (At room temperature, pure bitumen is so viscous that it will not flow.) The main job of the upgrader is to break down the oversized hydrocarbons into smaller units. We drove along roads with names like Sulphur Street and Diesel Alley and pulled up to a huge refinery-like complex that covered several square blocks. There were dozens of smokestacks and tanks, and more pipes than could possibly be counted. Jackson explained that somewhere inside this maze the bitumen would be "cracked," at a temperature of nearly nine hundred degrees. After that, in the form of synthetic crude, it would be piped to specially outfitted refineries, either in the United States or Canada, to be converted largely into transportation fuels—gasoline for cars, diesel for trucks, and jet fuel for planes. (Suncor owns a refinery near Denver that processes tar-sands oil.) I had told Jackson that I had twin boys at home, and at the end of the tour she handed me two yellow Matchbox-size versions of the 797B.

American accounts usually give the start of the oil age as 1859, the year that a former railroad conductor named Edwin L. Drake drilled his first successful well, near Titusville, Pennsylvania. Canadian accounts go back a year earlier, to 1858, when a businessman named James Miller Williams decided to dig a well for drinking water outside the town of Bear Creek, Ontario. Instead of water, he struck oil.

Efforts to extract oil from the tar sands soon followed. Entrepreneurs and con men sunk dozens of wells around Fort McMurray in the second half of the nineteenth century. (One enterprising German immigrant who claimed to have struck oil apparently poured the stuff down the hole himself.) Eventually, it became clear that there was no oil, and attention turned to mining the bitumen. In 1930, a former farmer named Robert Fitzsimmons set up the first commercial separation plant in the tar sands; in 1938, Fitzsimmons had to flee Canada to avoid his creditors.

In 1956, an American geologist, Manley Natland, came up with the idea of streamlining the process by using atom bombs. Natland reasoned that "thermal devices" could be lowered into the limestone beneath the tar sands and exploded. This would create cavities into which the bitumen, heated to more than a thousand degrees, would flow and from which it could then be collected. The idea was taken seriously at the highest levels in both Ottawa and Washington—the United States Atomic Energy Commission even agreed to supply a bomb to test Natland's theory—but it was never implemented. (Beginning in the mid-nineteen-sixties, the Soviet Union actually tried the experiment, setting off half a dozen nuclear explosions to stimulate conventional oil production; production increased, but, unfortunately, much of the oil turned out to be radioactive.)

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The technology for removing bitumen from the tar sands is probably still best described as a work in progress. Where the feed lies closest to the surface, as, for example, at the Suncor site, the bitumen is strip-mined and then separated. But most of the tar sands lie too deep to be mined profitably. In these zones, a method known as in-situ extraction is used. In-situ extraction is based on much the same principle as Natland's scheme, minus the atom bombs. Typically, two horizontal wells are drilled into the sands, one above the other. High-pressure steam is injected into the top well; eventually, the tar sands grow hot enough—nearly four hundred degrees—that bitumen begins to flow into the bottom well. The technical name for this process is Steam Assisted Gravity Drainage, or SAGD (pronounced "sag-dee").

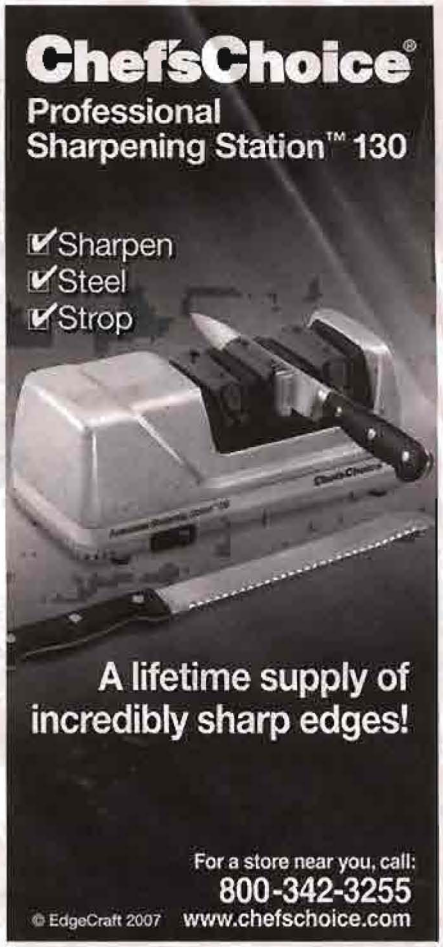
Whichever method is used, a great deal of energy is required. To produce a barrel of synthetic crude through mining takes roughly eight hundred and ten megajoules, which is the energy content of about an eighth of a barrel of oil. To produce a barrel of synthetic crude through SAGD takes more than sixteen hundred megajoules, which is the energy content of more than a quarter of a barrel of oil. This means that, for every three barrels extracted via SAGD, one has, in effect, been consumed.

Tar-sands oil itself could, in principle, be used to power the operations; in fact, most of the energy used to generate the steam for SAGD, as well as to run all the upgraders and separators, now comes from natural gas. It is estimated that by 2012 tar-sands operations will consume two billion cubic feet of natural gas a day, or enough to heat all the homes in Canada. Such is the demand for natural gas around Fort McMurray that a consortium of companies, including Shell Canada and Imperial Oil, has proposed building a seven-hundred-and-fifty-mile pipeline from the Arctic Ocean through the largely undisturbed wilderness of the Mackenzie River Valley and down into northern Alberta. The proposal, which has been challenged by native and environmental groups, has yet to receive regulatory approval; meanwhile, a variety of other plans have been floated. As it happens, while I was visiting Fort McMurray a company called the Energy Alberta Corporation filed an application to build a pair of nuclear reactors four hundred miles west of town. Early reports stated that the company already had a "large industrial off-taker" lined up to buy nearly three-quarters of the twenty-two hundred megawatts that the reactors would generate. Energy Alberta would not disclose the identity of this "off-taker"; in the local press it seemed to be taken for granted that the power would be going to the tar sands.

There are several reasons that companies like Chevron and ExxonMobil are now rushing to develop the tar sands, the most obvious being that it's increasingly profitable to do so. Converting the sands into synthetic crude costs around thirty dollars a barrel; last week, the price of a barrel of oil on the New York Mercantile Exchange was over ninety dollars. Other synthetic fuels require more elaborate processing, and are commensurately more costly to produce; converting coal into oil, for example, requires gasifying the coal under intense pressure and heat, then condensing it into a liquid. To extract oil from shale, meanwhile, involves basically rewriting geological history. (Shell has been experimenting with a process that involves baking the shale with electric heaters until it reaches a temperature of nearly seven hundred degrees while, at the same time, freezing the area around it.) If the price of oil remains above ninety dollars—many analysts expect it to hit a hundred dollars a barrel soon—then these and other unconventional forms of fuel can also be developed at a profit, and, all other things being equal, they will be.

No matter how it is carried out, oil extraction is a destructive business. Conventional oil wells require pipelines and drill pads and roads for heavy equipment; all of these fragment (or destroy) the landscape. The flaring of natural gas, which often accompanies oil production, produces an array of air pollutants, and leaks and spills release toxins ranging from volatile chemicals, like benzene (a known carcinogen), to much heavier compounds, like benzopyrene (another known carcinogen). With unconventional oil, the damage tends to be higher all around—more land gets disturbed, more pollutants are produced, and more opportunities arise for contamination. And then there are the greenhouse gases.

Alex Farrell is a professor in the Energy



WEB Exhibit # 36

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and Resources Group at the University of California at Berkeley who studies the impacts of unconventional oil. A few years ago, Farrell realized that all the major climate models were based on the same faulty premise: they assumed that in the future increased oil demand would be met with increased supplies of conventional crude. Together with a graduate student named Adam Brandt, Farrell decided to try to come up with projections that more accurately reflected reality. For their calculations, the two assumed that where there was a gap between demand and conventional supply it would be filled with synthetic fuels, first with tar-sands oil and later with oil from coal and shale. (According to high-end estimates, coal and oil shale could together yield some ten trillion barrels of unconventional crude.) They then calculated what the impact would be on global carbon-dioxide levels.

"All unconventional forms of oil are worse for greenhouse-gas emissions than petroleum," Farrell told me. "And it's pretty easy to understand why. It's not so hard to turn liquid petroleum into liquid fuels. Turning a solid material like coal into a liquid—it sounds hard to do, and it *is* hard to do. And that extra effort shows up in higher energy consumption and higher water use and higher emissions." In the case of tar-sands oil, total greenhouse-gas emissions per barrel—which is to say, the carbon dioxide produced in creating the oil and then burning it—are between fifteen and forty per cent higher than those from conventional oil. In the case of coal-to-liquids, or C.T.L., total emissions are almost two times as high as with conventional oil, and for oil shale they can be more than twice as high.

"Let's take coal-to-liquids," Farrell said. "You're talking about nearly doubling the greenhouse-gas emissions. Think about this—we're talking about a world in which over-all greenhouse-gas emissions should start to go down, and this is a technology that doubles emissions. They don't go together too well, do they?" Farrell and Brandt found that the shift to unconventional oil could add somewhere between fifty and four hundred gigatons of carbon to the atmosphere by 2100.

"The environment and climate change are what are called 'externalities,'" Farrell continued. "And at the moment we don't have effective ways of including these externalities in market transactions of any sort. Until we do, the market won't solve them, since by definition they're external to the market. They're a social good—government has to step up and say, 'We're going to take this into account.'"

One way that a government could take greenhouse-gas emissions into account would be to tax them. This would encourage producers of unconventional fuels to cut their emissions, by, for example, employing "carbon capture and storage" technologies. Ideally, it would also prompt entrepreneurs to develop alternatives to oil, like biofuels. Many analyses, though, suggest that, to have an appreciable effect on the oil sector, carbon taxes would have to be quite high—in the neighborhood of two dollars on a gallon of gasoline—precisely because today there are no readily available substitutes for gas or diesel or jet fuel. Farrell favors federal fuel standards, which would function somewhat like vehicle-efficiency standards, requiring oil companies to achieve a certain emissions target across all the products that they sell. (This target could be adjusted over time, much as auto-efficiency standards were ratcheted up during the seventies and eighties.) California is now in the process of drawing up such a plan—the California Low Carbon Fuel Standard is supposed to take effect on January 1, 2010—and several bills have been introduced in Congress that would impose such standards nationally.

At the same time, there is a great deal of support in Washington for measures that would, in effect, subsidize high-carbon fuels. One such measure, the Coal-to-Liquid Fuel Promotion Act, introduced earlier this year by Senators Jim Bunning, of Kentucky, and Barack Obama, of Illinois, would encourage companies to invest in C.T.L. plants by providing tax incentives and federal loan guarantees. (Although C.T.L. would be profitable at today's oil prices, building the plants requires large capital investments, which are considered risky as long as there's a chance that oil prices will fall.)

"If companies could lay off the risk of oil prices dropping below forty dollars a barrel, there would be enormous investment in this," Farrell told me. "But, when policies are proposed to promote C.T.L., I think the question to ask is, Is this an industry we want to start now?"

The Athabasca River flows north, into Lake Athabasca, which spans the Alberta-Saskatchewan border. In the winter, it is possible to drive the hundred and fifty miles from Fort McMurray to the lake on an ice road. (Because of rising temperatures, the number of days that the road is passable has been steadily shrinking.) In the summer, the only way to make the trip is by boat or by prop plane. One day when I was visiting Alberta, I flew up

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to a village on the edge of the lake, Fort Chipewyan, in a six-seat Cessna. As the plane gained altitude, I could see the vast black pits of the tar-sands mines that surround Fort McMurray. Farther north, the pits gave way to regularly spaced square-shaped clearings in the trees—signs of preparation for in-situ operations. Finally, these, too, gave way, and below was nothing but the wild green of the boreal forest. (Spread over 1.4 billion acres, Canada's boreal forest is considered one of the largest still intact ecosystems on the planet.)

Fort Chipewyan, which was founded in the seventeen-eighties as a trading post, is a native village; about half its twelve hundred or so residents are Mikisew Cree, and the other half are Athabasca Chipewyan. It has a few hundred houses, a post office, and two churches—one Anglican and one Catholic—both perched near the edge of the lake. To a certain extent, Fort Chip, as it is known locally, has shared in the tar-sands boom; many residents of the village work construction jobs in Fort McMurray and return home only on their days off. At the same time, there's a good deal of concern in the village about what is happening. A peculiarly high number of cases of a rare cancer have been reported in town; this has prompted speculation that toxins from the tailings ponds are working their way downriver into the lake, which provides the village with drinking water as well as with staples like whitefish and pike. Meanwhile, both the Chipewyan and the Cree consider many of the tracts that the Alberta government has leased to oil companies to be their ancestral lands. The week before I visited Fort Chip, there was a rally at the local community center, calling for a moratorium on new projects.

"It's sad to see this thing destroyed, you know," Ray Ladouceur, a fisherman I met, said. We were standing by the lake, which is more than two hundred miles long. It was a still afternoon, and billowy white clouds were reflected in the water. "A lot of the fish are getting—I might as well say it—scabby.

"I don't know what we have to do to try to prevent them from destroying any more," he said, referring to the oil companies. "They try to say they can clean it. There's no way. It'll take a thousand years before it flushes itself out, and I think I'll be too damn old for that."

Over the past year or so, opposition to new tar-sands projects has been steadily growing. Around Fort McMurray, the emphasis is on local impacts; town officials have fought recent expansion proposals by several oil companies on the ground that there's already a shortage of housing and hospital beds in the area. In the rest of Canada, the focus is on the destruction of the boreal forest and the implications for the climate. Canada, in contrast to the United States, was an early signatory to the Kyoto Protocol, but it will be all but impossible for the country to meet its CO_2-reduction goals, in part because of the tar sands. (A recent Toronto *Globe & Mail* op-ed piece on emissions from the sands was titled "The Gassy Elephant in Our Living Room.") The former Canadian Environment Minister Charles Caccia has compared the country's position on greenhouse gases—pledging to reduce emissions on the one hand while increasing tar-sands production on the other—to "attempting to ride two horses galloping in opposite directions."

Meanwhile, development in northern Alberta continues unabated. All the applications opposed by Fort McMurray officials were ultimately approved, and just a few months ago an American company, Hyperion Resources, announced plans to build the first new oil refinery in this country in thirty years, to handle increasing volumes of tar-sands crude. Stéphane Dion, the leader of Canada's Liberal Party (which is currently out of power), has said, "There is no environmental minister on earth who can stop the oil from coming out of the sand, because the money is too big."

When I first landed at Fort Chip's tiny airport, the place was deserted. When I returned there for the flight back, I found a few dozen people standing on the tarmac. The crowd, I was told, was waiting for a corpse; a village elder had died the previous day in a hospital in Fort McMurray, and his body was being brought home. Everyone was quiet as the casket was carried out of the plane and then loaded onto the back of a pickup truck. As soon as the crowd dispersed, I and three other passengers climbed into the Cessna, and two minutes later we took off. Below was the wilderness, then the perfectly square clearings in the trees, and, finally, as we headed into Fort McMurray, the vast pits and the black ponds, with the bitu-men bobbing on top. ♦

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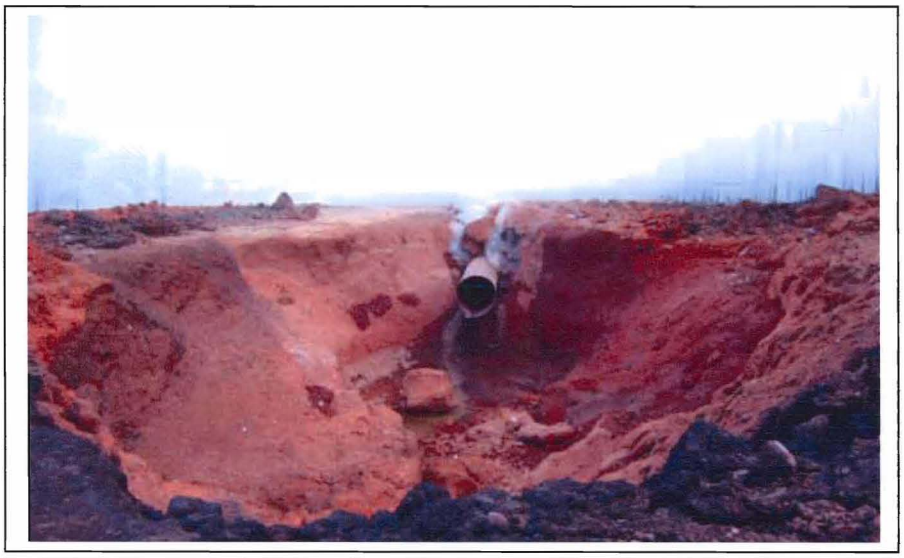

Is South Dakota Ready For High Pressure Crude Oil Pipelines?

Testimony Presented
October 31, 2007
by Curt Hohn Before the
S.D. Public Utilities Commission
In The Matter of Application HP 07-001
TransCanada-Keystone Pipeline

Photos: Pipeline failures at Whiteside County, IA, Oct. 15, 2007 (top photo)
TransCanada Pipeline south east of Grande Prairie, Dec 1, 2003 (middle & bottom photos)

"Thinner walled pipe means greater risk for South Dakota. Much of the steel pipe that will be installed will be made in China and India. Neither country can provide the level of inspection and quality control that U.S. steel pipe company's offer.

The PUC should require that all pipe installed in South Dakota be made in the USA and be of the same wall thickness or greater wall thickness than existing oil pipelines being operated, tested and inspected by the federal government in the United States of American.

Most of TransCanada's pipeline experience is with natural gas pipelines which are less likely to spill and damage soil or ground water. When crude oil pipes leak the oil spreads out into the soil and damages the groundwater aquifers.

Curt Hohn
WEB General Manager

WEB Exhibit # 37

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Why not a bond for a crude oil pipeline?

Saturday, July 21, 2007 3B

Board expands gold mine's bond

By Bob Mercer
American News Correspondent

PIERRE — The state Board of Minerals and Environment decided Thursday to increase the environmental-protection bonds for the Wharf Resources gold mine in the northern Black Hills.

Wharf's reclamation bond, intended to cover the costs of restoring the land if the company doesn't, was raised $236,000. The new total is $10,966,400.

The company's cyanide-spill bond was raised by $31,000 to the maximum $500,000 allowed under South Dakota.

Wharf uses a leach-pad process, where piles of ore are treated with cyanide solution that separates the gold for recovery. A pond system is used as part of the solution processing.

Black Hills operation affected

Wharf's expansions of two of its four leach pads, and the accompanying increase in the amount of solution being used, were the main reasons for the bonding increases.

"When we reviewed the plans, the ponds were all adequately sized to contain the extra solution," Eric Holm, a natural resources engineer for the state's mining and minerals program, told the board.

Wharf made a series of small expansions in 2006 and this year, designed to prolong the mine's life into mid-2010.

Wharf is the last remaining large-scale gold mine operating in South Dakota. Wharf mined nearly 3.3 million tons of ore in 2006 and produced 63,039 ounces of gold and 184,444 ounces of silver worth an estimated combined value of $40 million.

For its processing system, Wharf withdrew more than 42 million gallons of groundwater and used in excess of 330 tons of cyanide.

In addition to its cyanide and reclamation bonds, Wharf also has a third financial guarantee, known as a postclosure bond, to protect against any long-term environmental effects after mining has ceased and the site is reclaimed. Wharf's amount for that is $8,120,700.

WEB Exhibit # 38

TransCanada-Keystone Oil Will Sell For $38 Million to $58 Million Per Day They Should Treat Landowners Fairly And Pay For Any Leaks Or Property Damage

Below is a list of things that WEB believes the SD Public Utilities Commission, Governor Rounds and the South Dakota Legislature Can Do, IF they are willing to provide a reasonable measure of protection for South Dakota landowners and rural water systems.

1. **Increase Pipe Wall Thickness:** TransCanada-Keystone could design their high pressure oil pipeline with **wall thickness of 0.78 inch instead of 0.33 inch thick** whenever this high pressure crude-oil pipeline route comes near **a town, school, home, farm, business, park, rural water system or other public areas**. With profits TransCanada and the oil industry are making on $99 a barrel oil and $3.00 gas they can well afford to do things right in South Dakota.

2. **Reserve Fund**: As part of their permit application approval, **South Dakota should collect a fee on all oil that flows through the state through the TransCanada-Keystone Pipeline on a per-barrel basis to help cover the costs associated with spills, accidents, fires, environmental impacts, clean-up, and property damage.** A $0.15 per barrel toll on 590,000 barrels per day would generate $88,500 per day or $32.3 million per year. If TransCanada has a leak that damages the aquifer that the BDM Rural Water System relies on it could cost over $22 million to bring in water from WEB or some other alternate source. If the WEB water lines serving Day County are contaminated by an oil spill, it would cost of $11.5 million to replace the system. If productive farm land crossed by the pipeline is damaged by an oil spill the fund would be available to reimburse the landowner for their loss. **Oil selling for $65 per barrel will generate $38.5 million per day ($14 billion/year) in sales for TransCanada and their partners and investors. Oil selling for $99 per barrel will generate $58.5 million per day ($21.4 billion/year) in sales for TransCanada and their partners and investors.**

3. **No Eminent Domain:** South Dakota should not allow a **private company from a foreign country** to condemn and take the property of US citizens and South Dakota taxpayers by eminent domain. TransCanada-Keystone should be required to secure all easements from **willing sellers** without the threat of condemnation hanging over the landowners head. Condemnation of privately owned land should be discouraged and should be done only as a last resort and then only after all other alternatives and options have been exhausted. To assure that this happens, the PUC or the Governor and Legislature should establish a **process where landowners can appeal without having to go to court.** No land should be taken during this process. Rural water systems have installed thousands of miles of water lines using voluntary negotiated easements, without the use or threat of forced condemnation. Out-of-state out –of-country oil companies should be required to do the same. **No land acquisition activity should be allowed to begin until after a permit has been granted by the PUC and the legal appeal process has run its course.**

5. **Liability For Oil Spills, Cleanup & Damages:** TransCanada-Keystone should be required to reimburse landowners, adjacent property owners, water utilities, county government, township government and public lands and resources for any damage or impacts caused by an oil spill, pipeline construction or pipeline operations. Crop damage should be paid each year for the life of the pipeline because the heated oil will reduce crop. **This should be included as a condition of any permit issued by PUC.**

WEB Exhibit # 39

6. **Liability Insurance Coverage**: TransCanada-Keystone should be required to provide **proof of liability insurance coverage and a certificate of insurance** naming the State of South Dakota, counties, rural water systems, townships, utilities and individual landowners crossed by the pipeline as "**additional insured**" on the policy. The insurance policy should cover the operating life of the crude-oil pipeline, which is estimated by TransCanada at 50 years or more and should obligate all partners involved in the crude-oil pipeline, including LLC and LP.

7. **Post A Cash Bond:** South Dakota currently requires the owners of Homes take Gold Mine to post a cash bond to cover the costs of environmental impacts (See Exhibit 38). TransCanada and it's partners should be required to do the same thing. By **posting a bond or cash payment** with the State of South Dakota, the Public Utilities Commission and/or the Department of Environment and Natural Resources could be used to cover the cost of clean-up of any oil spills or leaks that may occur during the 50-year life of the TransCanada-Keystone Oil Pipeline. The permit application TransCanada filed with the federal government predicts that there will be oil leaks and pipe failure in 5 to 7 years (*Pipeline Risk Assessment pg 3-2 and DNV—Frequency Volume Study, May 2006). The "Frequency Volume Study"* prepared by DNV Consulting, risk management consultants hired by TransCanada, states that 53% of the oil leaks could be pinhole leaks and that the monitoring systems **will not detect leaks of 1.5% pipeline volume which means 370,000 gallons per day** of oil could leak from the system and not be detected for days, months or even up to 90 days according to the DNV report. (See DNV Report Filed on the PUC website)

8. **Dispute Arbitration:** The South Dakota Legislature should give the Public Utilities Commission or some other state agency the authority and responsibility to **arbitrate or mediate easement acquisition disputes** in an effort to reach reasonable settlement before TransCanada or other oil and gas pipelines are allowed to use South Dakota eminent domain laws to condemn land held in private ownership. The process should include independent appraisers using methods to determine fair compensation for temporary and permanent right-of-way easements including loss of crop production, loss of groundwater supplies, and other costs. Some states that have more experience will oil pipelines use special commissions made up of landowners in the community. The rights of private property owners along the pipeline route in South Dakota should not be left to the mercy of professional land acquisition agents sent in to the state by a foreign oil company.

9. **Strengthen Oil Pipeline Safety Laws:** The South Dakota Legislature should strengthen South Dakota laws and establishing a process for evaluating damage to land, water and resources by a gas or oil spill and a method and process for determining compensation for property damage caused by a gas or crude oil spill. The plan should include an administrative appeals process available to landowners and property owners who are not satisfied with the result of negotiations with TransCanada-Keystone or other gas and oil pipeline builders and operators. The process should be at no cost to the landowner.

10. **Require Prior Engineering Plan Review & Approval**: The Department of Environment and Natural Resources (DENR) must approve construction plans for livestock feedlot lagoons, fuel storage containment and for all water and sewer systems before they are built in South Dakota. Why not the same requirement for high pressure crude-oil and gas pipelines? The Legislature should require that oil and gas pipeline companies crossing South Dakota present detailed construction plans stamped by engineers licensed to do business in South Dakota to the Department of Environment and Natural Resources for prior review and approval before any easements are secured and most certainly before any permits are approved by the PUC or any other agency.

WEB Exhibit # 39


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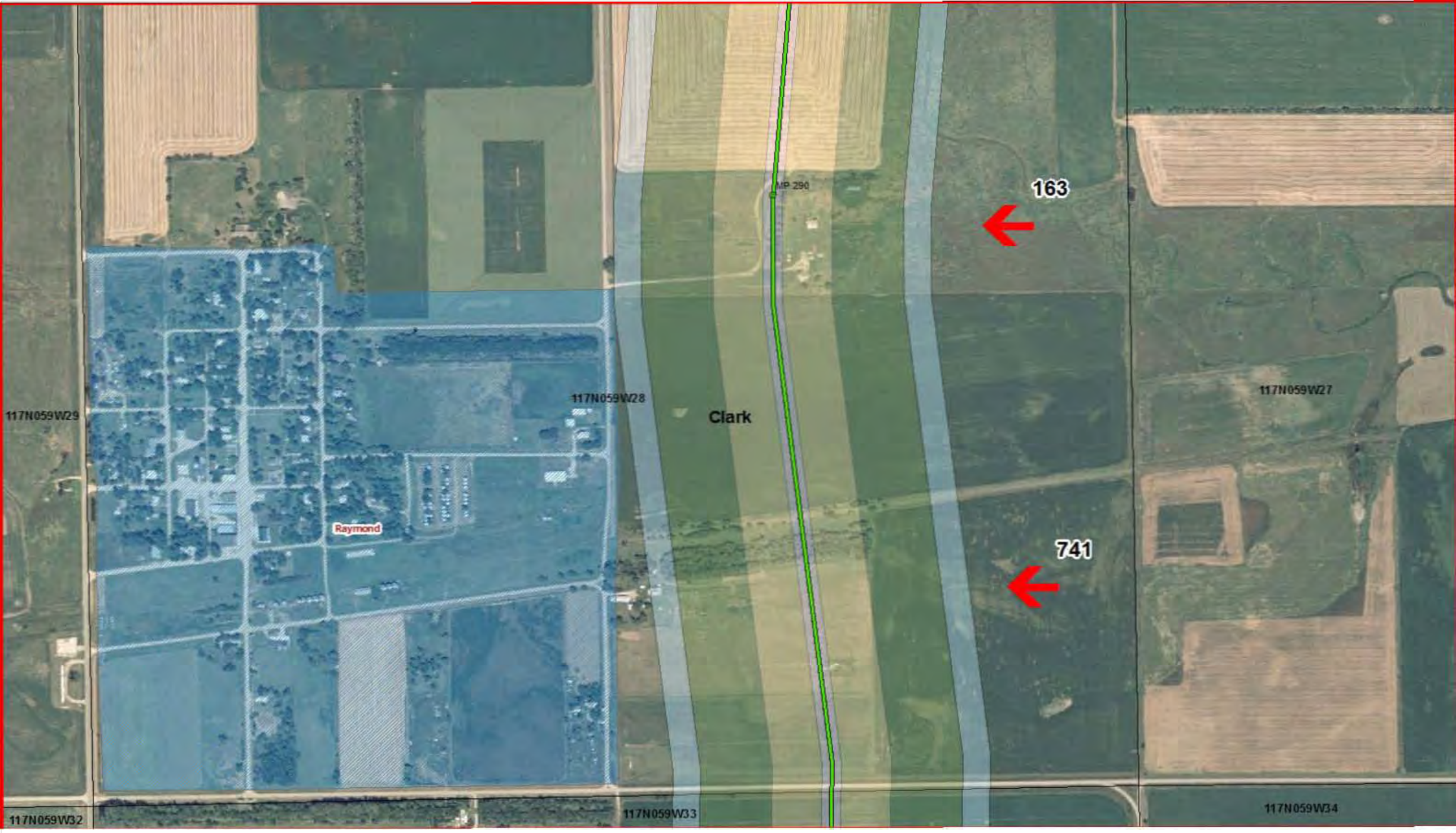
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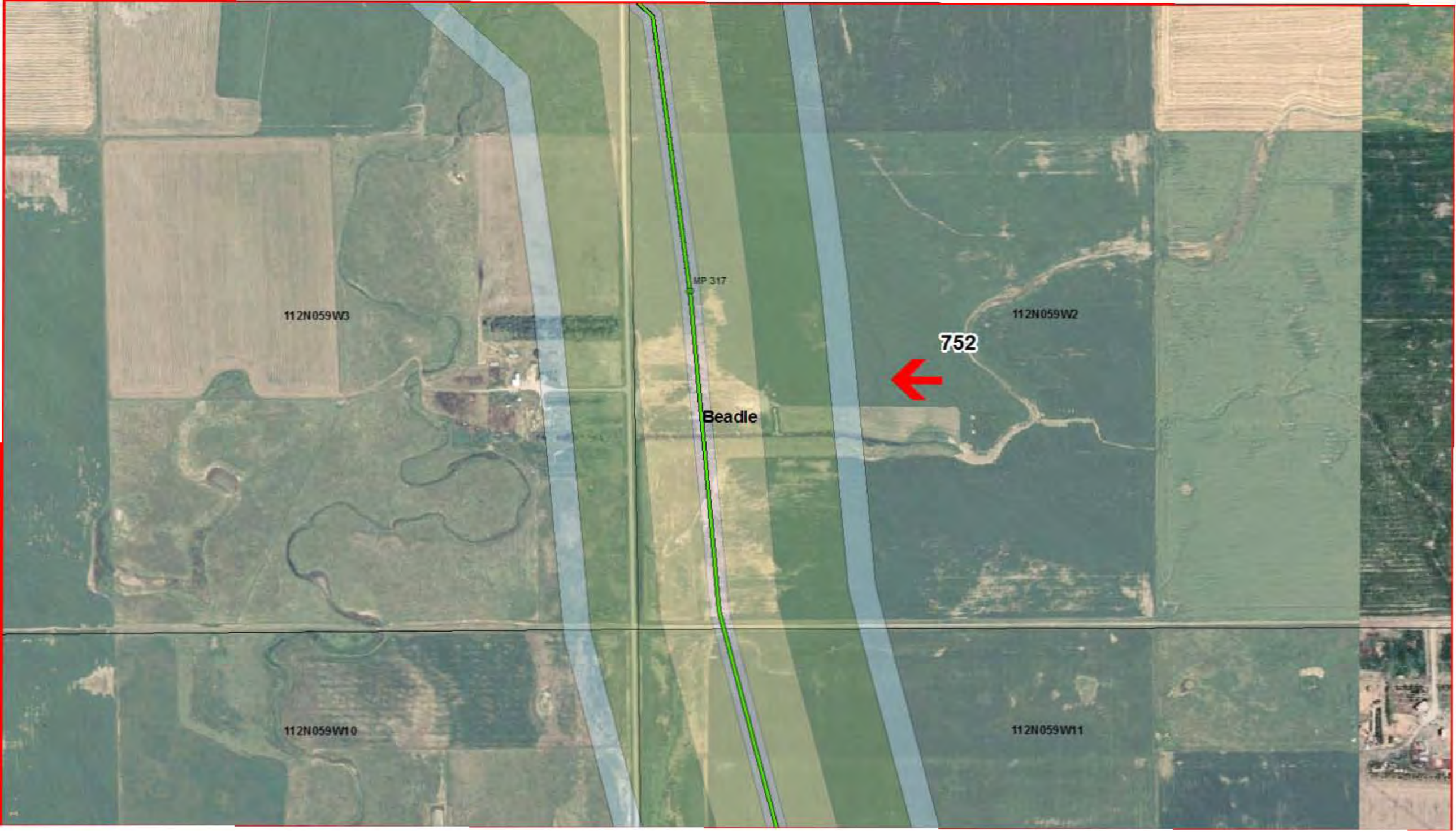
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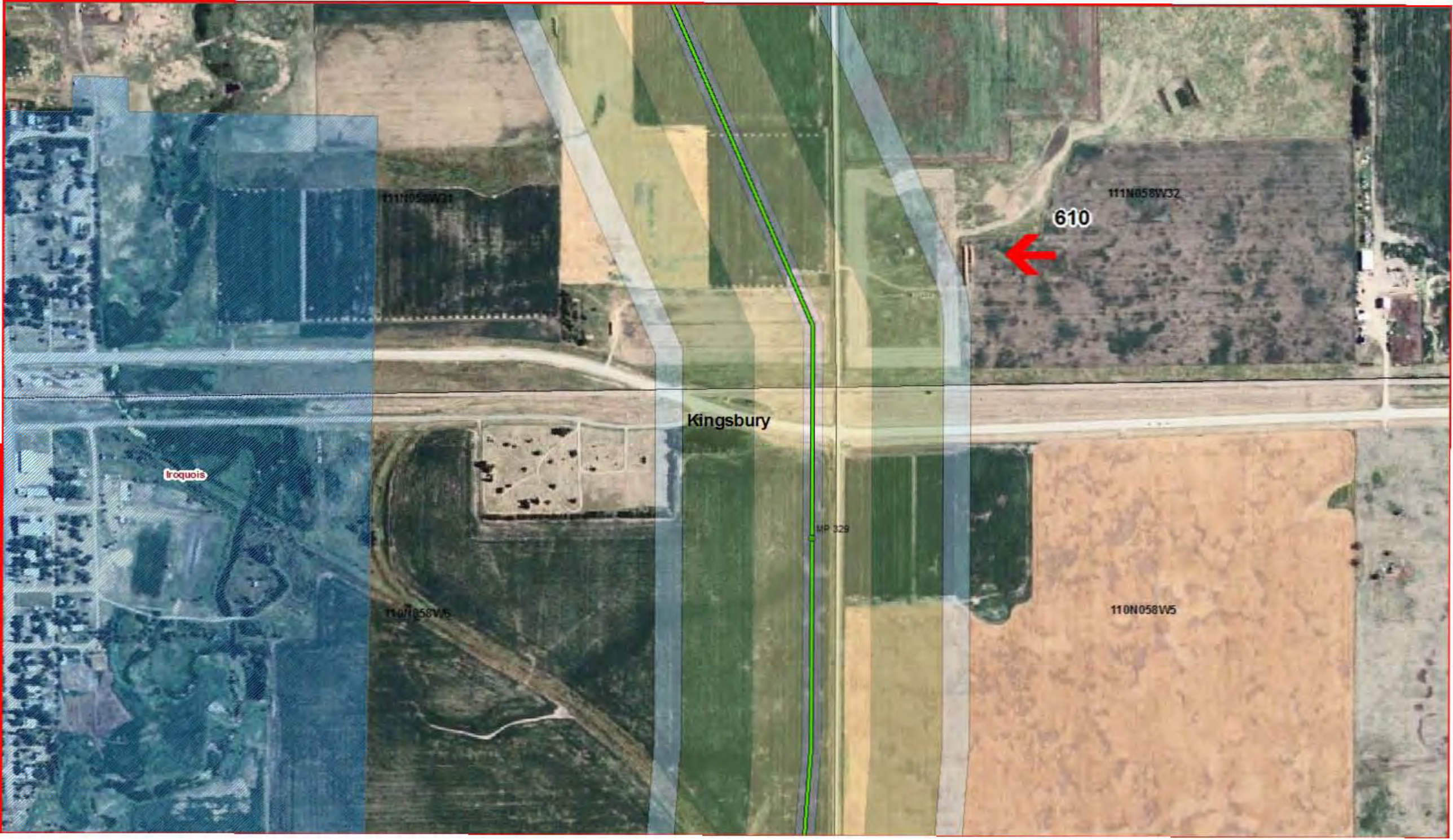
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Kingsbury
109N058W33
109N058W34


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Kingsbury
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MP 341
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Miner
108N058W3


108N058W35
MP 347
Miner
768
107N058W2


107N058W2
MP 348
Miner
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800
107N058W11
107N058W12

010391


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107N058W11
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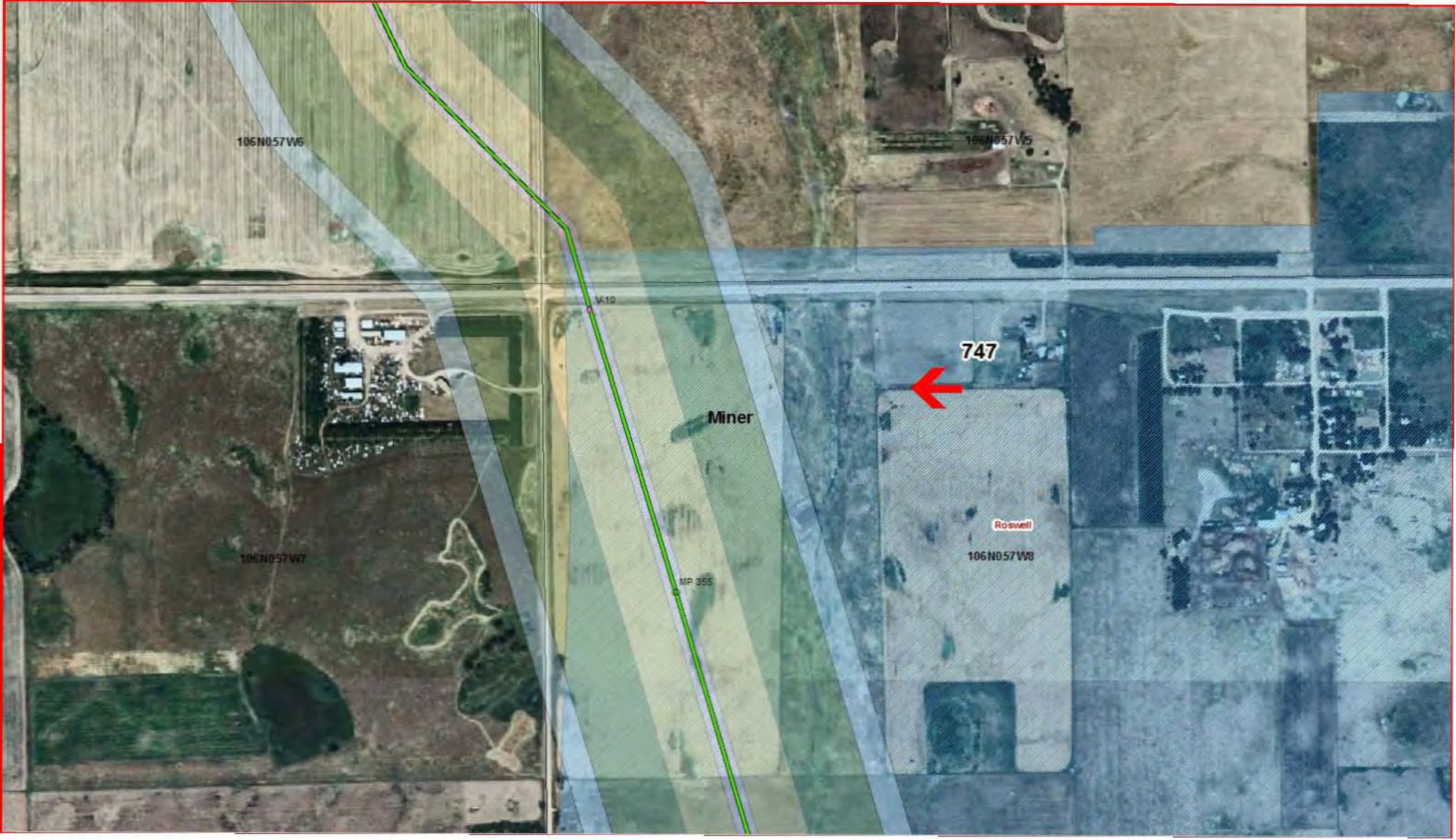
MP 349

010392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Miner
MP 365
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105N057W33
105N057W34


104N057W8
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104N057W10
Hanson
MP 368
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104N057W16
104N057W15


104N057W16
MP 369
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Hanson
702
104N057W21
104N057W22


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712
Hanson
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010398


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MP 381
727
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McCook
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McCook
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010400


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MP 385
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101N056W6
101N056W5


101N056W6
101N056W5
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MP 386
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101N056W9


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MP 387
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McCook
101N056W17
101N056W16

010403


101N055W20
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101N056W21
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V-12
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McCook
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101N056W29
MP 390
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McCook
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101N056W32
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100N057W14
MP 393
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Hutchinson
100N057W23
100N057W24


100N057W35
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100N056W31
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Hutchinson
099N057W2
099N057W1
099N056W6


MP 398
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647
099N056W7
636
099N056W18
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010408


MP 400
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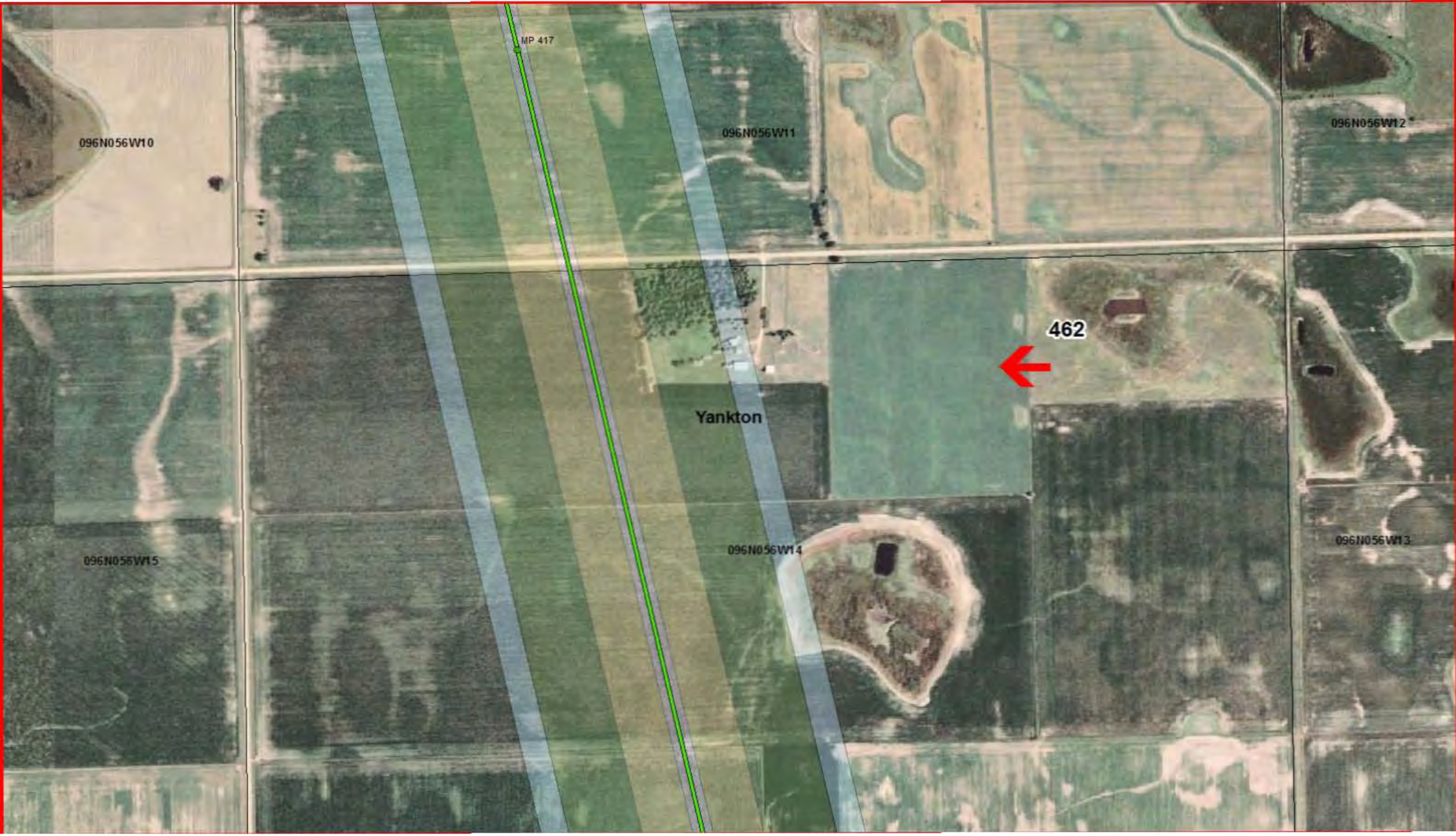
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Yankton
095N056W23
095N056W24
095N055W19

010419


MP 426
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095N056W26
095N055W30
638
Yankton
095N056W35
095N056W36
095N055W31


094N056W1
094N055W6
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Yankton
094N056W12
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MP 429


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MP 433
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Yankton
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Yankton
094N055W32

010422


094N055W31
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MP 434
103
Yankton
Yankton
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093N055W5
093N055W4

010423


517
093N055W9
093N055W8
093N055W7
Yankton
Yankton
MP 436
093N055W17
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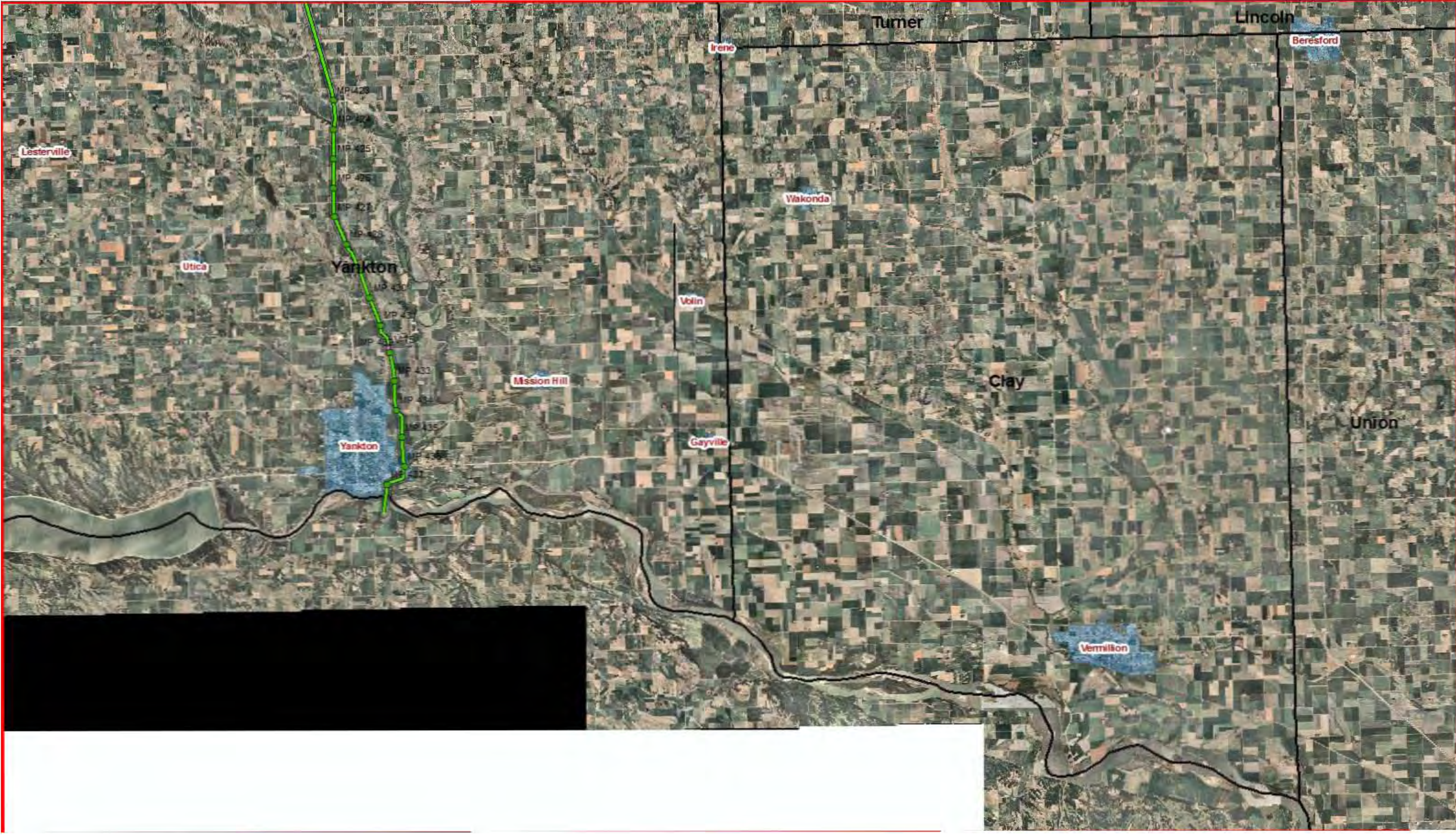
Turner
Lincoln
Irene
Beresford
Lesterville
Wakonda
Yankton
Utica
Volin
Mission Hill
Clay
Union
Gayville
Yankton
Vermillion

010426

Required Setbacks - 49 CFR 195: 50 ft from any
50 ft from any private dwelling
300 ft from bldgs during pressure testing of pipe
660 ft from any building
800 ft (12 people were killed 750 ft from a pipe failure at Carelsbad, NW in 2000)

			Distance Between			
			TransCanada Pipe			
Map Location	**Legal**		**And Structures (Ft)**			
MP 219	10-128-59			667		
	2-127-59			653		
MP-228	26-127-59			360		
MP-231	2-126-59			310		
MP-236	2-125-59			800		
MP-241	26-125-59			508		
MP-247	28-124-59			660		
MP-257	17-122-59			651		
	17-120-59			217		
	20-120-59			223		
	20-120-59			418		
MP-271	20-120-59			494		
MP-276	17-119-59			306		
MP-277	20-119-59			603		
MP-278	31-119-59			800		
MP-282	17-118-59			785		
MP-286	5-117-59			589		
	4-117-59			223		
MP-290	28-117-59			163		
MP-290	28-117-59			741		
MP-295	21-116-59			517		
MP-307	20-114-59			705		
MP-317	3-112-59			752		
MP-325	13-111-59			800		
	25-111-59			771		
	30-111-58			271		
MP-329	32-111-58			610		
MP-329	5-111-58			386		
MP-340	27-109-58			752		
MP-341	34-109-58			568		
MP-347	35-108-58			768		
MP-348	1-107-58			800		
MP-349	12-107-58			662		
MP-355	7-106-57			747		
MP-365	8-105-57			243		
MP-368	9-104-57			530		
MP-369	21-104-57			702		
MP-376	13-103-57			299		
MP-376	24-103-57			712		
MP-379	1-102-57			359		

MP-379	6-102-56			749		
MP-381	18-102-56			769		
MP-381	18-102-56			727		
MP-383	30-102-56			599		
MP-385	32-102-56			117		
MP-386	5-101-56			280		
MP-387	17-101-56			742		
MP-389	21-101-56			216		
MP-389	28-56-101			409		
MP-390	33-101-56			440		
MP-393	14-100-57			440		
	36-100-57			519		
MP-398	12-99-57			647		
MP-398	13-99-57			636		
MP-400	19-99-56			727		
MP-400	30-99-56			477		
	31-99-56			197		
	17-98-56			678		
MP-408	33-98-56			734		
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MP-412	15-97-56			583		
MP-412	22-97-56			356		
MP-413	22-97-56			397		
MP-413	27-97-56			682		
MP-414	27-97-56			674		
MP-414	34-97-56			436		
MP-417	14-96-56			462		
	23-96-56			68		
	13-95-56			632		
	25-95-56			638		
MP-426	6-94-55			262		
MP-433	32-94-55			329		
MP-434	5-93-55			103		
MP-436	8-93-55			517		
MP-436	17-93-55			28		
MP-437	17-93-55			398		
MP-437	18-93-55			399		

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

October 30, 2007

Public Utilities Commission
Capitol Building, 1st Floor
500 East Capitol Avenue
Pierre, SD 57501-5070

Re: Intervener Testimony for
Kent Moeckly
Merl Moeckly Co
MMP, INC.

Dear Commissioners:

Please find enclosed one original and one copy of my testimony for the TransCanada/Keystone pipeline matter.

Thank you.

Sincerely,

Kent Moeckly
Box 903
Britton, SD 57430

October 30, 2007

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Public Utilities Commission
Capitol Building, 1st Floor
500 East Capitol Avenue
Pierre, SD 57501-5070

Re: Intervener Testimony for
Kent Moeckly
Merl Moeckly Co
MMP, INC.

Dear Commissioners:

My name is Kent Moeckly. My address is Box 903, Britton, SD 57430. My telephone number is 605-448-2577. I am an officer in the Merl Moeckly Co. and MMP, INC. This testimony is for the formal hearing regarding the TransCanada/Keystone pipeline application.

I am against the granting of a permit to cross this state with a crude oil pipeline. South Dakota has much more to lose in this matter than it stands to gain. The landowners of this state stand to lose incredibly more than they could ever gain. The federal government calls this crude oil pipeline a hazardous liquid pipeline. The federal government has allowed this company to reduce the thickness of the walls of this hazardous liquid pipeline, and to increase the internal pressure of this hazardous liquid pipeline from over 1400 psi to over 1700 psi.

Onlookers are struck by the indifference of our federal and state officials, who instead of coming to the defense of our landowners, threatened by this foreign company, have turned a blind eye and deaf ear to the draconian tactics of this company, against the taxpaying citizens of this state.

Something is so terribly wrong with this whole process and yet it charges forward like a runaway locomotive. South Dakotans historically are reasonable, methodical people, not easily swayed and misled by the smoke and mirrors of snake oil salesmen and the like. Yet we have this project which is being pushed

through our beautiful state with little or no questions by those who are charged with the responsibility to protect this state and the people who live here.

TransCanada has lied to the people of South Dakota by saying the chances of a crude oil leak are insignificant, when the statistics of our own federal government and of a leading Canadian pipeline company are just the opposite. TransCanada's agents have lied to landowners while attempting to obtain signatures on their easements. TransCanada has failed to negotiate with landowners and then sued them in state court under the eminent domain statutes. While all of this is going on, our state officials are looking the other way, instead of challenging TransCanada on their questionable tactics.

The proposed path of this dangerous pipeline is directly through our farm. My family, my friends and I are completely in harms way. It is a tremendous threat to our health, safety and welfare. When this pipeline breaks and leaks crude oil into our environment, all ground water is vulnerable to contamination and destruction. Once our ground water is compromised by this toxic material, our very existence is threatened. TransCanada is perfectly content to have us take this risk. The citizens of this state should never accept such a risk. Not even an energy crisis should force us to accept such a risk. This is a high stakes game and we can not afford to risk our resources, such as our water supplies, among others, to a bunch of money crazed global vagabonds who are pandering to our masses, by offering us a supply of fossil fuel, which is old hazardous technology, and which amounts to a continuation of the business-as-usual mentality of the oil industry.

This pipeline will interfere with the orderly development of this region by its very existence. It will influence and interfere with wind generation projects, which have long been considered by my family for this property. Wind generation is cleaner, safer and environmentally compatible with the land, as opposed to fossil fuel generation, which is a threat to the land and a disaster to the earth's environment.

The easiest part of the valuation issue is to determine the land's value in relation to recent land sales in the locale. TransCanada is avoiding the difficult part of the valuation issue which involves the perpetual risk TransCanada wants the landowner to assume, and the literal loss of productivity on the strip of ground crossed by the pipeline, and the inevitable decrease in land value due to the presence of the pipeline on the property. TransCanada is also avoiding the loss of value due to the land being less desirable to farm because of the threat of crossing

the pipeline and damaging the pipeline with large/heavy agricultural equipment. TransCanada would like to sneak through this state and make huge profits with the transmission of dangerous crude oil, without shouldering up to their responsibility to the landowners, who are an integral part of their plan.

You owe nothing to TransCanada. You owe everything to the people of this state, to the landowners of this state and to the sanctity of this pristine state. Should you decide to choose TransCanada's interests over the interests of the people of South Dakota, you must place the following terms and conditions on any permit issued:

1. A trust account must be funded by TransCanada, which can be used by any damaged landowners, to clean up all oil spills from TransCanada's pipeline.

2. TransCanada must in writing assume all liability and responsibility for any damages caused by the pipeline, to the landowners and any third parties involved in the damages.

3. TransCanada must either bury the pipeline line deeper than 4 feet or accept full responsibility for any farm equipment damage to the pipeline, except for willful and wanton misconduct.

4. TransCanada must, by an officer of the company, personally sign a document with each landowner expressing their commitment to the agreement.

5. TransCanada must pay each landowner an annual stipend to compensate them for the perpetual risk assumed by them.

6. TransCanada must pay the state of South Dakota a fee per barrel of oil transported through the state each year.(Contrasted with the Governor's plan of meagerly accepting six to eight million dollars in property tax revenues which will undoubtedly diminish as time goes on giving the oil company another free ride through our state while landowners continue to be taxed beyond belief.)

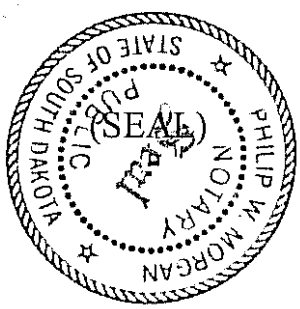
7. TransCanada must agree in writing to obligate any party who purchases or takes control of this pipeline from TransCanada, and further obligates any subsequent parties thereafter.

8. TransCanada must agree to the continuing compensation of all landowners for the decreased productivity of the land crossed.

Anything short of the requirement and inclusion of the above conditions, plus any more you may order of this Canadian company, would amount to a fraud on the people of this state. Your authority and responsibility requires you to protect South Dakota and its citizens. Crude oil pipelines break and damage property. TransCanada's pipeline will break and damage property. We will all look to whom was in power when permits were granted, and whether safeguards were in place to protect our citizens and environment. The populace of this state will not go lightly on anyone deemed irresponsible in this matter. You as commissioners have the power and the obligation to protect our landowners, our water supplies and our environment. Anything less is unacceptable. Our destiny is in your hands. Do not take part in the beginning of the demise of this great state.

Kent Moeckly
Intervener

Subscribed and sworn to before me this 30th day of October, 2007.



(SEAL)

South Dakota Notary Public
My Commission Expires: 8-11-11

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

October 30, 2007

Dear Sirs:

I am writing because of Trans-Canada Pipeline wanting to take my land for a long period of time. It seems that they will not look for a different way to exchange the route so that farmers could farm their land.

If they come on my land, they will have to go thru water two or three different places to put the pipeline in the ground.

They say that there pipeline will not leak oil into the ground but everyone knows that wont happen! The leadgage will go into the land, and then ruin the land, for many years.

If they apply Eminent domain-Condemnation to obtain 50 ft permanent easements plus 60 feet of additional workspace. They offer a small one time payment giving them ownership for 99 years.

The pipeline will leak at some point in time. The petroleum Product will is gotten from Canadian Tar sands and contains arsenic, mercury, and lead among other poisons.

Many feel that pipeline does not meet of public necessity as its sole purpose is to pass through the state.

Eminent domain should not be used!!!

Sincerly
Lynn Cossels
1105 Birchwood Lane
Aberdeen, S.D. 57401

010434

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Before the Public Utilities Commission of the State of South Dakota

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES AC T TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **DIRECT TESTIMONY OF RAYMOND & LILLIAN ANDERSON** **October 31, 2007**

Our names are Raymond and Lillian Anderson. Our home address is 12189 – 415th Avenue, Langford, SD 57454. We operate a cattle and grain farm with headquarters located 4 miles west and 1 mile north of Langford.

Burden of Proof
According to the letter that the PUC sent us on September 19, 2007, TransCanada has the burden to prove that their permit application and project plan complies with state law.

> **SDCL 49-41B-22 Applicant's burden of proof.** The applicant has the burden of proof to establish that:
>
> (1) The proposed facility will comply with all **applicable laws and rules;**
>
> (2) The facility will **not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants** or expected inhabitants in the siting area;
>
> (3) The facility will **not substantially impair the health, safety or welfare of the inhabitants;** and
>
> (4) The facility will **not unduly interfere with the orderly development** of the region with due consideration having been given the views of governing bodies of affected local units of government.

Keystone Pipeline Will NOT Comply With The Following Laws and Rules
OPS -PHMSA Regulations; Title 49, Part 195.6 Unusual Sensitive Areas (USA's)
As used in the part, a USA means a drinking water or ecological resource area that is unusually sensitive to environmental damage from a hazardous liquid pipeline release.

(a) An USA drinking water resource is:

(1) The water intake for a Community Water System (CWSP) or a Non-transient Non-community Water System that obtains it was from a surface water source and does not have an adequate alternative drinking water source;

(2) The Source Water Protection Area for a CWS or NTNCWS that obtains its water supply from a Class I or Class IIA aquifer and does not have an adequate alternate drinking water source. Where state law has not yet identified the SWPA, the Wellhead Protection Areas will be used until the state has identified the SWPA; or

(3) The sole source aquifer recharge area where the sole source aquifer is a karts aquifer in nature.

195.452 Pipeline Integrity management in high consequences areas.

(a) Which pipelines are covered by this section? This section applies to each hazardous liquid pipeline and carbon dioxide pipeline that could affect a high consequence areas, including any pipeline located in a high con sequence area unless the operator effectively demonstrates by risk assessment that he pipeline could not affect the areas.

Class I Aquifer means an aquifer that is surficial or shallow, permeable, and is highly vulnerable to contamination

Appendix C to Part 195

B. The rules requires an operator to include a process in its program for identifying which pipeline segments could affect a high consequence area and to take measure to prevent and mitigate t h consequences of a pipeline failure that could affect a high consequence areas. (See
195.452(f) and (i). (must look to)

(1) Terrain surrounding the pipeline (USGS maps).
(2) Drainage systems such as small streams and other smaller water ways that could serve as a conduit to a high consequence area.
(etc)

Keystone Will Pose a Serious Threat To The Environment and Economic Condition
We are landowners whose land TransCanada proposes to cross. This project, the TransCanada Keystone crude oil pipeline, will be a detriment to our farming operation. It will decrease the value of this quarter (NE ¼ of Sec. 14, T-125-N, R-59-W) crossed as well as the rest of our farm operation. Soil temperature is an important element in crop yield and production. The yields from farmlands crossed by this pipeline area will never be the same with crude oil running in the pipe buried 4 feet below the ground at between 75 and 80 degrees. This is South Dakota and July gets hot and dry. There will be no subsoil moisture left with 75 to 80 degree oil running under the land. Like heated pipe systems installed under concrete floors or shops and homes, the soil will be heated and

dried. Park a car or farm tractor in a shop or garage heated in this fashion and by morning the snow and ice will be melted away and all that will be left is the dirt and grit. So those acres crossed by the pipeline will be home mostly to weeds and pests and we will have to pay the taxes on the land even thought it will not be productive. We know that nothing will grow over that pipeline the way it once did. A corn crop at 150 bushels per acre at $3 equals $450 per acre per year. Even with expenses taken out, that far exceeds what TransCanada Keystone is offering which averages out to $36 per acre per year over the 50 year life of this pipeline. Multiply that loss times 30+ years for the time that my son will be farming this land. TransCanada is not even close to offering fair compensation for what they are ruining. Anytime land is dug up, it never produces what it did originally. TransCanada is sure that they can take our land for a nominal price. That is why they chose not to negotiate with the landowners. Putting in more lines would cause even more damage each time the ground is disturbed. (See Photo Attached – Anderson Exhibit #1
Photo is pipelines in London, Ontario)

There are close to 23 acres of virgin prairie on this quarter of land (NE ¼ Sec. 14 T-125-N, R-59-W). Next to that is a wetland creek which could be disturbed by the pipeline. The creek drains west and north and goes right through other farm operations (See Maps Attached – Anderson Exhibit #2, 3,4,5,6 & 7). An oil leak will most certainly cause damage to our farm and other lands crossed, as well as the aquifer. In our area, there is very little virgin sod left. We have protected this piece of land in Section 14 since 1963 when Raymond purchased this land. There are plants out there that we have never seen anyplace else, including the Prairie Fringed Orchid (*Platanthera praeclara*), native grasses, and the Dakota Skipper (*Hesperia dacotae*) which we understand are on the federal endanger and protected species list. There are many different kinds of birds in the summer that aren't in cultivated fields. The NE ¼ of Section 14 is 135 acres of farmland and 23 acres of native grassland which has never been broken up. Some day the native grasslands may have higher value for the wild plants that grow on it or for organic farming. TransCanada does not take that into consideration in their offer.

We own land 20 miles north that will be within a mile of this line (S ½ of Sec. 13 T-128-N, R-59-W). That increases our chances of being affected by a spill many more times. The water table is even higher up there than it is at our homestead. Unfortunately, it is the same aquifer as the one that we live on so we couldn't even move up there to get water if they ruin the aquifer where we live now. (See Maps Attached – Anderson Exhibit #8 & #9)

There is no need for this pipeline with this type of crude oil. The president has given the car companies 20 years to increase the miles per gallon. That should be mandated right now and we believe that it is possible right now. The only reason that it does not happen is that the oil companies don't want to lose their profits. They are making plans for alternative fuels using field wastes so as not to impact the food supplies. The country and oil companies should invest in alternative fuels such as ethanol, wind generation , and hydrogen, not tar sands oil that is recognized in the oil industry as the bottom of the barrel, the dirtiest of the oils.

Keystone Will Substantially Impair Health, Safety and Welfare of Inhabitants
In most years and we believe every year since 1992, this land has had large amounts of water flow across it. We have snow melt and rain runoff from the hills to the east of us in the spring or in case of large rainfalls. There is more than a 450 feet elevation drop from the Coteau Hills in the east to our property in Section 14, T-125-N,R-59-Wand a 20 foot drop in elevation from this section 14 of land to the slough west of our farm located in S ½ Section 21, T-125-N, R-59-W. (See Maps Attached – Anderson Exhibit # 10 & # 11) This slough has the potential of covering parts of at least seven miles when it is full. To the east is the Crow Creek water shed. The Crow Creek flows into the James River and on to the Missouri River. If there were to be an oil leak of any extent, there is no way of telling how much damage could be done to the rivers of South Dakota. And that in turn damages the water systems of towns along the river south all the way to Huron, Mitchell, Yankton and the Missouri River.

A Canadian website lists the following elements as being found in tar sands crude oil: benzene, toluene, ethybenzene, xylene and other light weight chemical compounds. If the benzene, toluene and these other chemicals should get into our ground water aquifer that our farm and community has relied on for over 100 years, our farm and this rural community would be ruined. We could not operate as we do now. The chemicals found in tar sands oil can cause health problems in livestock and humans according to the Canadian health agency, including mutations and cancer. Any loss of this water could force us to sell our cattle at a large loss of income to our operation. That would take a large part of our income from us as well as Langford, Britton and the surrounding communities that rely on our business. We have eight wells on our farmstead with good water in all of them. It is plentiful, running at about 15 to 30 gallons per minute. It is good, clean water that our livestock thrive on. The aquifer starts anywhere from 4 to 8 feet from the soil surface to the water surface all over our farm. This fact has been confirmed by ground water studies completed by the USGS and the South Dakota Geological Survey in Vermillion, SD.

The potential risk of a spill from this pipeline is great. It is a risk that our farm and our community does not have now. Accidents do happen to even the best plans. But thinner pipe produced from a foreign country isn't that reassuring. It doesn't even have to be TransCanada's fault. That is why they are called accidents. But once the spill has occurred, there is no turning back. The damage is done. The soil and water are ruined for our lifetimes, if not forever.

TransCanada applied for waivers in building this line. Some of those waivers have been approved. How many more have they applied for that we do not know about? They have not been truthful with the citizens of South Dakota. TransCanada plans to install thinner walled pipe and operate it at a higher pressure than other oil pipelines currently operate in the USA. This is of special concern to those of us who live and farm along the pipeline because TransCanada has admitted at public meetings that this will be the first oil pipeline they will have built and operated. TransCanada may have operated natural gas

lines but they have no experience for operating high pressure thin walled crude oil pipelines.

At the four public meetings held by the PUC in June, TransCanada offered no explanation or plans for remedying any type of spill. They say that they will get to that later. How much later? After there is the spill that they say will never happen? How many crude oil pipeline have they built? How many have they run? How long have they run a crude oil line? What is their track record for this kind of pipeline? Others that have been in the business for years have spills all the time. The pipeline industry is trying to expunge those records from public records. Why do you think that would be except to stop people from knowing what is going on. And the only reason that they would do that is because there are more spills than they care to admit to.

Based on information I have received through a Google search and information provided by the Safe Pipelines Organization, this type of crude sand oils is reported to cause three times more greenhouse gases than sweet crude. Could that be why Canada chooses not to refine their own product but would rather ship it down to the USA so we can have this pollution? With what is happening in our world now because of emissions, do we want to cause more problems for our children and grandchildren so that oil companies can reap more profit? There has to be a better way than tar sands oil.

Landowner Relations

TransCanada has shown contempt for the landowners. Of course the ones that signed right away say TransCanada was good to work with because they caused TransCanada no problems. Those that wished to talk to their families or attorneys and those that asked questions or disagreed with their land agents were soon told that they had no rights. That TransCanada had deep pockets and they would walk over us. And it seems that they have. There has been little opposition from the people that are sworn to protect us—our county, state and federal officials. Taxes have been hung in front of our local and state governments. Then right away, there are promises of refunds. TransCanada VP Robert Jones stated in a news story that the $18 million in construction and excise tax could be reduced to $3 million. No farmer or small business or homeowner gets a break like that when we build a new shop, or improve a business building, or shingle the roof. What about a per barrel tax for the state?

Keystone is running advertisements in South Dakota newspapers denying that they are using the threat of eminent domain when talking to farmers. (See Attached Copy of Ad – Anderson Exhibit #12). We have a witness who was in our yard when the land agent came to our home and on the first visit told us …"*You had better take what is offered now or they will take it and you will get nothing. TransCanada has deep pockets and you can't fight them. They can take your land by eminent domain.*" We have names of other land owners who were treated in the same way and have complained to the PUC at public meetings and sent letters and emails, all of which is in the PUC records and on your website. TransCanada is using deceptive, false advertising and it should be stopped.

Eminent Domain

TransCanada violated the trust of South Dakota when they filed condemnation papers on 18 landowners and taxpayers before the PUC held public hearings and before they were granted a permit from the SDPUC or the US Department of State. A PRIVATE company from a FOREIGN COUNTRY is trying to take the land from United States and South Dakota tax payers. They have not negotiated with anyone who did not take their offer. Their land agents make promises and when pressed for more information, state that they really have no power to do so. If TransCanada, a private company from a foreign country, is allowed to take lands by condemnation, then property rights are no longer safe in the United States of America. Under South Dakota law the use of eminent domain (condemnation) is limited to state and local governments, power lines, rural water systems and railroads that provide benefit to the communities they cross. Taking of private land is done only after all other options have been exhausted. Even then, landowners can appeal to local boards and commissions for relief. TransCanada, a private oil company from a foreign company, claims it has the right to use state law to take land for an oil pipeline that provides no direct benefit to anyone in South Dakota. TransCanada land agents threaten landowners with condemnation at the first meeting. There is no negotiation. There is no place to appeal. Read the letters filed with the PUC http://puc.sd.gov/commission/dockets/HydrocarbonPipeline.

Cultural Resources

There has not been sufficient surveying done to protect any relics or our cultural resources from the past. I understand that the Native Americans or SHPO need to do a 100% walking survey to protect their rights. Treaties with the Native Americans in the USA and Canada should be protecting these rights for them. As landowners, we have a right to ask the Department of State and the State Historic Preservation Office (SHPO) to require that a 100% walking survey be done over our entire quarter section of land (NE ¼ Sec. 14, T–125-N, R-59-W) to check for cultural and historical resources before TransCanada is allowed to cross our land. We have sent such a request to these two agencies.

Need & National Interest

TransCanada says their pipe is in the "national interest" and is needed to move Canadian tar sands oil south to Illinois and Texas. Yet, US oil refineries are running at less than full capacity. Canadian oil will compete with US energy supplies, including ethanol and wind energy here in the Midwest. TransCanada provides no direct benefit to South Dakota. Federal and state agencies, like the Fish and Wildlife Service, NRCS, and GF&P refuse to grant easements so the oil pipe can not cross government land or land with government easements. That forces the oil pipeline over on to private farm land. Apparently a high pressure crude oil pipe is in the "National Interest" so long as it is on private land and doesn't cross government lands.

Drinking Water & The Environment

TransCanada claims that they and the SDPUC have "meticulously investigated and reviewed the project from every angle". Not true. The only information the PUC has

seen is what TransCanada has given them. Their paid consultants from Denver and Alberta are not independent experts. They say whatever TransCanada wants them to say. Plans filed with the U. S. State Department and the SDPUC failed to acknowledge that the Keystone oil pipeline would cross 8 rural water systems in South Dakota, shallow aquifers and thousands of farm wells. Under federal law, public water supplies are consider "High Consequence Areas" and must be protected. TransCanada claims their pipe will leak once in 41 years and is no risk to the water supply. Rural water systems and independent groundwater reports say otherwise. Shortly after TransCanada said their pipeline wouldn't leak, pipelines failed and leaked in Minnesota, Kansas and British Columbia, including one operated by TransCanada.

State & Federal Review

If a serious review of this project has been done by any state agency, it has never been released to the public. Alternative pipeline routes through western North Dakota and South Dakota where oil wells are located or installing the pipe in the wide I-29 road ditch were never seriously considered or studied. The Department of Environment and Natural Resources (DENR), GF&P, Health Department, Geological Survey, EPA, and Fish and Wildlife have all been silent. If a farmer installs a 1,000 gallon fuel storage tank, the DENR would review the plans and require containment to protect groundwater and the environment. If it leaks, the farmer will be fined or prosecuted. The TransCanada pipeline will move 28.4 million gallons of crude oil PER DAY through South Dakota (591,000 barrels) through 220 miles of high pressure, thin walled pipe crossing aquifers, wetlands, streams, and hundreds of public and private water lines and our state and federal officials are silent. Risk Management Consultants, DNV, say that a pinhole leak could release 372,000 gallons of oil PER DAY with no review by state agencies. If a farmer drained a wetland, GF&P or USF&W would fine them. If a farmer's oil tanks leak, DENR would issue a fine and enforce the law. Yet TransCanada, a private oil company from a foreign country, is allowed to threaten landowners with condemnation, trespass on private property, dig through wetlands, streams and aquifers, and add a new risk to our environment. Our Governor, PUC, Attorney General, state officials and Congressional Delegation all looked the other way.

Public Information

Documents TransCanada filed with the SDPUC in April in support of their permit application were all stamped **"Confidential"** and not made available to the public. Even the table of contents was confidential. Only after formal complaints were filed by Dakotan's Concerned and others was part of the information made available months later. Those documents that were eventually released were not available until the **Friday before** the public meetings—too late for the 660 people who attended the meeting to review the documents. TransCanada did most of the talking at the four meetings leaving only limited time for questions and pubic input. Landowner lists were never made available by TransCanada. After complaints were filed, a list was released by the PUC but it was loaded with names of adjacent landowners so no on could really tell where the pipeline would go and who was impacted. An updated pipe route map dated June 26th is still not available to the public on the PUC website on Oct 29, 2007, one month before the PUC hearings.

Thinner Pipe Wall

November 17, 2006, TransCanada applied for a "Special Permit" from the federal government pipeline with THINNER PIPE WALL THICKNESS than any other oil pipeline currently operating in the United States. They also asked for permission to run the pipe at a HIGHER OPERATING PRESSURE (11% higher). TransCanada didn't inform the SDPUC or the public until August 23, 2007, almost a year later. Even more remarkable, TransCanada has no track record of operating high pressure crude oil pipelines. Most of TransCanada's experience is with natural gas pipelines which are less likely to spill and damage soil or ground water. When crude oil pipes leak, the oil spreads out into the soil and damages the groundwater aquifers. Thinner walled pipe means greater risk for South Dakota. Allowing a company like TransCanada, with no oil pipeline experience, a permit of that kind is an insult to South Dakota and every state crossed. According to recent news reports, much of the steel pipe that will be installed will be made in China and India. Neither country can provide the level of inspection and quality control that US steel pipe companies offer. China has had problems making toothpaste, dog food and children's toys. The PUC should require that all pipe installed in South Dakota be made in the USA.

I-29 Alternate Route

TransCanada claims "constructing any pipeline along a major highway will put workers at risk, require highway closures, increase safety impacts and costs, hamper development of commercial districts and trade one group of affected landowners for another". Not true. WEB rural water has installed miles of 30 inch and 24 inch pipe in the Highway 12 and Highway 281 road ditches without accident or injury and has operated the pipelines safely for more than 20 years. The State owns the highway road ditch so little if any private lands would be needed. Road access for construction, operation and emergency response would be better than dirt or gravel section line roads. In 2006, TransCanada proposed three pipeline routes that would have used the west ditch of I-29. All three options ran right past Elk Point, SD, the location Hyperion has picked for its Oil Refinery. South Dakota was never included in the decision process on site selection for the pipeline or the refinery. The oil industry in Canada and Texas made the decisions.

Emergency Response

DNV Risk Management consultants say that the thin walled 30 inch, high pressured 1700 psi oil pipeline will fail within the first 5 to 7 years. When that happens, TransCanada wants the oil leak in some remote, back road area and not along a well traveled highway like I-29. It doesn't matter that a 372,000 gallon per day crude oil leak will damage farmland and pollute the water. It doesn't matter that it will be more difficult to get heavy pumper trucks and large equipment to the leak on dirt or gravel section line roads in the fall, winter and spring. It doesn't matter that small town, local volunteer fire departments like Britton, Langford, Carpenter, Iroquois, Freeman, and Alexandria aren't equipped or trained to contain oil spills or fight crude oil fires where the fumes can cause cancer and damage to the lungs and vital organs. It doesn't matter to TransCanada that they are crossing 8 rural water pipeline systems and aquifers which are the water supply

for thousands of South Dakota citizens. What matters to TransCanada, ConocoPhillips, and their investors are profits, annual stock dividends, and the bottom line.

The Aberdeen American News editorial had it right. The oil industry in Texas and Alberta made the decisions. South Dakota had no say. Where are our elected officials? Where are Governor Rounds, the legislature, Attorney General Long, and the SD Congressional Delegation?

In summary, we object to the TransCanada-Keystone Crude Oil Pipeline crossing through our community and our land, we feel threatened by the project and ask that the SDPUC ask TransCanada to move the pipeline to another location, either the west ditch of I-29 or out to western South Dakota and North Dakota where there are oil wells that might be able to make use of it. The speed with which this pipeline is being rushed through our state is alarming. I doubt that Canada would let an American company tear through their states with so little concern for their citizens, their private property, their ground water and their natural resources.

There is an Amish proverb that says **"We don't inherit the land from our ancestors. We borrow it from our children"**. This TransCanada Keystone pipeline will not be a good gift to our next generations.

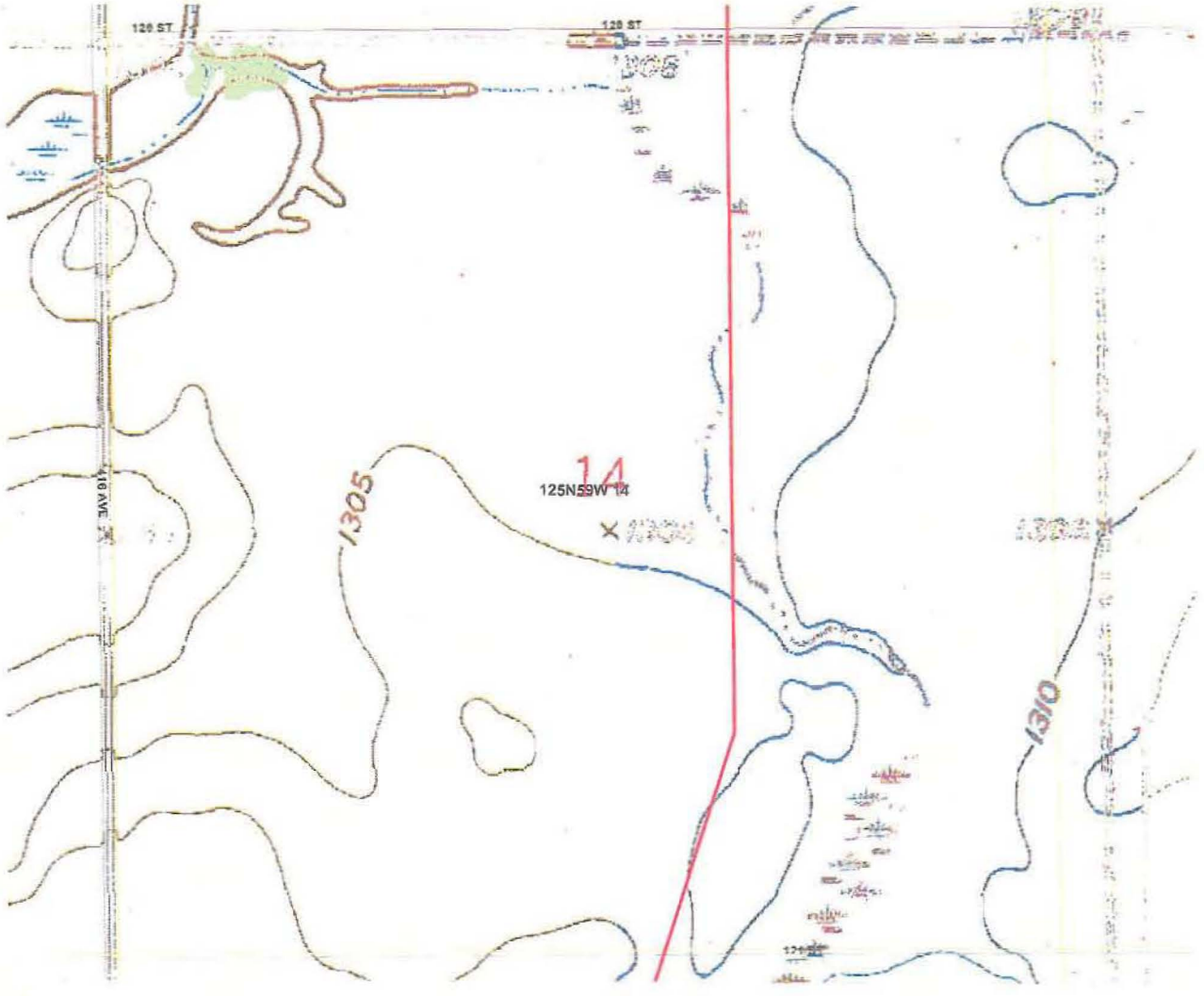
Raymond Anderson
10/31/07

Lillian Anderson
10/31/07

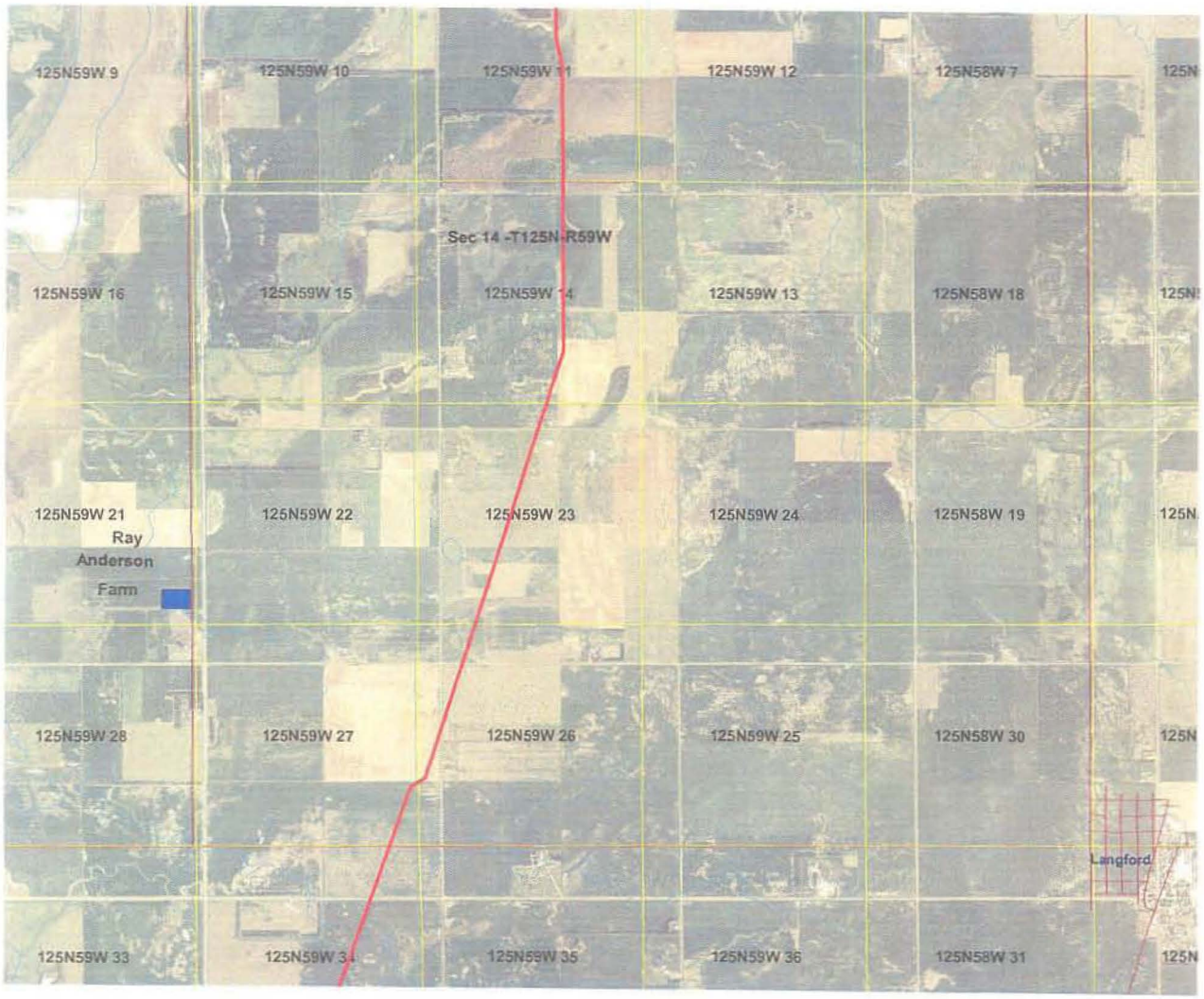
Anderson Exhibit #1

Anderson - Exhibit # 2

Anderson - Exhibit # 3



Anderson - Exhibit # 4



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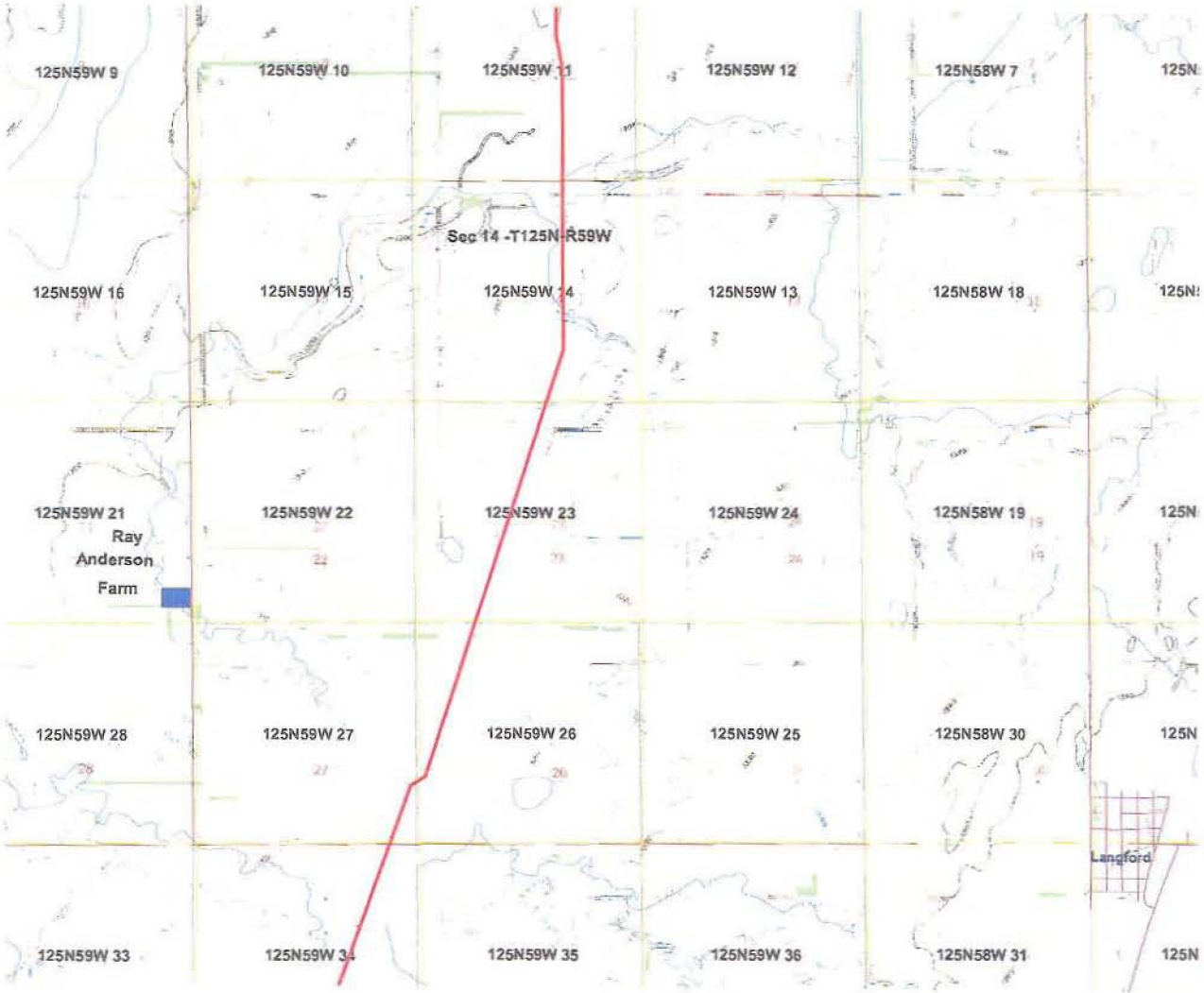
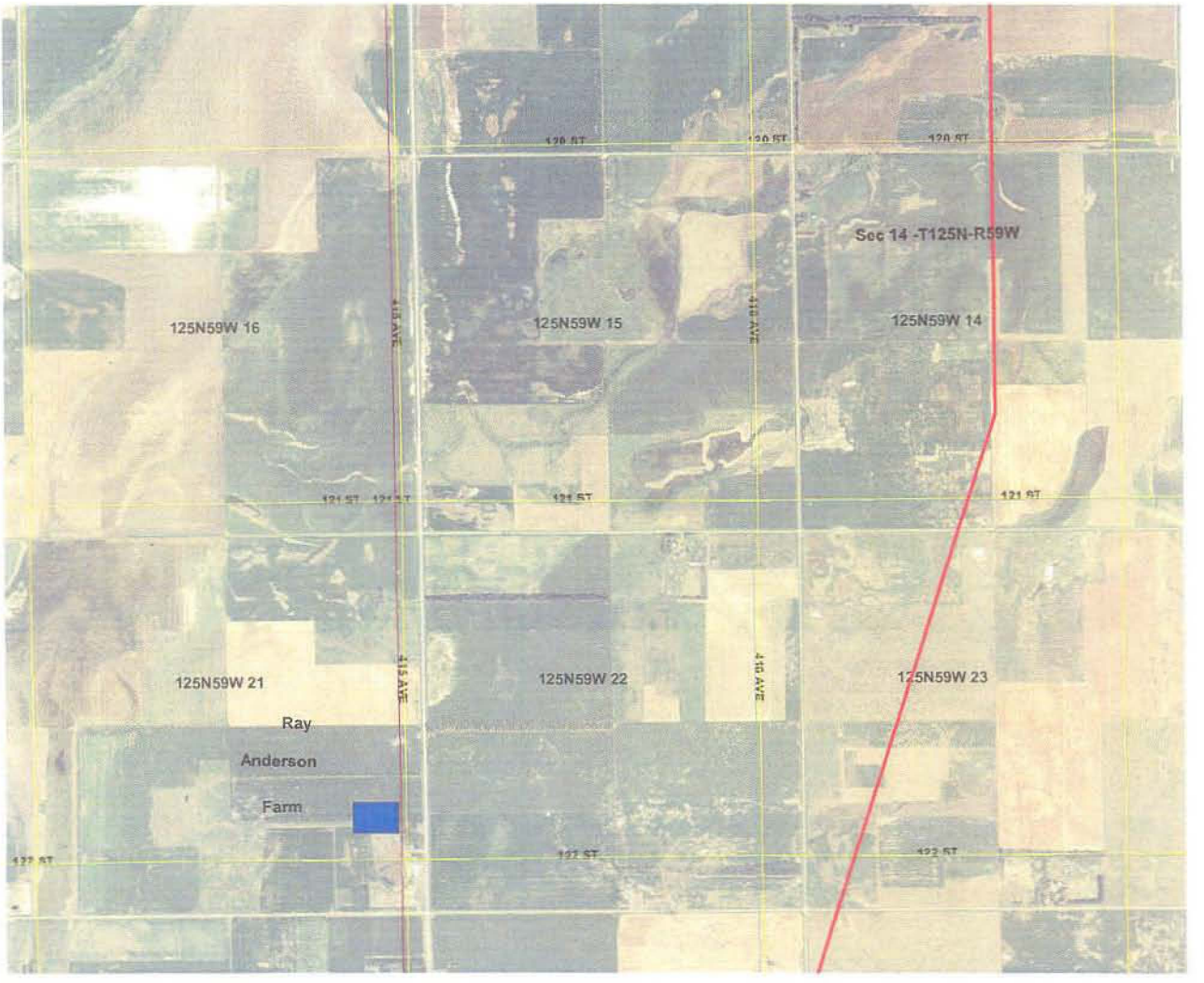
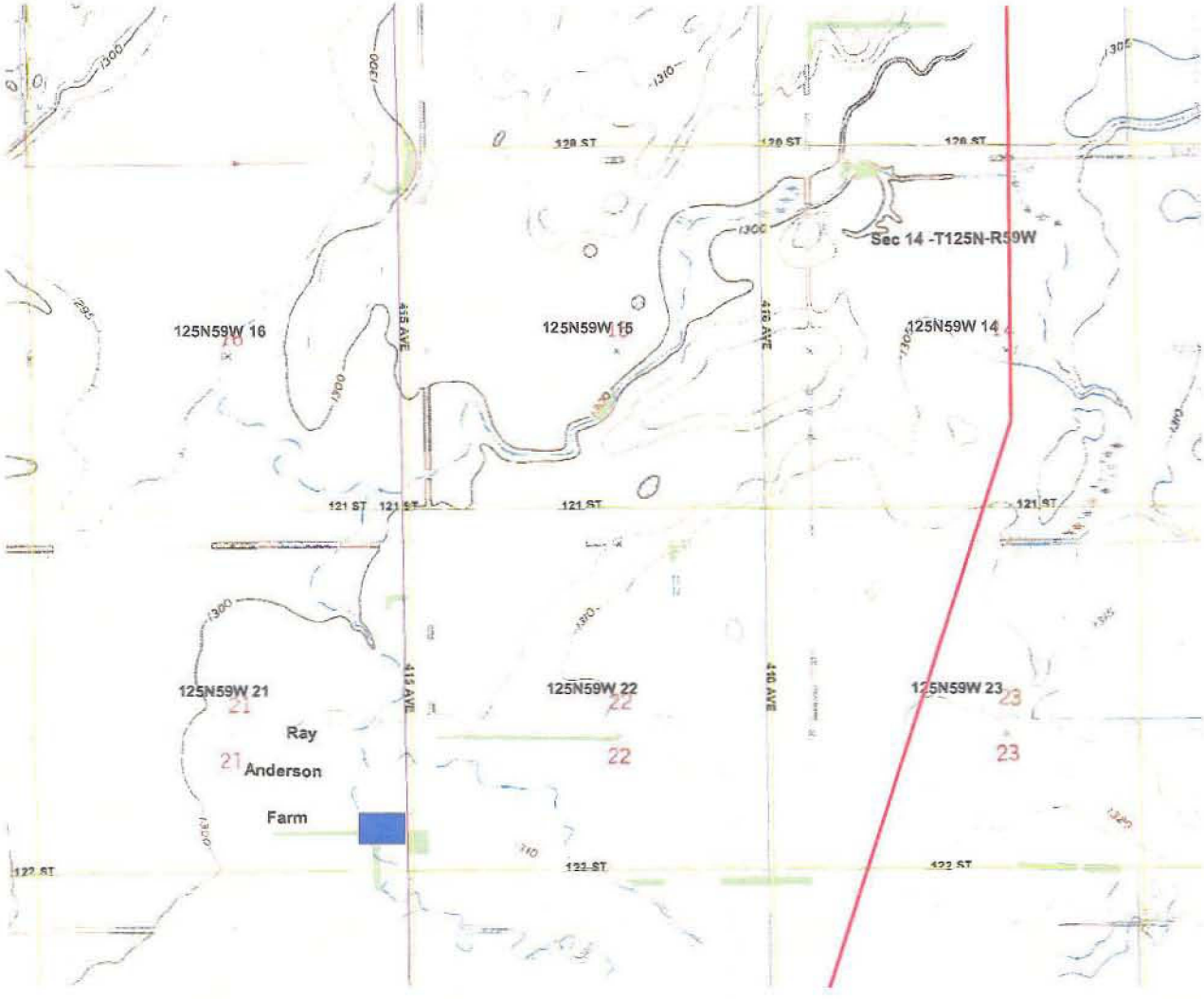


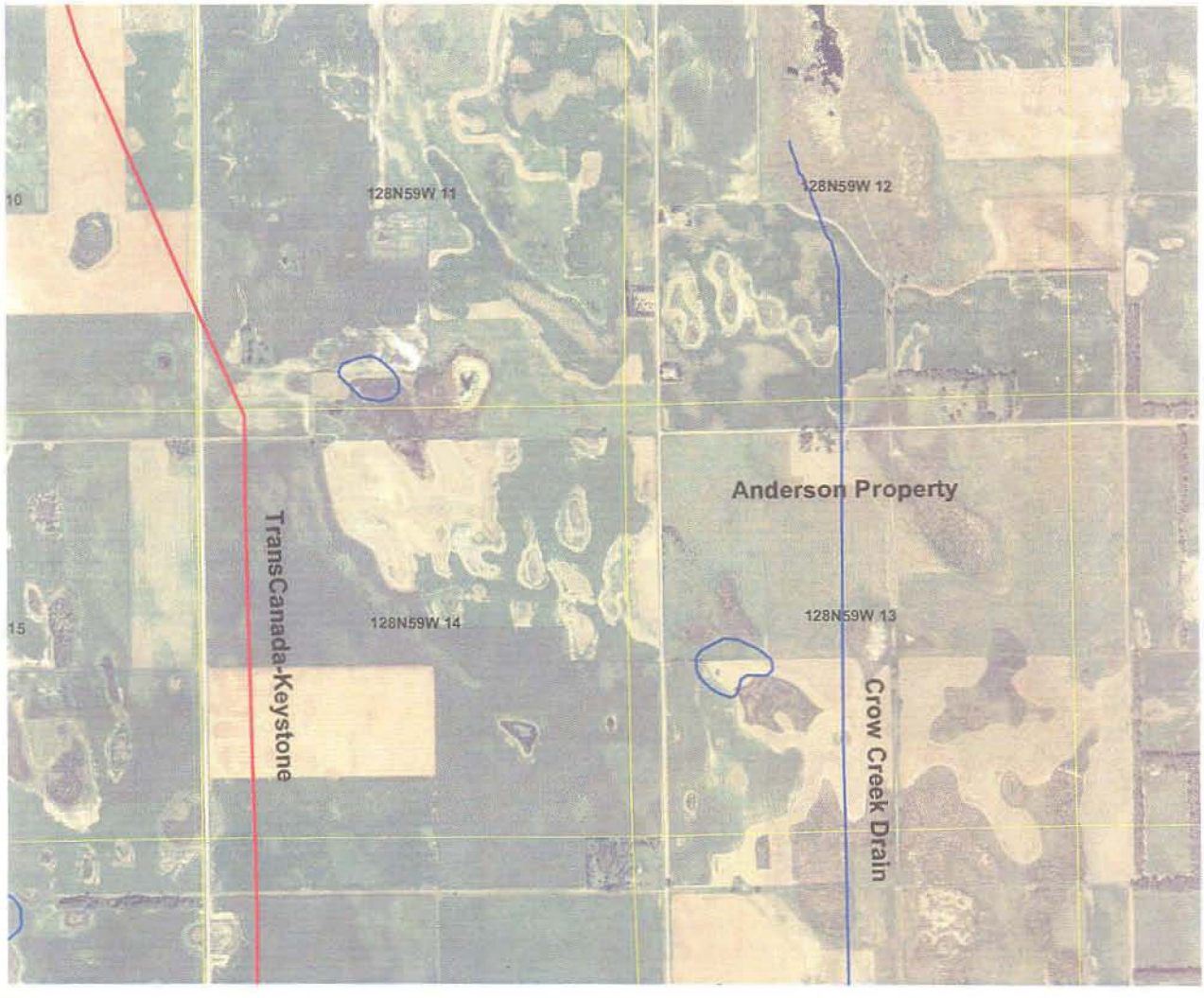
Anderson - Exhibit #6



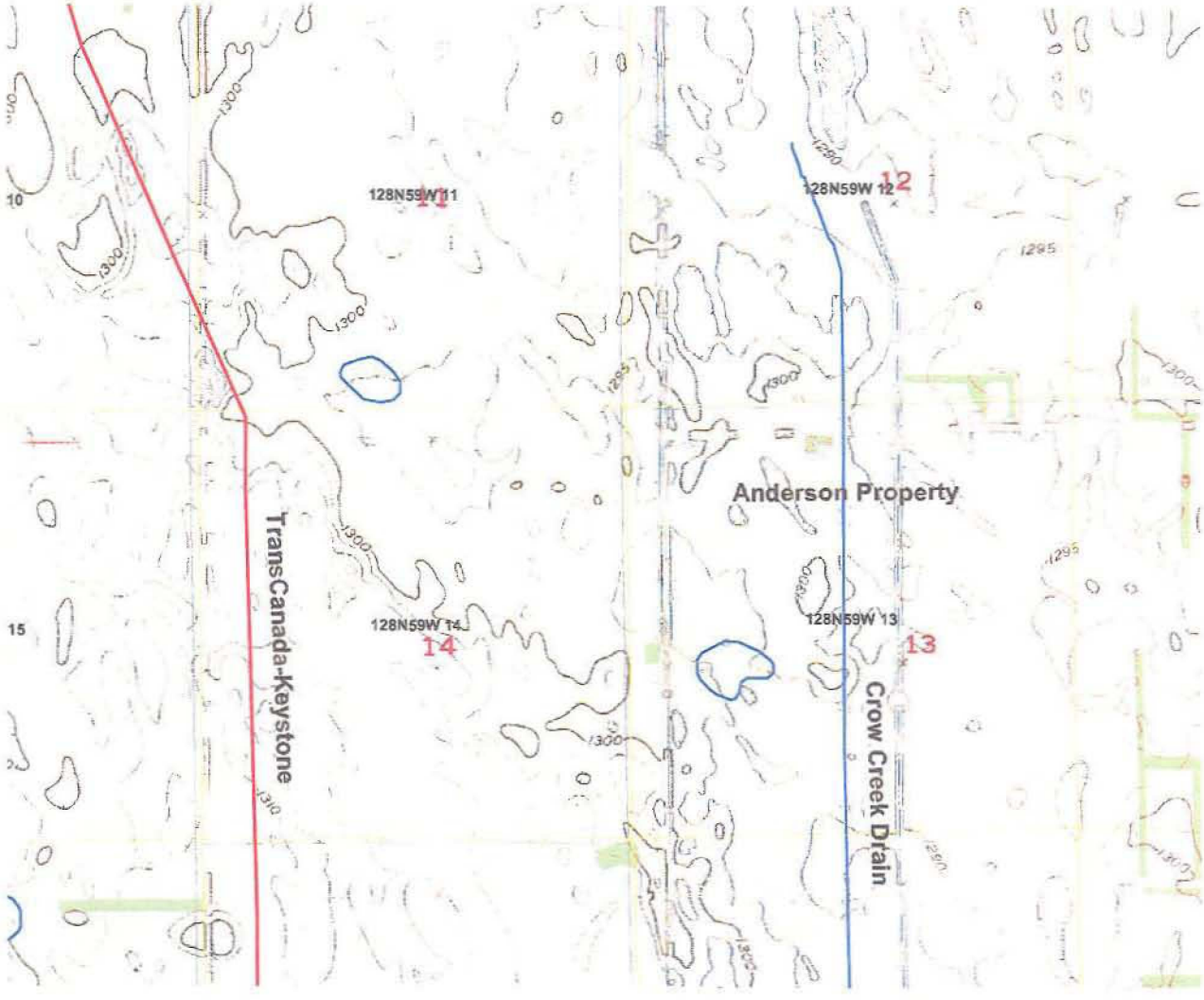
Anderson- Exhibit # 7



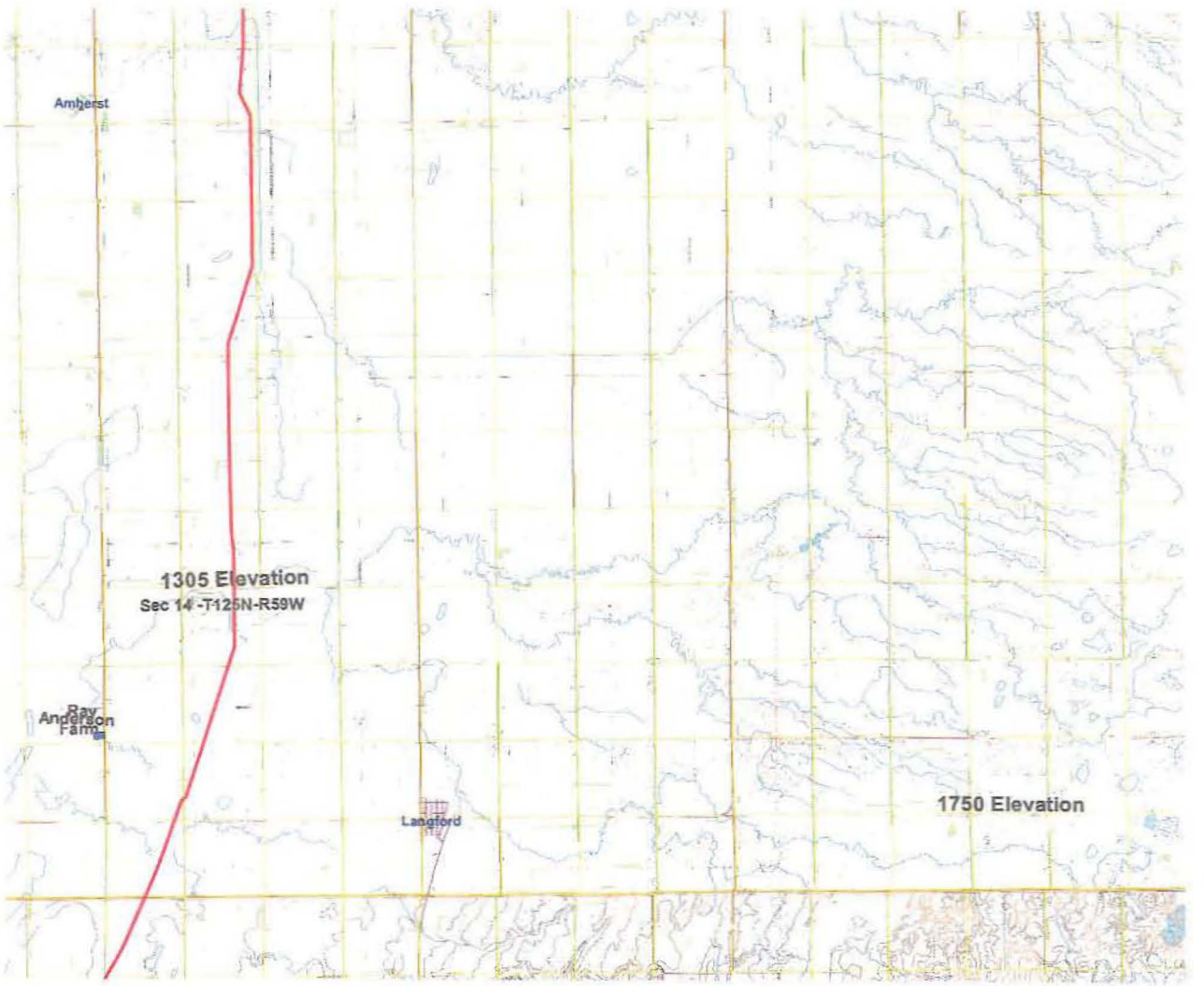
Anderson Exhibit # 8



Anderson - Exhibit # 9



Anderson - Exhibit # 10



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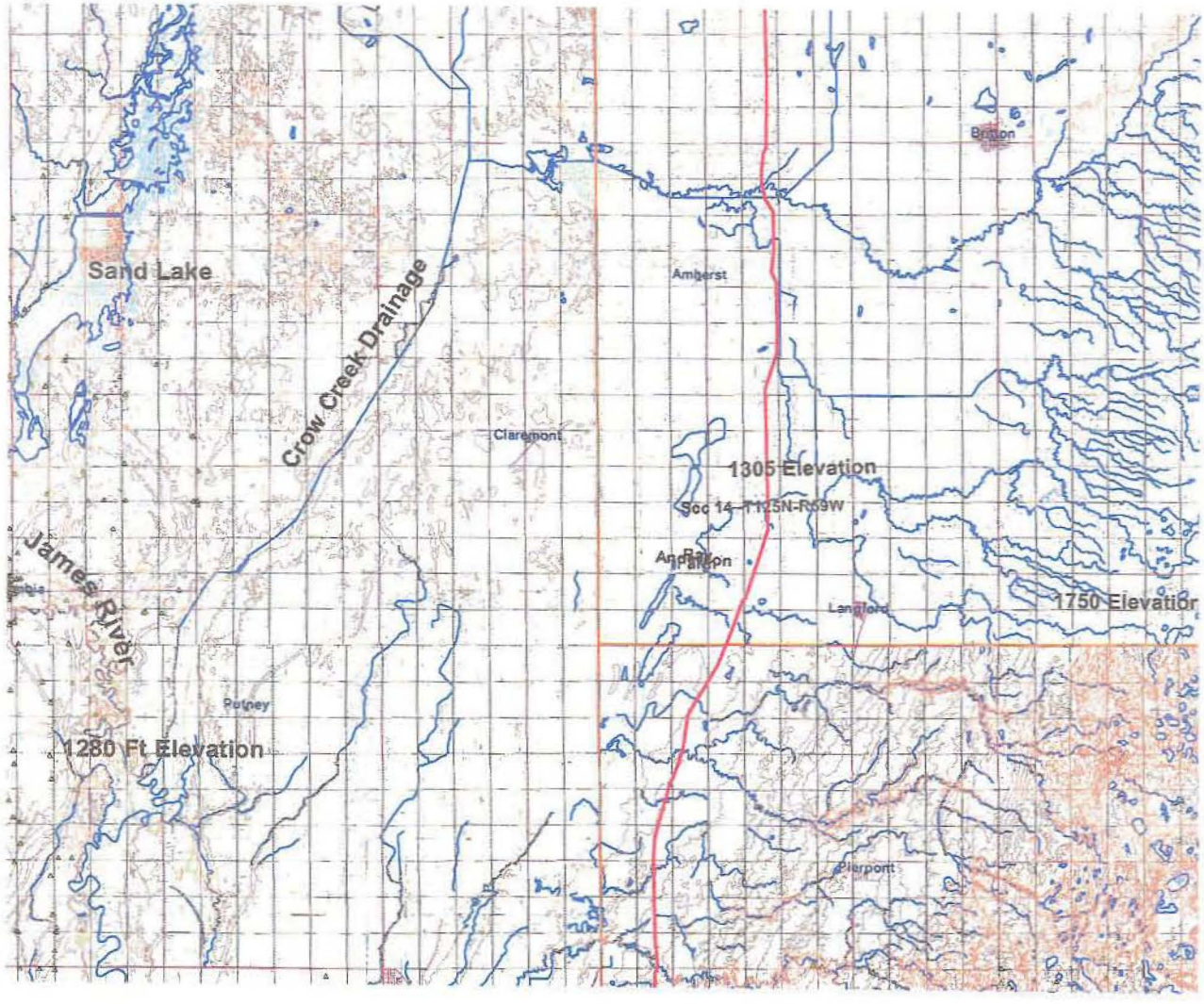


TransCanada's Keystone Pipeline Project

Anderson Exhibit #12

With more than 50 years of experience, TransCanada is a leader in the responsible development and safe operation of pipelines and other major energy infrastructure facilities. The Keystone Pipeline Project is a timely and innovative solution to meet the growing need for energy in the United States. Keystone provides a reliable North American connection between the world's second-largest oil reserve in Canada and existing U.S. refineries.

Keystone: Fact or Fiction

Fiction: Keystone has threatened to take lands from landowners through the use of eminent domain.

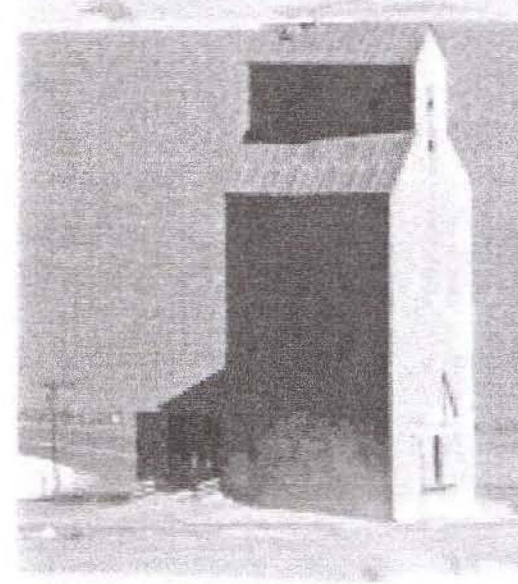
Fact: Keystone is committed to treat landowners respectfully and our preference is to negotiate an easement that meets both the needs of the landowner and Keystone. However, if a landowner asks about eminent domain, Keystone land agents must answer truthfully. State law gives pipelines such as Keystone the ability to secure an easement through a legal process where voluntary agreements with landowners cannot be reached.

Fiction: Landowners won't own the land after Keystone acquires an easement.

Fact: Landowners will continue to own the land on which the pipeline has been buried and will continue to use it for crops, pasture or other purposes. Easements provide Keystone limited rights needed for pipeline construction and safe operation. However, Keystone is making full market value offers as though it were a land purchase.

Keystone and Landowners

TransCanada has relationships with more than 40,000 landowners across a 36,500-mile pipeline network. We recognize and value these important relationships. Our landowner policy on Keystone is simple: treat landowners fairly and honestly and with courtesy and respect. That philosophy is why Keystone has successfully negotiated easements with nearly two-thirds of South Dakota landowners where Keystone plans construction in 2008.



For more information about Keystone and TransCanada or answers to other questions, please visit www.transcanada.com/keystone or call us toll-free at 866.717.7473.

TransCanada
In Business to Deliver

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NOV 0 1 2007
SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

Before the Public Utilities Commission of the State of South Dakota

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES AC T TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	HP 07-001 **DIRECT TESTIMONY OF RAYMOND & LILLIAN ANDERSON** **October 31, 2007**

Our names are Raymond and Lillian Anderson. Our home address is 12189 – 415th Avenue, Langford, SD 57454. We operate a cattle and grain farm with headquarters located 4 miles west and 1 mile north of Langford. This is a continuation of our testimony.

TransCanada says that one of the reasons they have kept certain parts of their permit confidential is to protect environment. We find that very interesting since an eagle nest seemed to disappear from the NE ¼ of Sec.35, T-128-N, R-59-W after their surveying started. We noticed it was missing about then and asked someone who lived just west of this site. He also stated that was when he noticed that it had disappeared.

As I have stated before, this land (NE ¼ of Sec 14, T-125-N, R-59-W) floods. (See Attached Photo – Anderson Exhibit - #13) This was an aerial photo taken in 2003. I have drawn a red line about where TransCanada wishes to put their pipe. Even with this flooding, we raise good crops on this land.

The road that we use to this quarter (NE 1/4 of Sec.14, T-125-N, R-59-W) is a dirt road that is under water in the spring. (See Attached Photo – Anderson Exhibit - #14) There will be nothing left of this road if they drive heavy equipment on it. If it should happen to be in the wet spring or winter with snow, they could not travel this road. Even pickups that drive this road during hunting seasons when there is moisture tear it up.

There is no section road to the east side of the quarter (NE ¼ of Sec. 14, T-125-N, R-59-W) (See Attached Photo – Anderson Exhibit - #15)

The road ditches to the north and west are still full of cattails. (See Attached Photos – Anderson Exhibit - # 16 & # 17)

To the east of this quarter (NE ¼ of Sec. 14, T-125-N, R-59-W) 1 mile is a drainage ditch that is part of the Crow Creek watershed. There is still water in that ditch today this late in the year. In the event of a spill on our land, this would be one of the ways the rivers of South Dakota would be polluted. (See Attached Photo – Anderson Exhibit - #18)

When the water flows to the west, it hits a very large slough that is home to hundreds of thousands of geese and ducks in the spring and fall. Donnell Hanson lives to the west of this slough with his wife and two small children. (See Attached Photos – Anderson Exhibit # 19 & # 20) This is Section 16, T-125-N, R-59-W.

Section 9, T-125-N, R-59-W is the section next to the Hutterite Colony. (See Attached Photos – Anderson Exhibit - #21 & #22) There are approximately 100 people living there now. The water was high enough at one time that their hog confinement operation was in danger of flooding until they built a dike. A spill could cause serious problems for them since this water is very close to their buildings site.

Raymond Anderson
10/31/07

Lillian Anderson
10/31/07

Anderson Exhibit # 13

North

ANDERSON Exhibit #14

HNDERSON Exhibit # 10

HANDERSON Exhibit 16

ANDERSON EXHIBIT - 11

ANDERSON EXHIBIT - 18

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ANDERSON Exhibit #19

ANDERSON Exhibit # 20

ANDERSON Exhibit #21

ANDERSON Exhibit #22

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

18852 415th Ave
Carpenter SD 57322-6808

October 30, 2007

Public Utilities Commissioners
Capitol Building, 1st floor
500 East Capitol Avenue
Pierre, SD 57501-5070

Dear Public Utilities Commissioners:
This letter is for my testimony for the formal hearing of the PUC pertaining to the TRANSCANADA pipeline affecting 680 acres of my land in eastern South Dakota.

I don't think it is fair that a foreign owned company can dictate to my family and me what we must agree to for the routing of their pipeline. At first I didn't think it would be unreasonable. The more contact I had with their representatives the worse it got. They don't seem to care about the future of what could happen.

I am a fourth generation farmer and I take great pride in my families land. My family homesteaded a few miles from here in 1883. This is not just 'land' to a farmer.

A project of this magnitude takes great care and thought. I feel the executives of this project are only thinking of profit, profit, profit. I tried to work with these people as they wanted to put a pump station on my land. I mentioned we would be willing to work out a 100 year lease to assure the land would return to the owner of the surrounding acres. Rather they elected to move the pump station to an area off the main highway that would likely be inaccessible in the winter. This decision alone constitutes that TRANSCANADA puts safety second to profit.

Sincerely,

Kim Madsen
Landowner
(605) 352-7339

010468

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

18852 415th Ave
Carpenter SD 57322-6808

October 30, 2007

Public Utilities Commissioners
Capitol Building, 1st floor
500 East Capitol Avenue
Pierre, SD 57501-5070

Dear Public Utilities Commissioners,
Testimony for FORMAL HEARING concerning TRANSCANADA KEYSTONE PIPELINE.

I stand opposed the building of the Transcanada Keystone Pipeline because TRANSCANADA hasn't convince me that our livelihood couldn't be destroyed by contamination of our land in case of an oil leak. This concerns me, not only for myself but also for future generations. I realize the country needs oil but we have worked hard to maintain and improve the quality of the land so it is possible to produce food for people. This is important also and the proposed pipeline may jeopardize that for us and others.

I feel also that we weren't offered much of a monetary value for the inconveniences they are expecting us to put up with for the rest of our lives.

We simply asked for this company to put these changes in the easement that they want us to sign but they refused to negotiate with us, in fact the gentleman reading our lawyers requests pretty much laughed at them.

Since we can't seem to get anywhere with them on our own, we are at the mercy of the PUC to protect us and other South Dakotans from a catastrophe waiting to happen. Our land is our life, we need it to make a living. Please don't let a foreign company force us to do something we feel this strongly against.

Respectfully,
Valerie Madsen

Valerie Madsen
Landowner

Phone 605-352-7339
email billiemadsen@hotmail.com

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

18902 415th Ave
Carpenter SD 57322
(605)352-2467

October 30, 2007

Public Utilities Commissioners
Capitol Building, 1st floor
500 East Capitol Avenue
Pierre, SD 57501-5070

Dear Public Utilities Commissioners,

This letter is my testimony for the Transcanada pipeline formal hearing.

I am against this project.

I am a 26 year old, 5th generation farmer. I have been actively farming on my family farm since I was 13. My ancestors homesteaded just a few miles away in 1883. This history is important to my family and myself. I have been raised to respect the land and take care of it.

I am concerned that if this pipeline comes through it will someday break and contaminate the soil and the natural springs that are running all around and through Carpenter. I feel that water is way more necessary than oil. Especially when you look at places like those in Georgia where their water is almost depleted. We are looking for ways to use water instead of oil everyday.

I don't know if this is the best place to put this pipeline. Transcanada says they don't want to use the I-29 corridor because they will interfere with more landowners and it will take longer to complete the project. I feel that would be the safest because a leak would be more visible and accessible. They want it out here where they treat us like we are 'nobody' and it don't matter if we have a leak because there aren't very many of us. They can keep a low profile and do anything they want. Transcanada seems to only be worried about profit. They seem to want to rush this project along so they can start raking in the cash. That worries me too, a project like this shouldn't be rushed. When you rush, things happen and I am afraid it is going to happen on South Dakota land. If you make them go by I-29 there will be eyes on them all the time.

Please take my concerns seriously and do what is right for South Dakota and me. Don't let Transcanda walk all over us. I am just trying to take care of my land.

Respectfully,

Kaley John Madsen
Landowner

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NOV 01 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

To: Public Utilities Commission,

From: Jerry J. Burger,
10644 417th Ave.
Britton, SD 57430
Marshall County

I signed up to be an intervener shortly after being presented an easement contract by Trans Canada Keystone. On our first contact their land agent tried to get me to sign the easement without even having a chance to read it. He had a check book in hand if only I would sign. I know the only reason he did not push any harder than he did is we were sitting in the Clerk of Courts office in Marshall County. I told the gentleman that I would not sign anything until I had a chance to read it over and to talk to my lawyer. He wasn't very happy but he agreed to call on me later. He then preceded to call me every other day until I finally told him that I was not going to sign at all. I was then informed that if I did not sign that I would probably get nothing as they would take the land by eminent domain.

I have several Questions that I would like to address to the commission.

1. Why should I accept a one time payment offer of $6,363.00 for a permanent and temporary easement across my 80 acres of land? They would like to use my 3.5 acres for at least 50 years which equates to $6363.00 / 3.5 acres / 50 years = $36.36 per acre per year. Why should I settle for this when I make a $100.00 per acre now with no or very limited risk. I don't have to worry about my property being contaminated beyond use or repair with my renters as they are farmers and know how to treat the land. Also if my renters don't abide by our agreement I can always rent it to someone else.

2. What gives a foreign company from a foreign country the right to come into our state and use the right of eminent domain to take my land that has been in my family for four generations? The company says it negotiates in good faith but there is no give and take if you don't give the land to them then they will take it.

3. According to the easement that Trans Canada asked me to sign, if there was a leak that contaminated my land or my neighbors there is absolutely no recourse for me to recoup the damages from their spill without going to court. Even then if I voluntarily signed this easement I don't think there would be a thing the court could do for me. It sates in paragraph 1 and 8 that the Grantor (on behalf itself and its heirs, assigns, agents, successors in interest and any other person or entity through or under it) does herby release, acquit, waive and forever discharge Grantee and its successors … from all manner of action, causes of action, lawsuits, claims and demands of every kind and nature whatsoever, whether known or unknown… If this is the case and there is a leak who is going to help the land owners?

4. I believe that before a permit is issued that Trans Canada should be required to do several things:

A. Return all previously signed easements. So they can be renegotiated **in good faith** not told to take it or we'll take it from you.

B. Post a cash bond much like Homestake gold mine was required to do.

C. Provide proof of liability insurance coverage naming the state of SD the PUC, counties, any and all water systems that are going to be crossed, along with each and every land owner as additional insured on their policy.

D. Trans Canada should also be charged a fee for each and every barrel of oil pumped through the state. This fee should be posted in a fund for future use to help cover all costs associated with spills, accidents, fires , environmental impacts , clean ups and property damage.

In closing I guess what I really want form the public utilities commission is to do what we as South Dakotans elected you to do. Namely protect us from these overzealous corporations and protect what is rightly ours as citizens of this state.

Sincerely:

Jerry J. Burger

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Official Testimony of:

Chris Hastings
41410 101St
Britton SD 57430

For the Formal Hearing of
The Public Utilities Commission

October29, 2007

My name is Chris Hastings and I am a resident of Dayton Township, Marshall County South Dakota. The proposed Trans-Canada Keystone Pipeline is set to cross my family's land. I am against the construction and use of this proposed pipeline and have the following concerns.

Environmental, Crop and Roadway Damage: First off, the crude oil transported through this pipeline will leave the soil temperature warmer than the surrounding soil, what will happen when every rodent and/or pest within a two mile radius of the warm pipeline decides to burro, dig and live near it? If the ground around the pipeline collapses during normal farming activities who is at fault? If all of the rodents/pests are centered in one area, who is responsible for the crop damage they cause?

The equipment that Trans-Canada has shown in there films is massive, much larger than any of the roads in our county can handle. We have also had a considerable amount of rainfall the last few years and once we have a sink hole, it stays a sink hole. Once Trans-Canada bores through the roadways, then drives their heavy equipment across it, they will be left in despair. It could take years to fix the spots they bore through for their pipe, possibly even having to rip the damaged spots up and starting over. If there equipment is too heavy and leaves hard pans that are rough and washboard, that is the only answer there will be.

In our area, noxious weeds are a big problem. I spend many hours every year trying my best to control them and to keep them from becoming a much larger problem. We also have a very sandy soil, which takes an adequate rainfall to produce lush green grass. In the areas in which Trans-Canada would put their pipe through areas of native grasses, I expect the ground will be left bare when they are finished. Even if they come back and replant the grasses, it will take a lot of moisture and monitoring to get the grasses back to where they were. I guarantee the first thing to grow back in those areas is our noxious weeds, and I doubt whether Trans-Canada will be around to keep this from happening.

Leaks: This is my biggest area of concern. I don't know how I could express this any greater. Pipes leak; in fact anything man made will eventually leak. Last I knew soil plus oil equals disaster. What is going to happen if our soil is contaminated with crude oil? I have no idea how many times I have asked this question and have not gotten a straight answer. I keep getting told that "Our pipes won't leak". That is not a good enough answer for me. Again, anything man made will eventually leak. To top it off just today as I am preparing this document, I read an article which appeared 9-9-07 in the Aberdeen American News that states Trans-Canada will be allowed to use a thinner pipe for the construction of there pipeline in rural areas. Does this make sense to anyone? Why on earth would you take something as dangerous as crude oil and decide to put in a thinner pipe? The only reason I can see is that Trans-Canada thought they needed to have a little more money in there back pocket. So much for the "Good Neighbor Policy".

If the pipeline does break in my area, what is the next step? If a break occurs on the land that I operate and crude oil is shot everywhere, nothing will grow. I have highly erodeable soil in my area. If nothing will grow because of an oil spill, how will I stay in compliance with FSA regulations? How will my family generate an income off of dead land that we will still have to pay taxes on? Will Trans-Canada buy me more land so that I can continue my farming operations?

If an oil spill occurs on our land, it will also contaminate the aquifer that BDM Rural Water Systems relies on for their water. How do you suppose Trans-Canada will get water to the thousands of residents, not to mention the tens of thousands of cattle, that rely on BDM for their water everyday. They claim that "that has never happened", but then again there is a first time for everything.

Trans-Canada is also proposing a pumping station just to the north of our land. How does Trans-Canada propose to protect this area? What would a stray bullet from a hunter do to this area? Or possibly on purpose; have you ever seen what stop signs on some of our back roads look like?

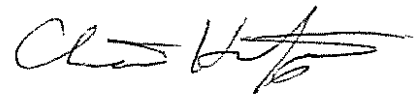
Solution: Trans-Canada has told us time and time again that they are open and willing to negotiate, and the reason for eminent domain is that landowners are not willing to do so. But from my standpoint it has been nothing but a take it or leave it situation. We personally have tried to negotiate with Trans-Canada with issues like having the easement state that only one pipeline may be placed in that easement land. The particular land agent we discussed with said that it would not be a problem and she would have it sent in and changed. When we received the revised easement in the mail, nothing had been changed, it still read "pipeline(s)". So if Trans-Canada cannot change one word of there easement, how is that negotiating? How are we suppose to negotiate with a company who says one thing and does another?

So here is my suggestion. If we absolutely have to have a foreign oil pipe running across prime American soil, we need protection. I propose that Trans-Canada put up one million dollars for every tract of land they cross. That money going to American banks to accrue interest. Once that sum of money has doubled, Trans-Canada can have there principal back. Leaving landowners enough money to clean up an oil spill **when** one occurs. I am sure that to Trans-Canada this would seem absurd, but then that is how landowners feel about having there land taken away through eminent domain by a foreign company wherever and whenever they want.

In closing I would like to again state that I am against any kind of crude oil pipeline running through South Dakota. I think it would be a detrimental mistake for anyone to allow this to happen. Thank you for taking the time to read this document and let my voice be heard.

October29, 2007

Sincerely,



Chris Hastings

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

KIRK J. MAUSER
4464 189th St.
CARPENTER S.D. 57322

To: S.D. Public Utilities Commission.

This letter is for the formal hearing on DEC 3 2007.

I am opposed to TRANSCANADAS proposed pipeline project. THE pipline will come within ½ mile of my RESIDENCE. The underground water level in our AREA is high. My well pit is 4 feet below ground, and every spring or when we have alot of rain 1½ to 2" I have water up to 1' to 2' feet in my pit.

TRANSCANADAS Pump Station for the CARPENTER AREA was going to be put on our land South of CARPENTER. We would not agree to the way they wanted it, so they went ½ South on another persons land. This land has no accessible road to it. How will they get to it in the winter?

I believe we need more time to study TRANSCANADAS proposed PIPELINE.

Kirk Mauser

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SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

Jerauld N. Glanzer
26936 433rd Ave
Bridgewater, SD 57319-5410
605-729-2649

This testimony is for the formal hearing. My response may be treated as if under oath.

I am totally against the TransCanada Keystone pipeline. The proposed route would go through or under the Wolf Creek and the pipeline would be ¼ mile from my farm yards. The Wolf Creek provides water for my cattle from spring until fall and provides water to every pasture between here and the James River 8 miles away. An oil spill would ruin the creek water and very likely my farm wells. Most of my farm income comes from cattle. If I am unable to raise cattle I would expect TransCanada to replace my lost income yearly.

We have rural water in our area. There have been two water breaks by the Wolf Creek and one by the James River in recent years. The most damage water can do is cause a flood, but an oil spill will ruin our water and soil, and as a result, our farming operations. A custom applicator applied too much chemical on 5 acres of my land and it didn't produce

anything for years. How much damage would an oil spill cause on our land?

This proposed pipeline has been stressful for my family and on our health. My son wants to join the family farming operation, but will he decide to throw in the towel if a foreign oil company is creating problems? My wife & I have worked a lifetime to build our farming operation. We don't need TransCanada to come and destroy our life's work.

Our family has owned and operated Hillview farm for over 125 years. My great grandfather, Joseph Glanzer, homesteaded S½NW¼ & SW¼NE¼ of Sec. 14 & SE¼NE¼ of Sec. 15 Township 100 N, Range 57 W (Pleasant Township in Hutchinson County). He was granted a homestead certificate in 1887 signed by President Grover Cleveland. The certificate states "granted to Joseph Glanzer and his heirs forever". It was not given to a foreign country then and it is not to be given to a foreign country now.

Jerrold P. Glanzer

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SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Before the Public Utilities Commission of The State of South Dakota

Testimony of Ben Grote

B Grote

Concerning the proposed Keystone oil pipe line and the Environmental Impact Statement for the proposed Keystone pipeline.

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Submitted on October 31, 2007

010480

Burden of Proof

Under South Dakota law, the applicant in this case, TransCanada, has the burden of proof as stated in SDCL 49;

> **SDCL 49-41B-22 Applicant's burden of proof. The applicant has the burden of proof to establish that:**

(1) The proposed facility will comply with all applicable laws and rules;

(2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the sitting area;

(3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and

(4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

I Ben Grote will Insert either *(1),(2),(3),(4)* or a combination of the numbered sections as stated in SDCL49 after some of but not all of stated facts concerns and or questions where I see relevance to issues where burden of proof needs to be established.

Mutations

It should be proven that when a leak does occur, the chemicals that are released into the environment will not cause mutagenic effects to plant life *(2)*, especially hereditable mutations which would quickly spread beyond the original site where it first occurred. This threat is not specific to the land owners that the chemicals come in direct contact with. A genetic mutation can quickly reach far beyond the locality in which it first occurred through reproduction and is, as far as current science and technology stand, impossible to control beyond the second generation. If a leak of any size were to occur, the detection of any mutation would have to happen before reproduction for it to be stopped from spreading.

According to the Genetically Engineered Organisms Public Issues Education Projection, the USDA "APHIS has regulatory jurisdiction over the release of new GE plants and microorganisms into the environment *(2)*." Humans genetically engineer seeds and plants and these organisms are studied and approved before taken out of isolation from the lab and introduced to nature. The material contents of the proposed Keystone pipeline are not strictly raw material. It includes? (This information is not available in the EIS.)

Any mutagenic effect caused by these chemicals would not be a natural occurrence in nature and could pose threats of many sorts *(2),(3),(4)*.

For the safety of people and the security of the environment in which they live, the EIS should include an in-depth study on the subject of mutations in life forms caused by the chemicals that will be used in the keystone pipeline *(2),(3),(4)*.

The risks of an accidental human caused mutation having negative effects on the environment are more or less the same as a genetically engineered organism (depending on the specific risk.)

The International Society of Environmental Botanists Enviro news, Vo. 10 No.3-July 2004-Environmental Impact of Genetically Engineered Crops list the risks as

- Increased invasiveness *(2),(3),(4)*.
- Development of new more virulent strains of viruses on transgenic virus resistant plants *(2),(3),(4)*.
- Effect of toxic, transgenic products from insect and pathogen resistant plants on non-target organisms *(2),(3),(4)*.
- Overcoming the resistance mechanism of the transgenic by insect pest leading to more virulent insect biotypes *(2),(3),(4)*.
- Transfer of antibiotic resistance genes, used a selectable maskers in the process of developing transgenicies to other organisms *(2),(3),(4)*.
- Safety of food items obtained from transgenic crops-allergic reactions *(2),(3), (4)*.
- Gene flow to other crop cultivars, traditional varieties, land races, wild weedy

related species leading to the loss of biodiversity *(2),(3),(4)*.

- Long term effects
- Non-foreseeable effects on ecosystems

"The possibility of the above mentioned risks cannot be ruled out on the basis of scientific knowledge" (not only of GE crops but also of Genetically Mutated life).

There is a possibility that a mutation could occur, such that, if engineered in a lab and analyzed by the USDA, would not be approved.

A mutation caused by the keystone pipeline could poses threats to, the altered organism, the entire species of altered organism, eco systems, farmers, organic farmers *(2),(3),(4)*.

The effects of Keystone pipe line on organic farmers

Organic farmers and consumers around the world have high standards in consumer goods and goods production. The demand for certified organic products is rising *(2)*. **See exhibit 1.**

This rise is not simply a fad or pop culture. It is happening as people become more aware of their own health, their relationship to industry, their relationship to the land and eco friendly production. It is quite likely that this rise in awareness and a rise in demand and production will be a continuous escalating trend.

As an organic gardener and organic consumer, I believe I stand with the majority of

people who share this lifestyle, when I say; I want to know where what I consume comes from. Most of those in the organic industry cater to this desire by proudly sharing with their consumers in detail the entire production and distribution process from seed to store including the state of the land.

I don't know if anyone along the proposed pipeline path is farming organically, but I do know that they have the right to do so on their own land, the land they know and care for.

I don't believe the EIS has addressed the concerns of organic landowners and consumers. The EIS should answer the following questions, address the following concerns and state the following facts:

- Where under the law does the government have the right to repudiate a land owners right to produce organic foods ***(1)***? If the answer to this question is that they don't have this right and that the USDA will certify crops as organic that are grown over this pipeline, then the following question must be answered.
- Where under the law does the government have the right to repudiate a farmer's right to fair competition in the marketplace ***(1)***? Certainly most consumers of organic products would be disesteem by the fact that a certified organic product is grown over an oil pipeline. Public perception would devalue the farmer's product and discredit the USDA's certification system. There are other certification systems on which organic consumers can rely.
- If there happens to be a leak what about the neighboring farms? What about their right to farm organically ***(3),(4)***?

- Would all land owners affected be compensated fairly for damages?
- Organic farms are governed by the federal Organic Foods Production Act and the National Organic Program (NOP) standards contained in federal regulations, C.F.R §205 et seq ***(1)***.
- The "MinnCan" was rerouted to avoid harming Organic farms.
- Ecology is integral part of all agriculture. Organic farmers pay close attention to soil composition and the ecology of the land to produce maximum yield, while conserving it for future generations.
- Even a 5 °F increase from normal soil temperature generated from the pipeline will change the soil composition ***(2)***,***(4)***.
- Farmers will need to study changes in soil composition and treat the soil differently along the pipeline path to optimize agricultural production.
- I am concerned the farmers would not be compensated for the efforts required to study the changes in soil composition. I am concerned farmers would not be compensated for the extra labor involved in treating this land differently than it would be treated under normal conditions ***(2)***,***(3)***,***(4)***.
- I am concerned the pipe will break and destroy farms ***(2)***,***(3)***,***(4)***.

On a social economic level, just the potential of an oil leak would render the value of any land seen as potentially vulnerable, worthless to many, certainly not any more valuable to anyone ***(2)***. The influence of this social perception will drive the value of land down tremendously affecting not only the price of land the pipeline routes through but all land that is perceived to be in harms way. This includes property down stream, property over

the aquifer and property tapped into water systems that cross the Keystone pipelines path

No drought prone soils?

It has been stated in the EIS under soils and sediments 3.2 pages 10 and 11 "although decreases in soil moisture content within 3 feet of the pipe center line may occur, no drought-prone soils have been identified along the proposed route." This is either a false statement or a deceptive statement. One way or the other it is an irrelevant statement. Take a look at the drought US monitor Archives and it is obvious drought often occurs along the proposed pipeline path. Take SD, August 14, 2007 as an example. Much of the proposed pipeline path was in moderate to severe drought. **See exhibit 2**

Take a look one year back to July 25, 2006 in the drought monitor archives and again you will find drought. Scan up and down The U.S. along the pipeline path and you will find more droughts. **See exhibit 3**. Look through the archives, again, more droughts.

SD counties along the proposed pipeline path declared in 2006 for drought assistance were Clark, Beadle, Kingsbury, Miner, Hanson, Hutchinson which represent six of the 56 SD counties declared in state of drought. A drought declaration map can be found at http://www.state.sd.us/applications/MV3/DroughTaskForce/idex.htm. **See exhibit 4.** At the same web sight is a letter to the honorable Mike Johanns, Secretary of Agriculture signed by Governor M. Michael Rounds. The letter opens "Dear Secretary Johanns: The State of South Dakota is now in its seventh consecutive year of drought. So far in 2006, late spring killing frost, extreme heat, high winds, hail, insect damage, insufficient

subsoil moisture and significantly below normal precipitation have caused the same conditions that impacted the agricultural industry in portions of South Dakota in 2005 and previous years." **See exhibit 5.**

Note that in this letter, Rounds has indicated insufficient subsoil moisture. There is an inconsistency from Rounds statement to what the EIS states "no drought prone soils have been identified." If there is any truth to the EIS, it either lies in the word identified (in which case no drought study has been done), or in the definition of the word prone which depends on the period of time being observed, which is irrelevant anyways. Time and time again drought hits this land and that is what matters to farmers and affects the crops and all vegetation subject to it.

The EIS states that impacts to agricultural productivity will be addressed by the recommended agricultural impact evaluation and compensation plan. I expect my questions, concerns and statements will be addressed in-depth in this statement. I would like to point out that soil is part of a lot bigger picture than just agricultural and a much more extensive and complete study of it should be included not only in the Agricultural Impact Evaluation but in the EIS.

Effects of heat on soil, the validity of the analysis? And the importance of the reliability of the study!

I question the validity of the analysis of the effects of pipeline operations on winter and

summer soil temperatures along the proposed pipeline route. The analysis must be reported in more detail than has been to have any meaning.

The methodology of the study should be transparent and the data produced should be stated in a scientific and discernable manner.

Data is stated as follows in the EIS "for the lower operating volume soil temperatures at 6 inches depth within 3 feet of the pipeline center line would be elevated by less than 5°F in early March."

- From the given statement it is not perceptible whether the data was taken from the southern US or the northern US or somewhere in between.
- From the given statement, it is not perceptible whether the data was taken from a random day in March, the warmest day in the recorded history of March, the coldest day in the recorded history of March or the average temperature over any given time period in March.

Data produced by analysis on the hottest day in the history of March in the southern US as compared to data produced on the coldest recorded day in the history of March in the northern US would be radically different.

The data should include:

- Temperature of oil at specific bpd
- Thermal conductivity (R value) of the pipeline

- Normal unaffected soil temperature at specific depth
- Soil type
- Ground moisture content in normal unaffected ground
- Ground moisture content in affected ground
- Depth of pipeline
- Temperature of soil at various depths reported in context of all relevant data.

The methodology of the analysis should be reported in full disclosure so that the validity of the study can be discerned.

The importance of the integrity of this study is multifaceted.

- Soil temperature affects many biological and chemical processes.
- Soil temperature affects the decomposition of organic matter ***(2)***.
- Even a small change in soil temperature will change the eco system surrounding the pipeline.
- A change in temperature will force some micro-organisms to migrate away from the heated soil changing the dynamics of the ecology of the area including subsurface and surface life.
- These changes will be suitable for organisms that would otherwise not survive in the area. Over time, non-native organisms will be introduced to the area some of which may be invasive ***(2)***, ***(4)***. Once established, these organisms may adapt to migrate away from the pipeline because of limited affected space ***(2)***, ***(4)***.
- The likelihood of new life being introduced to the area is not limited to micro

organisms but includes bacteria, fungi, worms, insects, plants, etc., any of which could pose a threat to the existing ecology and or agriculture ***(2)***, ***(3)***, ***(4)***.

If the soil temperature is elevated even to a small degree, this process is inevitable to some extent and to a larger extent the higher the elevation in soil temperature ***(2)***, ***(3)***, ***(4)***. The better insulated the pipeline; the less ecology would be changed from its natural state. Evidence of effects of relatively small changes in soil temperature on soil decomposition and composition are seen in the following excerpt of an article published in The European Journal of Soil Biology Volume 42, issue 2, April-June 2006 pages 74-81.(Many other studies can be cited)

The effects of soil temperatures of 5, 10 and 15 °C on the decomposition of Scots pine (*Pinus sylvestris* L.) needles were assessed in a 1-year (360 days) growth chamber experiment. Intact peat cores from two climatically different peatland sites (southern and northern Finland) were used as the incubation environments. Needles were incubated in litter bags beneath the living moss layer, and mass loss and nitrogen (N) concentration were determined at 60-day intervals. The rate of mass loss from the needles over time was clearly lower in the 5 °C treatment than at the higher temperatures. Mass loss was strongly related to the accumulated soil temperature sum. In temperatures higher than 5 °C, mass losses were higher in the northern peat. Also, the limit value of decomposition (asymptotic maximum mass loss) was slightly higher in the northern peat (92%), than in the southern peat (87%). The N concentration increased up to a mass loss of 50–60%, whereupon it decreased, while the amount of N (as a percentage of the original amount) remained unchanged until a mass loss of 50–60%, whereupon it decreased linearly. It

seems that increasing soil temperatures may result in slightly higher rates of needle litter mass loss and consequent N release in northern peat than in southern peat.

From an engineering stand point, I speculate that it is necessary for some heat to be released so that the oil in the pipe does not overheat. It would please many people to see the heat recaptured and converted into energy to power the pump stations or returned to the electrical grid. At very least heat loss should be controlled and not released into the soil.

We should learn from History! We should be building safer not cheeper!

The following is a quote from the book *Cradle to Cradle* by William McDonough and Michael Braungart: "The GDP takes only one measure of progress into account: activity. Economic activity. But what sensible person would call the effect of an oil spill progress? By some accounts, the *Valdez* accident led to the death of more wildlife than any other human-engineered environmental disaster in U.S. history. According to a 1999 government report, only two of the twenty-three animal species affected by the spill recovered. Its impact on fish and wildlife continues today with tumors, genetic damage, and other effect. The spill led to losses of cultural wealth, including five state parks, four state critical-habitat areas, and a state game sanctuary. Important habitats for fish spawning and rearing were damaged, which may have led to the 1993 decimation of the Prince William Sound's Pacific herring population (perhaps because of a viral infection due to oil exposure). The spill took a significant toll on fishermen's income, not to

mention the less measurable effects on morale and emotional health.

The GDP as a measure of progress emerged during an era when natural resources still seemed unlimited and "quality of life" meant high economic standards of living. But if prosperity is judged only by increased economic activity, then car accident, hospital visits, illnesses (such as cancer), and toxic spills are all signs of prosperity. Loss of resources, cultural depletion, negative social and environmental effects, reduction of quality of life—these ills can all be taking place, an entire region can be in decline, yet they are negated by a simplistic economic figure that says economic life is good. Countries all over the world are trying to boost their level of economic activity so they, too, can grab a share of the "progress" that measurements life the GDP propound. But in the race for economic progress, social activity, ecological impact, cultural activity, and long-term effect can be overlooked."

I have driven nearly every road directly parallel and adjacent to the pipeline path photo documenting the road conditions, the landscapes and the wildlife through out Day and Marshall Counties. I have seen where the pipeline would run closely parallel to irrigation ditches and creeks rushing with water. I have seen where the pipeline would run under ponds and sloughs and near a pristine lake. I have seen where the pipeline would cut through untouched grasslands and glacieral hills and valleys. I have seen where the pipeline would cut through family's backyards and farmer's hard worked fields. I can't help but be concerned that these things are being ignored. Reviewing the EIS has only magnified my concerns.

I am all for progress! I realize our need for energy is real but there are other things concerning our well-being at stake. This is why I believe the EIS should be left open for more public and professional input until it is a fair and responsible document which takes the cumulative concerns and knowledge of the people it will affect into serious consideration.

Thank you.

USDA United States Department of Agriculture
Economic Research Service
The Economics of Food, Farming, Natural Resources, and Rural America

Data Sets

Organic Production

Overview

Organic farming has been one of the fastest growing segments of U.S. agriculture for over a decade. The U.S. had under a million acres of certified organic farmland when Congress passed the Organic Foods Production Act of 1990. By the time USDA implemented national organic standards in 2002, certified organic farmland had doubled, and doubled again between 2002 and 2005. Organic livestock sectors have grown even faster. ERS collected data from USDA-accredited State and private certification groups to calculate the extent of certified organic farmland acreage and livestock in the United States. These are presented in 13 tables showing the change in U.S. organic acreage and livestock numbers from 1992 to 2005. Data for 1997 and 2000-2005 are presented by State and commodity. Data for 2000-2005 include the number of certified operations, by State.

Go to the data tables, or read more about organic production below.

In 2005, for the first time, all 50 States in the U.S. had some certified organic farmland. U.S. producers dedicated over 4.0 million acres of farmland—1.7 million acres of cropland and 2.3 million acres of rangeland and pasture—to organic production systems in 2005. California remains the leading State in certified organic cropland, with over 220,000 acres, mostly for fruit and vegetable production. Other top states for certified organic cropland include North Dakota, Montana, Minnesota, Wisconsin, Texas, and Idaho. Over 40 States also had some certified organic rangeland and pasture in 2005, although only 4 states—Alaska, Texas, California and Montana—had more than 100,000 acres. USDA lifted restrictions on organic meat labeling in the late 1990s, and the organic poultry and beef sectors are now expanding rapidly.

Top 10 States, 2005					
Number of certified operations		**Cropland acres**		**Pasture acres**	
California	1,916	California	223,263	Alaska	1,460,000
Wisconsin	580	North Dakota	143,322	Texas	241,353
Washington	527	Montana	126,450	California	137,004
Iowa	453	Minnesota	116,813	Montana	103,433
Minnesota	433	Wisconsin	91,030	Wyoming	66,290
New York	427	Texas	87,124	Colorado	60,766
Vermont	366	Idaho	81,220	North Dakota	37,811
Oregon	317	Kansas	80,180	Wisconsin	31,308
Pennsylvania	308	Nebraska	77,820	Idaho	19,412
Maine	288	Iowa	64,158	Nebraska	17,655
Data for all States and previous years are available here.					

Exh. 6.1
1

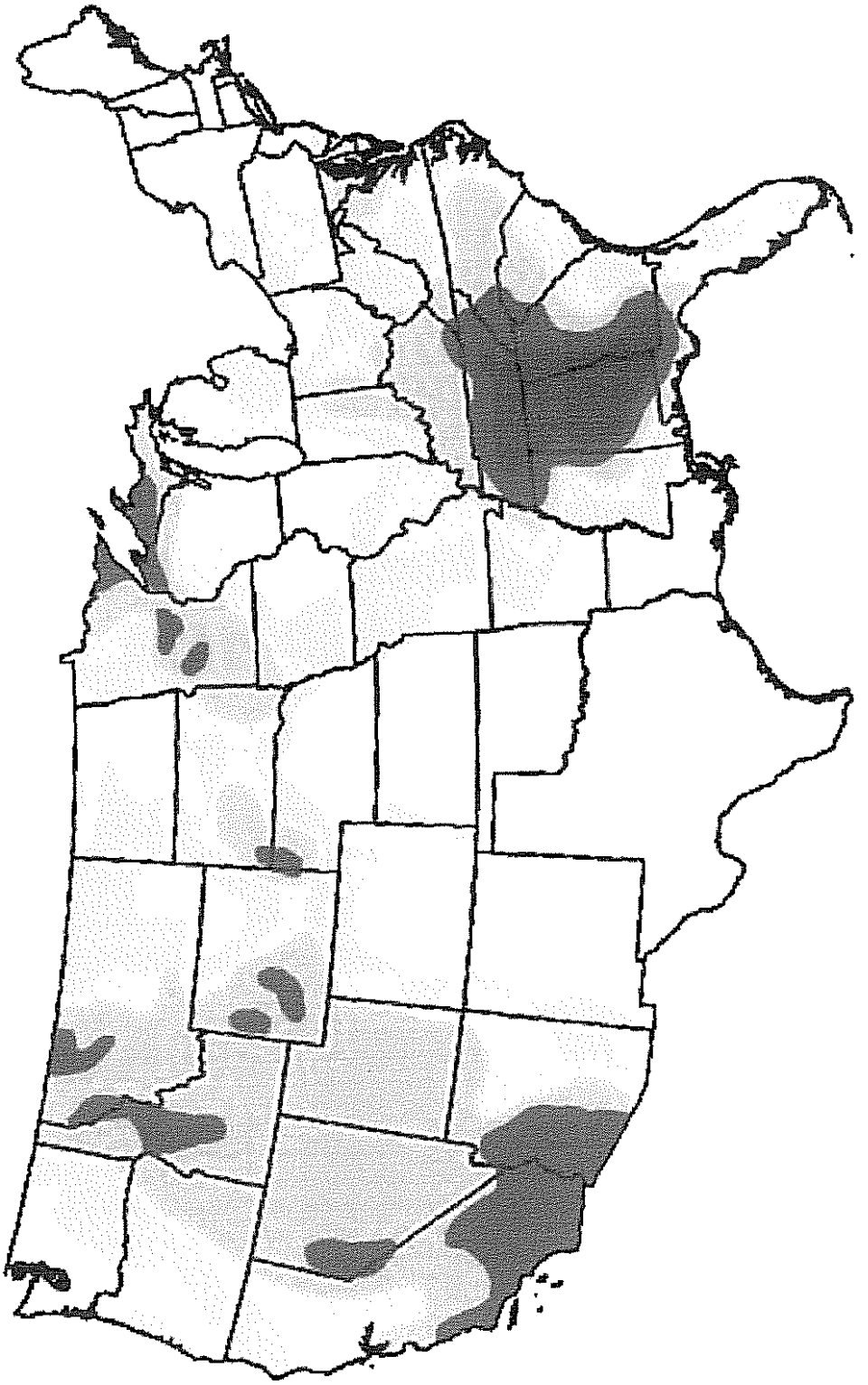
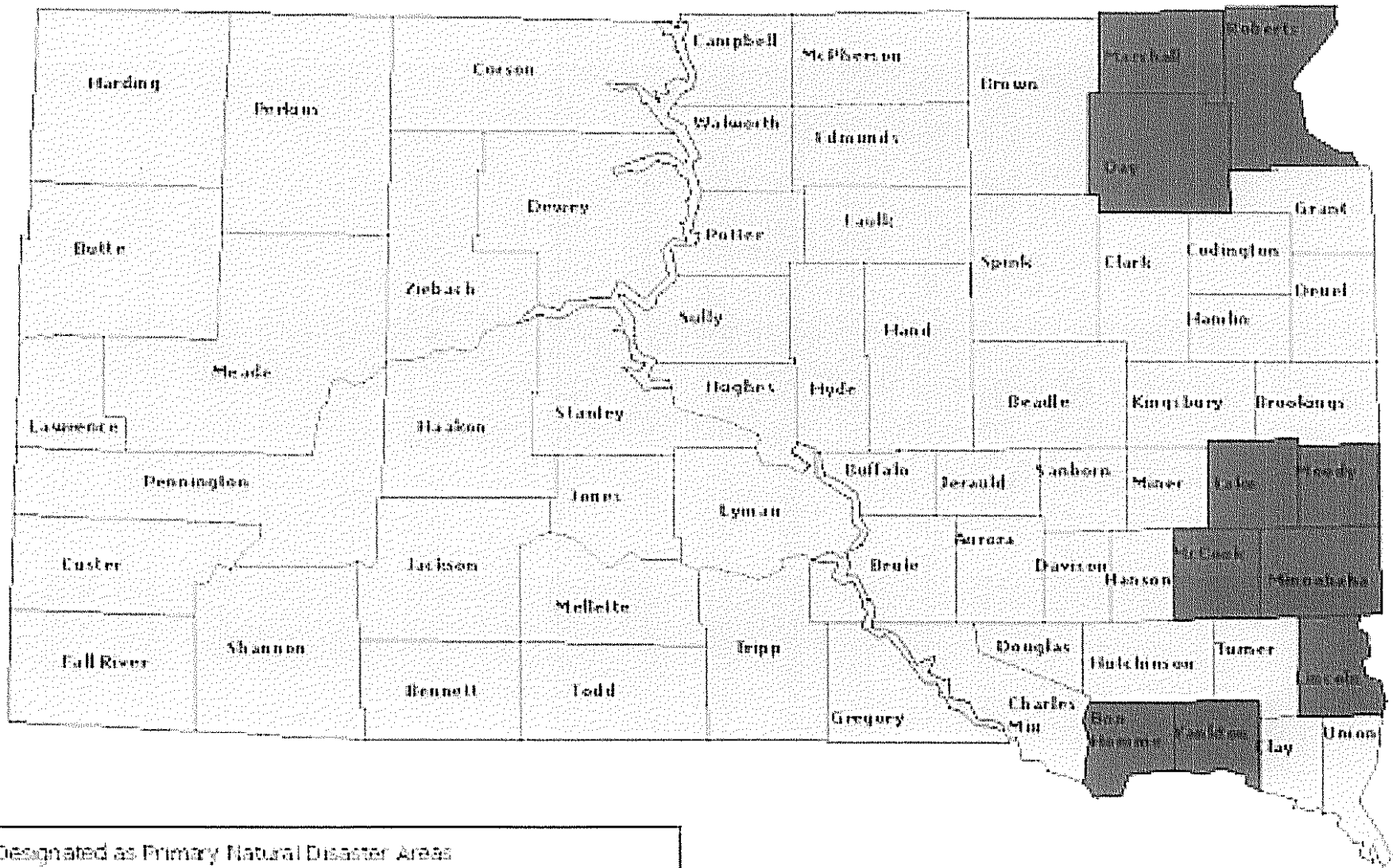

D0 Abnormally Dry
D1 Drought - Moderate
D2 Drought - Severe
D3 Drought - Extreme
D4 Drought - Exceptional

Exhibit 2

010497

Exhibit 2

South Dakota Counties Declared in 2006 by USDA for Drought Assistance



Designated as Primary Natural Disaster Areas

Contiguous

Exhibit 7

South Dakota Office of Emergency Management

December 6, 2006

STATE OF SOUTH DAKOTA
M. MICHAEL ROUNDS, GOVERNOR

June 30, 2006

The Honorable Mike Johanns
Secretary of Agriculture
14th Street and Independence Avenue S.W., Room 200A
Washington, DC 20250

Dear Secretary Johanns:

The state of South Dakota is now in its seventh consecutive year of drought. So far in 2006, late spring killing frost, extreme heat, high winds, hail, insect damage, insufficient subsoil moisture and significantly below normal precipitation have caused the same conditions that impacted the agricultural industry in portions of South Dakota in 2005 and in previous years. This drought has left dams and dugouts dry and aquifers low, which has the potential to produce high selenium concentration threatening the health of livestock. Counties have reported losses of cash crops such as alfalfa, barley, corn, hay, oats, soybeans, sunflowers and wheat, as well as shortages of grass and forage for livestock. All of these conditions have forced farmers and ranchers to begin to reduce their cattle and sheep herds. The conditions continue to bring economic hardships not only to the affected farmers and ranchers, but also to those businesses that depend on farmers and ranchers for their livelihood.

I have received County Disaster Resolutions and United States Department of Agriculture Flash Situation Reports noting the conditions listed above from the counties of Brule, Buffalo, Campbell, Corson, Custer, Dewey, Edmunds, Fall River, Faulk, Hughes, Hyde, Jackson, Jerauld, Jones, Lyman, Meade, Pennington, Perkins, Potter, Stanley, Sully, Walworth and Ziebach. The Flash Situation Reports reflect alfalfa, barley, corn, hay, oats, soybeans, sunflowers and wheat production, rangeland and pastureland losses varying from 30 to 100 percent.

I have also received a County Disaster Resolution and United States Department of Agriculture Flash Situation Report from Turner County as a result of high winds, heavy rain and hail that occurred on June 16, 2006. Turner County reports losses ranging from 50 to 90 percent to cash crops such as corn, soybeans, winter wheat and oats.

010499

Exh. 6.7
5

I am concerned that the agricultural producers in these counties may not be able to continue their family farming and ranching operations next year if assistance is not provided by the United States Department of Agriculture. Therefore, I am requesting that you declare the counties listed above as Secretarial natural disaster areas and make available to these producers all necessary and available assistance.

Sincerely,

M. Michael Rounds

MMR:nkn

cc: Senator Tim Johnson
Senator John Thune
Representative Stephanie Herseth

Enclosures

Ben Grote
710 13th Ave. SW
Aberdeen, SD 57401
605-225-8783

Current employee of Web Water

Past employment:	Granary Rural Cultural Center Nonprofit, Artistic Director
	Grote Roofing Co., Inc., Sheet metal and roofing work
Education:	High School graduate of Roncalli High School, Aberdeen, SD
	Northern State University-studies in fine arts

ARNESON, ISSENHUTH, LEIBEL & PARENT, LLP
ATTORNEYS AT LAW

THOMAS M. ISSENHUTH
JAY M. LEIBEL
PHILIP R. PARENT

205 NORTH EGAN
P.O. BOX 28
MADISON, SOUTH DAKOTA 57042-0028

TELEPHONE NO.
605-256-9161
FAX NO.
605-256-9213

October 31, 2007

RECEIVED
NOV 02 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Public Utilities Commission
Capitol Building, 1st Floor
500 East Capitol Avenue
Pierre, South Dakota 57501-5070

RE: TransCanada Keystone Pipeline

Dear Commissioners:

This letter is submitted to briefly summarize the position our client, South Dakota Association of Towns and Township (SDATAT), would take at the formal hearings to be held in front of the PUC commencing December 3, 2007.

It is the position of SDATAT, an intervenor, that they are neither for nor against the pipeline. Their concern is that if the permit is issued it be granted on the condition they be required to construct it in such a manner as to minimize damage, allow for continued safe passage and maintenance of the township's roads and right-of-ways during construction, operation and maintenance of the pipeline.

ARNESON, ISSENHUTH, LEIBEL & PARENT,

By
Jay M. Leibel

JML/cd

cc: Gail Brock, Executive Director
& Board of Directors

RECEIVED
NOV 0 2 2007
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

October 31, 2007

Chairman Dustin Johnson
Vice Chair Gary Hanson
Commissioner Steve Kolbeck
South Dakota Public Utilities Commission
500 East Capitol Avenue
Pierre SD 57501-5070

Ron Schaeffer
43656 291st St
Menno SD 57045

605-387-5250

Dear Commissioners,

I wish for this letter to be submitted for the formal hearings scheduled for December 3, 2007 concerning the TransCanada Keystone Pipeline.

I applied for party status and should be on file.

I am a farmer in Hutchinson & Yankton County. I live on a county line and farm in both counties. I am on the Township board of Molan Township in Hutchinson County. The proposed pipeline is intended to cross two of my fields immediately across the county line into Yankton County, Jamesville Township, East 1/2 of the NE 1/4 of Section 3 (T96N-R56W) & the West ½ of the NW ¼ of Section 2 (T96N-R56W).

I oppose the current route of the Pipeline. Before I have heard or read any info on it, I have been concerned about the issue of tiling. I have intents to tile both of these fields at some future date. The placement of the tile could be adversely affected by the pipeline. It could make it substantially more expensive to complete the tiling project or make it impossible to do at all. I discussed this briefly with several TransCanada officials at one of the informational meetings. I believe two were friendly and cooperative and the third got quite excited when I asked about having the line placed deeper under my land - siting much greater expense as well as it only being a plan on my part. It did not appear that they would be cooperative on this matter. Currently, the discussions have been more positive with land agents. However, I have not seen this matter in writing yet.

As an expanding crop farmer, I am concerned with area fields which the pipeline crosses and how they may impact tiling. Has the current landowner even considered that tiling might be a future option? Probably not. My current tiling plans could very well be affected by the depth of the pipeline in the neighbors field!

Also, before reading any opposing information, I am greatly concerned about the excavation for the pipeline. I have had a 16 to 20 inch waterline placed under my land and landlords land. The agreement was for them to restore all drainage to the original condition. First off, it is very difficult with more dirt coming out of the hole than going back in. The extra dirt must be properly placed in the landscape by someone who understands the landscape. I needed to spend significant time (and expense) reconditioning the contour to properly drain the area. The water company also placed a

010503

valve that provides a large obstruction on the surface, permanently causing me to drive around and mow around on my landlord's property (probably without consultation of him or extra compensation). I am not transferring ill will from the waterline company to TransCanada. I only have experience as to the difficulties involved. It takes time for the dirt to settle so that it can be shaped back to the original contour. The black dirt is never fully placed back onto the surface and is mixed with the subsoil or vice versa. In addition, I spent numerous hours picking up trash and rocks (which were exposed) from the project. What about compensation or proper economic reassurance that this will not take place?

I have heard that the ground temperature is warmer in the area of the pipeline due to the friction. Probably the ground will never freeze in this area. This distorts insect cycles, as well as the natural freeze/thaw cycle controlling disease and improving soil structures. The absence of a freeze cycle could allow insects and diseases to over-winter in this area providing early infection of area crops. Currently, many diseases and insects must blow in from the South on a yearly basis. Early infection could cost South Dakota a massive amount in lost crop or increased pesticides. In the cases of drought years, the evaporative moisture loss would be increased substantially over the pipeline. I expect there to be significant yield loss over the pipeline area due to the increased soil temperature. Recently, the land agent has mentioned future yield loss payments to me. However, it is not written in the easement, and he suggested that it wouldn't be.

I understand that the current easements do not free the landowner from liability. I am concerned at the risk of placing tile in the field and potentially for damage to the pipeline. If there was even a touch of a dent in the line, it could place my tile contractor or me at risk. Will I even be able to get a tile plow operator to enter my field? I think it could be rather difficult! There is no easement payment that is large enough for me to take on liability for soil contamination of a neighbor and no payment that is large enough that would encourage me to risk contamination my own fields.
I feel at a loss to negotiate an easement with these people when they have the possibility of condemnation. If I were to sign an easement, I would be motivated by fear of getting nothing rather that what is fair.

One of these fields has been in my family for over 30 years. I take a huge pride in caring for this land as best I can. I don't want to limit myself as to future tiling, I can't have my current drainage distorted, and I can't take any liability for an oil spill. These are risks one should not have to make for a foreign company.

I encourage the board to force the company to consider an alternate route down the I-29 corridor that would be on public land, already unusable for cropland. The effects of the distortions due to excavation in a grass roadway right of way would be far less than in highly productive farmland. I believe the agronomic changes due to the lack of freezing would be far less also. Please consider this. Yes, traffic would temporarily be disrupted, but it would soon be back to normal. The cropland over a pipeline may never be back to normal. Please, take this option.

010504

In the event that the commission grants TransCanada to construct the pipeline on the proposed route, I need an easement that states the promises made by the land agents written in common language that protects me, the landowner. I need it to be clear that I have no liability whatsoever except for intentional damage to the pipeline.

In addition, if the company properly assumes liability, will it have the means to pay. There should be an escrow or a deposit of some kind with the State of South Dakota, with the State monitoring all such problems, especially a break of some kind and the resulting ruined land. I don't want to use legal terms to get a foreign company to do what it promised, neither should any government entity be responsible to clean up after a foreign company.

Respectfully submitted,

Ron Schaeffer

Ron Schaeffer
43656 291st St
Menno SD 57045

Home phone 605-387-5250
Cell phone 605-660-1111

010505

Dustin Johnson, Chair
Gary Hanson, Vice Chair
Steve Kolbeck, Commissioner

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

500 East Capitol Avenue
Pierre, South Dakota 57501-5070
www.puc.sd.gov

Capitol Office
(605) 773-3201
1-866-757-6031 fax

Warehouse
(605) 773-5280
(605) 773-3225 fax

Consumer Hotline
1-800-332-1782

November 7, 2007

Patricia Van Gerpen
500 E. Capitol Ave
Pierre, SD 57501

VIA ELECTRONIC FILING ONLY

Re: Direct Testimony of Leo Sibson

Dear Ms. Van Gerpen:

Mrs. Leo Sibson contacted me today regarding her husband's direct testimony. She and her husband, Leo Sibson, want and intend for his response to Staff's discovery request to also be considered his direct testimony. Had they completely understood the process, they would have made their intentions clear in their October filing of discovery responses. She asked me to please place their discover response on our Website and in the public record. Attached please find the referenced discovery response. Thank you.

Sincerely,

Kara Semmler

RE: Transcanada Keystone Pipeline LP HP07-001

Leo F. Sibson (a)
24586 411th Ave. (b)
Mitchell, SD 57301-5238
(c) - 605-996-8469
(d) none (e) none

Info Request #1 -
" " #2 - Unknown at this time
" " #3 - Yes - W 1/2 of NE 1/4 of Section 20, 106-N, R-57W
" " #4 - Not to my knowledge
" " #5 - (1) unknown (2) don't a spill a threatinjiry? (3) how much is substantially? (4) what about interferance of? (a) layout of land (b) negotiations of easements.
" " #6 - Not sure at present
" " #7 - " " " " do not know land requirements
" " #8 - No witness at present.
" " #9 - No
" " #10 - Unknown at this time. Yes - my own

Document Req # 1 - Yes - Map of proposed location of pipeline.
" " #2 - Enclosed

This Data Request may filed under oath.

PUC - Enclosed the data Request. I find this prefiling confusing. I hope I have responded correctly.

Leo F Sibson

010507
RECEIVED

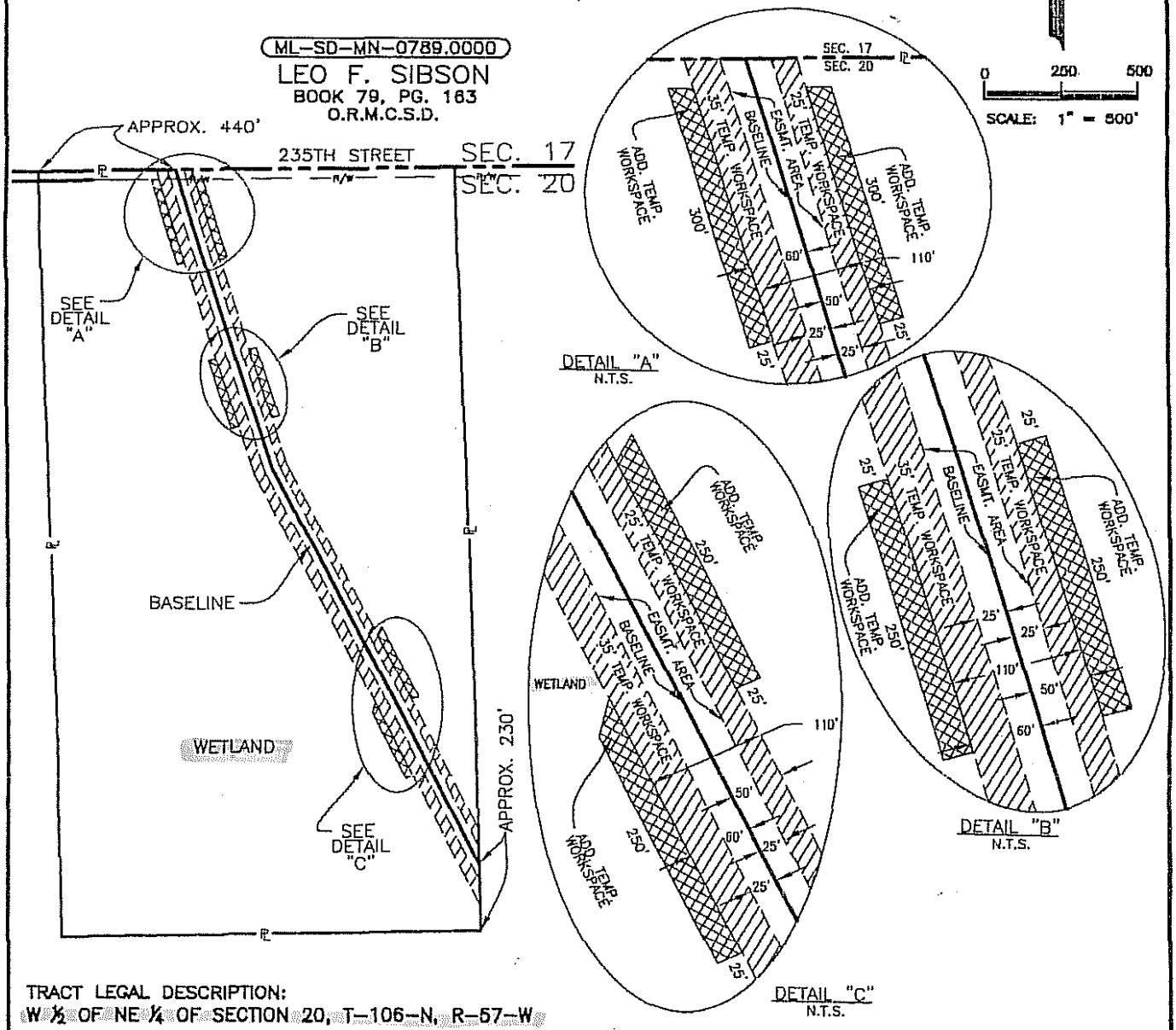
MINER COUNTY, SOUTH DAKOTA

T-106-N, R-57-W, SECTION 20

LEGEND:

P/L	PIPELINE
PG.	PAGE
℄	PROPERTY LINE
ADD.	ADDITIONAL
EASMT.	EASEMENT
APPROX.	APPROXIMATELY
EXIST.	EXISTING
TEMP.	TEMPORARY
SEC.	SECTION

O.R.M.C.S.D. OFFICE OF THE RECORDER OF MINER COUNTY, SOUTH DAKOTA



TRACT LEGAL DESCRIPTION:
W ½ OF NE ¼ OF SECTION 20, T-106-N, R-57-W

TOTAL LENGTH: APPROX. 2,610 FT.
EASEMENT AREA: APPROX. 3.0 ACRES
TEMPORARY WORKSPACE: APPROX. 3.6 ACRES
ADDITIONAL TEMP. WORKSPACE: APPROX. 1.0 ACRES

NOTE:
THIS SKETCH DOES NOT MEET THE MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS. IT WAS NOT DERIVED FROM AN ON THE GROUND SURVEY BUT IS INTENDED FOR RIGHT OF WAY PURPOSES ONLY.

UNIVERSAL ENGRG. SRVS.

NO.	REVISION	DATE
0	BASED ON TITLE	05/14/07
1	APPROVED IN ICC.	05/15/07
2	ISSUED FOR ACQUISITION	05/15/07

TransCanada

KEYSTONE PIPELINE PROJECT

EASEMENT AREA
ACROSS THE PROPERTY OF
LEO F. SIBSON
ML-SD-MN-0789.0000

SCALE	DATE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
1" = 500'	01/09/07	SSH	GTC	ML	K-46-P-7500-1185

PROJECT: 9347.000

EXHIBIT A

Above taken from easement mailed to me. As noted it crosses my property diagonally so the whole 8 0 A. is impacted not just the 7.6A as stated. It could be placed along a fenceline to prevent odd shaped fields. Private landowners concerns have been

010508

Before the Public Utilities Commission
of the State of South Dakota

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	**HP 07-001** **DIRECT TESTIMONY OF Arden D. Davis Ph.D, P.E. November 13, 2007**

Please state your name and address for the record.

Arden D. Davis, Ph.D., P.E., 1014 Milwaukee Street, Rapid City, South Dakota 57701

Please state your professional qualifications and background.

I have been involved in the fields of ground water and environmental contamination since 1978. I hold a B.A. degree in Geology from the University of Minnesota, and M.S. and Ph.D. degrees in Geological Engineering from South Dakota School of Mines and Technology. I am a registered professional engineer in South Dakota (no. 4663). Since 1985 I have taught courses involving ground water, ground-water contamination, geological engineering, and environmental pollution at South Dakota School of Mines and Technology. I have also presented expert witness testimony in numerous cases, and have assisted the State of South Dakota in ground-water contamination problems, including the Williams Pipe Line / Hayward Elementary School site in Sioux Falls.

Have you provided a copy of your resume with your testimony?

Yes

What potential impact could the TransCanada-Keystone Pipeline have on ground water in South Dakota?

The potential effects of a crude-oil leak on ground-water supplies are of paramount concern. The proposed TransCanada-Keystone Pipeline would cross the recharge areas of several large shallow aquifers in eastern South Dakota.

010509

What impact on water quality, public safety and the environment in general would a crude oil leak from the TransCanada-Keystone Pipeline cause?

Crude oil contains aromatic hydrocarbons, including benzene, toluene, ethylbenzene, and xylene.

Benzene is of particular note because it is a carcinogen and its maximum contaminant level (MCL) in drinking water is 5 parts per billion. Benzene is soluble in ground water and can be transported downgradient toward receptors such as private wells and public water-supply wells.

Because of benzene's solubility and its allowable limit of only 5 parts per billion in drinking water, a crude oil pipeline leak could contaminate a large volume of ground water in shallow glacial aquifers of eastern South Dakota.

Have you had experience with other petroleum pipeline leaks and what was the result in your opinion?

Leaks from pipelines have occurred in the past in South Dakota and have threatened ground-water supplies. These include a pipeline leak from Williams Pipe Line Company near water-supply wells for the City of Sioux Falls. A large leak occurred north of the City of Sioux Falls on glacial till near the Big Sioux aquifer. In addition, a gasoline leak from an above-ground storage tank at the Williams Pipe Line facility in Sioux Falls caused serious contamination to a shallow aquifer, took years to clean up, and resulted in considerable cost. The Hayward Elementary School had to be abandoned and relocated. Reports of these leaks are available in the files of the South Dakota Department of Environment and Natural Resources.

TransCanada has stated that leaks on the Keystone Pipeline would be unlikely and that their state-of-the-art monitoring systems will detect leaks and shut the pipeline down so they it can be fixed. Should South Dakota feel reassured by that statement?

The Frequency-Volume Study of Keystone Pipeline Report, (Appendix A), dated May 1, 2006, filed by DNV Consulting as part of the TransCanada permit application indicates on page 19, Table 5-2, that a leak rate of less than 1.5% of pipe volume could go undetected for 90 days for below-ground pipe. At 591,000 barrels per day of pipe volume, 1.5% could represent as much as 8,865 barrels per day or 372,330 gallons per day (591,000 x 1.5% = 8,865 barrels x 42 gallons/barrel = 372,330 gallons).

Page 20, Figure 5-1, of the same report indicates a leak detection and verification time of 138 min (2.3 hours) for a leak rate of 1.5%. The leak rate for this detection time is approximately 200 barrels per hour (BPH) or 8,400 gallons. This potentially could result in a leak of about 19,320 gallons (2.3 hr x 200 barrels/hr x 42 gallons/barrel).

It appears, therefore, that larger volumes of oil could leak over a longer time (e.g., 90 days), if the leak rate is less than 1.5%. A leak of 19,320 gallons or greater could contaminate a large volume of ground-water supplies because of the solubility of crude oil components such as benzene, toluene, ethylbenzene, and xylene. Even a small leak of less than 1.5% located in a remote area, where it could go undetected for days, weeks, or months, would cause serious damage to ground water and drinking water supplies.

Federal rules that regulate the siting, construction, and operation of hazardous liquid pipelines (which include crude oil pipelines) require that areas defined as geologically sensitive High Consequence Areas (HCA's) and Unusually Sensitive Areas (USA's) which include public water supplies, be given special consideration and protection. In your opinion, are there aquifers and ground-water resources in the area being crossed by this project that are geologically sensitive and need protection under state and federal law?

It is my opinion that the proposed pipeline will cross shallow aquifers with ground-water resources that are geologically sensitive. These include ground water that is used for public water supplies. It would be desirable for these areas to have protection under state and federal law.

Regarding down stream transport of an oil spill, TransCanada assumes that any spill would be intercepted five miles downstream of the release location. Based on your experience and knowledge of the area, are there locations or drainages along the pipe route where a spill may be intercepted within 5 miles of the leak?

Based on my experience and knowledge of the area, it appears that there are several locations such as stream drainages, along the pipe route, where oil from a leak could be transported more than five miles downstream from the release location before being intercepted.

What could be done by TransCanada and/or the State of South Dakota to protect against contamination of ground water?

I urge the South Dakota Public Utilities Commission to require TransCanada to explore and consider an alternate route for the proposed TransCanada-Keystone Pipeline that would not cross shallow aquifers. There would be less risk of contamination of ground-water aquifers if the pipeline were routed based on geological information and soils that are less permeable and that are not located over shallow aquifers.

Additional protection such as thicker pipe or a second, outer sheathing for the pipeline also should be considered, along with improved leak-detection systems, and more isolation valves to reduce the amount oil that leaves the pipe in the event of a pipe failure and shut down.

Please state whether you believe the project will pose a threat of serious injury to the environment or the inhabitants within the siting area?

I believe the proposed project will pose a threat of serious injury to the environment and to the social and economic condition of the inhabitants in the siting area. As mentioned earlier, crude oil contains soluble components such as benzene, which can seriously impair ground-water quality in the event of a leak.

Please state whether you believe the project will substantially impair the health, safety and welfare of the inhabitants in the siting area?

I believe the proposed project has the potential to substantially impair the health, safety, and welfare of the inhabitants in the siting area.

Please state whether you believe the project will comply with applicable laws and rules?

I defer to legal and regulatory officials on this question.

Please state whether you believe the project will interfere with the orderly development of the region?

It is my opinion that the proposed project has the potential to interfere with the orderly development of the region, with regard to the possibility that valuable ground-water resources could be contaminated by a leak from the planned pipeline, potentially disrupting public water supplies.

Does this conclude your direct testimony?

Yes.

Would you be available to present testimony and respond to questions on a dated schedule during the formal hearing process set for December 3 to December 14, 2007?

Yes

Date this 13th day of November, 2007.

_____

Arden D. Davis, Ph.D., P.E.

I believe the proposed project will pose a threat of serious injury to the environment and to the social and economic condition of the inhabitants in the siting area. As mentioned earlier, crude oil contains soluble components such as benzene, which can seriously impair ground-water quality in the event of a leak.

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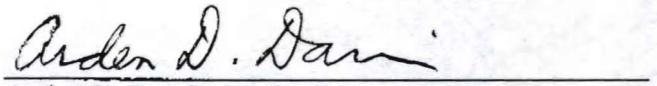

Arden D. Davis, Ph.D., P.E.

Arden D. Davis
Resume

Dr. Davis is a native of Minnesota. He received a B.A. degree in geology from the University of Minnesota and M.S. and Ph.D. degrees in geological engineering from South Dakota School of Mines and Technology.

Dr. Davis currently is Professor in the Department of Geology and Geological Engineering at South Dakota School of Mines and Technology. Since 1982 he has served as Instructor, Assistant Professor, Associate Professor, Professor, and Chairman of the Department of Geology and Geological Engineering. During that time he has worked on digital modeling of ground-water flow as well as transport and dispersion of subsurface contaminants. He teaches courses in ground water, digital modeling of ground-water flow and contaminant transport, ground-water geochemistry, analytical methods in ground water, and geological engineering design.

Dr. Davis is a Registered Professional Engineer in South Dakota. He also is a member of the Society for Mining, Metallurgy, and Exploration (SME). He has served as associate editor and reviewer for the journal of Ground Water, and as a book reviewer for the Bulletin of the Association of Engineering Geologists. He is chairman of the Council of Education and the Accreditation and Curricular Issues Committee of the Society for Mining, Metallurgy, and Exploration. From 2002 to 2007, Dr. Davis served on the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology(ABET). In 2007, he was appointed to the ABET Board of Directors.

During his career at South Dakota School of Mines and Technology, Dr. Davis has worked extensively on ground-water projects and geological engineering site evaluations. He has been an investigator in more than forty funded research projects. As a consultant he has provided expert witness testimony in cases involving environmental contamination and disposal of waste. He also has given technical assistance to the South Dakota Department of Environment and Natural Resources in the review of mining plans and ground-water contamination problems, including Superfund sites.

In his service to South Dakota School of Mines and Technology, Dr. Davis has acted as Geological Engineering Program Coordinator and ABET Coordinator for geological engineering accreditation. This has included revision of the geological engineering curriculum, origination and teaching of new engineering design courses, and preparation of ABET reports. He also is active in ground-water protection efforts, and in 1998 received the Virginia Simpson Award for community service in the Rapid City area. In 2007, he received the Ennenga Award for Excellence in Teaching.

010514

Arden D. Davis

Academic rank:	Professor, Dept. of Geology and Geological Engineering	
Education:	B.A. - 1971	University of Minnesota (Geology)
	M.S. - 1979	South Dakota School of Mines and Technology (Geological Engineering)
	Ph.D.- 1983	South Dakota School of Mines and Technology (Geological Engineering)

Registered Professional Engineer (South Dakota; No. 4663)

Experience:	2006 - present	Professor S.D. School of Mines and Technology
	2002 - 2006	Chairman Dept. of Geology and Geological Engineering S.D. School of Mines and Technology
	1995 - 2002	Professor S.D. School of Mines and Technology
	1989 - 1994	Associate Professor S.D. School of Mines and Technology
	1984 - 1989	Assistant Professor S.D. School of Mines and Technology
	1982	Instructor
	1976-1982	Teaching and Research Assistant
	1978	Shell Development (Shell Oil Company)

Teaching:	Digital Modeling of Ground-Water Flow Systems, Ground Water, Ground-Water Geochemistry, Geochemistry, Analytical Methods in Ground Water, Advanced Ground Water, Engineering Field Geology, Geological Engineering Design Project
Consulting:	Ground-water hydrologist and geological engineering consultant for numerous projects over past twenty-five years involving ground-water contamination, aquifer evaluation, low-level radioactive waste site evaluation, spring-flow measurements, and mine site development.
Funded research:	Projects involving ground-water contamination, ground-water resource evaluation, aquifer vulnerability, water quality, and mine waste.
Community service:	Ground-water protection efforts (see following pages).

010515

Theses: Thirty six M.S. theses and eleven Ph.D. dissertations supervised.

Consulting:

2007	Siting of new Madison wells for public water supplies in the Black Hills.
2006	Modeling of ground-water flow and biodegradation of benzene.
2005	Modeling of ground-water flow and gasoline contamination.
2004	Ethylene dibromide contamination; expert witness.
2003	Alliance of Architects and Engineers; expert witness.
2002	Alliance of Architects and Engineers; expert witness.
2001	Consolidated Engineers & Materials Testing; GeoTek; expert witness.
2000	Hillcrest Spring Water; Rapid City Landfill; expert witness.
1999	Boyd County LLW Monitoring Committee; Gill Landfill modeling.
1998	Boyd County LLW Monitoring Committee; Rapid City Landfill.
1997	Boyd County LLW Monitoring Committee; Terra, Inc., modeling.
1996	Terra, Inc., modeling; Boyd County LLW Monitoring Committee.
1995	Terra, Inc.; modeling for City of Ida Grove, Iowa; Vogel Paint and Wax.
1994	Keystone Gold Project, Keystone, South Dakota.
	Dunbar Resort: proposed railroad grade, Deadwood, South Dakota.
	Vogel Paint and Wax Superfund Site, Maurice, Iowa.
1993	Keystone Gold Project, Keystone, South Dakota.
	Vogel Paint and Wax Superfund Site, Maurice, Iowa.
	Low-level radioactive waste site evaluation and modeling.
1992	City of Rapid City: criteria for private wastewater disposal facilities.
	Nitrate contamination from mine waste.
1991	Corrosion problems during geothermal heating.
1990	Low-level radioactive waste site evaluation.
	South Dakota Department of Environment and Natural Resources: cyanide contamination.
1989	Wastewater facility site evaluation.
	South Dakota Department of Environment and Natural Resources: review of mine plan, northern Black Hills.
1988	Expert witness: gasoline contamination of ground water.
1987	South Dakota Department of Environment and Natural Resources: modeling of gasoline contamination.
	Utility Engineering Company: aquifer test evaluation.
	Gasoline contamination of ground water.
1986	South Dakota Department of Environment and Natural Resources.
1985	South Dakota Department of Environment and Natural Resources: ground-water contamination.
1983	Rosebud Sioux Tribe: aquifer evaluation.
1981	Save Wyoming Water: drawdown calculations.
	South Dakota Public Utilities Commission: aquifer evaluation.
1981	Evans Plunge, Hot Springs, South Dakota: spring discharges.
1979	U.S. Environmental Protection Agency; Engineering Science, Inc.

010516

Community Service:

Assisted City of Rapid City and Pennington County in determining aquifer vulnerability in the Rapid City area. Assisted U.S. Environmental Protection Agency and South Dakota Department of Environment and Natural Resources as member of Technical Advisory Team, Gilt Edge Superfund Site.

Selected Publications:

Davis, A.D., 1986, Deterministic modeling of dispersion in heterogeneous permeable media: Ground Water, v. 24, no. 5, p. 609-615.

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Process and apparatus to reduce the amounts of arsenic in water: Dr. Cathleen J. Webb, Dr. Arden D. Davis, and Dr. David J. Dixon; U.S. Patent Application Serial No. 10/861,586; patent pending. Continuation-in-part filed in 2006.

Related research:

Grainger Prize for Sustainability: HydroTech Engineering and Rohm & Haas (collaboration): Limestone-based arsenic-removal method; selected for Round II of competition. Field tests in Bangladesh and China. Field test planned for Keystone, South Dakota.

Recent Research Funding:

U.S. Geological Survey 104b Grant Program / South Dakota Water Resources Institute: Development of an agglomeration process to increase the efficiency of limestone-based material to remove metals from drinking water: Dr. Arden D. Davis and Dr. David J. Dixon, $10,897.

U.S. Geological Survey 104b Grant Program / South Dakota Water Resources Institute: Fixed-bed adsorption column studies and engineering scale-up design of a limestone-based metals removal technology for small water supply systems: Dr. Arden D. Davis and Dr. David J. Dixon, $12,918.

U.S. Geological Survey 104b Grant Program / South Dakota Water Resources Institute: Leaching tests for encapsulation of waste after arsenic removal from drinking water: Dr. Arden D. Davis, Dr. David J. Dixon, and Dr. M.R. Hansen; $11,873.

U.S. Department of the Interior, National Park Service; Jewel Cave Pumping Test; Dr. Arden D. Davis, Principal Investigator; $8,800.

U.S. Bureau of Land Management: Belle Eldridge Mine Sampling and Monitoring, Phase III, $4,500 (additional); Arden D. Davis, Principal Investigator.

West Dakota Water Development District: Determination of historic ground water pollution problems, Part II: Pactola Dam, Rapid City West, and the North One-Half of Rockerville quadrangles; $9,162; Dr. Alvis L. Lisenbee, Principal Investigator; Dr. Arden D. Davis, Co-Principal Investigator.

West Dakota Water Development District: Aquifer susceptibility study of the Pactola Dam quadrangle, South Dakota: Part II – Precambrian: $9,112; Dr. Alvis L. Lisenbee, Principal Investigator; Dr. Arden D. Davis, Co-Principal Investigator.

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West Dakota Water Development District: Aquifer mapping (1:24,000) of the Hermosa NW quadrangle; $13,538; Dr. Alvis L. Lisenbee, Principal Investigator; Dr. Arden D. Davis and Dr. Larry Dr. Stetler, Co-Principal Investigators.

West Dakota Water Development District: Preliminary aquifer vulnerability and susceptibility study of the Blackhawk quadrangle; $15,988; Dr. Alvis Lisenbee, Principal Investigator; Dr. Arden D. Davis, Co-Principal Investigator.

West Dakota Water Development District: Geologic mapping of the Mt. Rushmore quadrangle, South Dakota; $14,970; Dr. Alvis Lisenbee, Principal Investigator; Dr. Arden D. Davis, Co-Principal Investigator.

West Dakota Water Development District: Aquifer vulnerability study of the Rockerville quadrangle, South Dakota; $14,763; Dr. Alvis Lisenbee, Principal Investigator; Dr. Arden D. Davis, Co-Principal Investigator.

Phase I Small Business Innovation Research Grant, U.S. Environmental Protection Agency, Limestone-Based Material for Arsenic Removal from Drinking Water: Dr. Cathleen J. Webb, Dr. Arden D. Davis, Dr. David J. Dixon, and Dr. Terrence L. Williamson; $100,000.

Phase II Small Business Innovation Research Grant, U.S. Environmental Protection Agency, Limestone-Based Material for Arsenic Removal from Drinking Water: Dr. Cathleen J. Webb, Dr. Arden D. Davis, Dr. David J. Dixon, and Dr. Terrence L. Williamson; $225,000.

National Science Foundation, Statewide Partnership to Support Technology Innovation and Entrepreneurship in South Dakota (PFI), University of South Dakota: Arsenic Removal from Drinking Water; John C. Lofberg, Dr. Arden D. Davis, and Dr. David J. Dixon; $35,826.

010524

Before the Public Utilities Commission
of the State of South Dakota

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	**HP 07-001** **DIRECT TESTIMONY OF Perry H. Rahn Ph.D, PE November 13, 2007**

Geological Factors for the Proposed Keystone Pipeline

by
Perry H. Rahn [1]
1207 11th St.
Rapid City, SD 57701
November 13, 2007

Please state your name and address for the record.

My name is Perry H. Rahn. My address is 1207 11th Street, Rapid City, SD 57701

Please state your professional qualifications and background.

I'm a Professional Engineer and a Certified Professor Geologist. I have a PhD in geology from the Pennsylvania State University (1965) and have taught in the Department of Geology & and Geological Engineering at the South Dakota School of Mines and Technology since 1968. I retired as Professor Emeritus in 1997. I specialized in Ground Water and Engineering Geology.

Have you provided a copy of your resume with your testimony?

Yes

Please provide us with a summary testimony.

This paper was written to evaluate geologic information concerning aquifers in the eastern South Dakota for the South Dakota Public Utilities hearing to be held in December, 2007. This information is relative to the application for a permit (re: the South Dakota Energy Conversion and Transmission Act) to construct the Keystone Pipeline Project by TransCanada.

The proposed pipeline route is shown in Figure 1. The route extends along the eastern side of the James River Valley from Marshall County to Yankton County.

Please provide us with a summary of the geology and aquifers located in the area that would be crossed by the proposed pipeline route.

AQUIFERS

The geology of eastern South Dakota consists of glacial drift and alluvium on top of Cretaceous or Precambrian bedrock.

Till underlies much of eastern South Dakota. These deposits have very low permeability. Barari and Hedges (1985) show, for example, that ^{14}C dates on water in unweathered till are approximately 10,000 years old.

The major aquifers in eastern South Dakota are: (1) glacial outwash and (2) alluvium underlying flood plains. Bedrock aquifers including the Cretaceous Dakota Sandstone also exist in some places. The primary concern relative to a possible oil pipeline break is the near surface aquifers such as alluvium and outwash.

Outwash aquifers consist of fine to very coarse sand and gravel (Hamilton, 1978). There are published hydrogeologic studies that show the location of outwash aquifers near the proposed pipeline route. For example, Koch and Bradford (1978) describe the outwash aquifers that are a water supply for Aberdeen.

Koch (1975) describes the "James aquifer" in Marshall County. This outwash aquifer provides 500 gpm or more to wells. It can be very near the land surface, extending to 200 ft depth in some places (Koch, 1975, Figure 19). Recharge to this outwash is by ground water inflow and by percolation from precipitation.

In Clark County, Altamont Aquifer 2 underlies 630 square miles, and has a depth ranging from 10 ft in the west to 480 ft under the Coteau de Prairie (Hamilton, 1986). Up to 2,000 gpm can be obtained from wells in this aquifer.

Alluvium under flood plains is the primary source of water for Sioux Falls (Koch, 1982) and Brookings. The deposits are typically less than 100 ft thick, but typically are very permeable. Leap (1988) and Rahn (1988) describe the origin of alluvial and glacial deposits in Day County, and their relation to the numerous glacial lakes.

In your professional opinion, what are the potential impacts that could result if the TransCanada-Keystone Pipeline were constructed and operated through eastern South Dakota as proposed?

POTENTIAL IMPACTS FROM THE PROPOSED TRANSCANADA PIPELINE

The proposed pipeline crosses several geologic units in eastern South Dakota. Figure 1 is the state geologic map showing these Quaternary units, including lacustrine deposits in Marshall County, and alluvium and till (ground moraine) in Day, Clark, in Day, Miner, Hanson, McCook, Hutchinson, and Yankton Counties.

The geological map of South Dakota (Martin et al., 2004) can be used to study the potential impacts to ground water caused by a pipeline leak. The map (Figure 1, to be presented at the December hearings) is available on-line; the map used in this study was printed at 1:500,000 scale. There are more detailed geologic maps of some locales, such as Marshall (Koch, 1975), Day (Leap, 1988), and Clark (Hamilton, 1978) Counties. In order to examine the geologic factors involved along the entire pipeline route, this map by Martin et al. (2004) was chosen because is shows the entire route at the same scale with consistent geologic units.

Maps showing the proposed pipeline route and mileposts for the Keystone Pipeline Project are available at the TransCanada website. This proposed oil pipeline would cross the general area served by WEB Water. The WEB Water Development operates a regional water pipeline system to 8,000 homes and 105 towns in this area. WEB Water is currently exploring the use of ground water in glacial drift in Marshall, Day and Clark Counties; this ground water would be used to blend with Missouri River water for use by WEB Water.

The primary factor in assessing the environmental impact to ground water supplies is the possibility of a leak from the pipeline. Alluvium and glacial outwash are highly susceptible to contamination because they are quite permeable. Till, on the other hand, is virtually impermeable.

From the Canadian border to the Missouri River Valley at Yankton, the proposed pipeline crosses 24 different streams where alluvium is extensive enough to be mapped at 1:500,000 scale. Using the geological map by Martin et al. (2004) a total of 17 miles of alluvium would be traversed by a pipeline where it crosses these stream valleys.

An oil leak into these alluvial deposits would not only contaminate the alluvium near the pipeline, but would most likely surface into a nearly stream. In the alluvial aquifer, the contaminants would move slowly downgradient (westerly) into the James River Valley. The contaminants could migrate from alluvium to outwash because the alluvium is hydraulically connected to outwash aquifers. Because outwash and alluvial aquifers are being utilized, these deposits should be considered “geological sensitive” areas. They are “High Consequence Areas” (HCA) and need special protection.

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What impact on water quality, public safety and the environment in general would a crude oil leak from the TransCanada-Keystone Pipeline cause?

An oil leak into these alluvial deposits would not only contaminate the alluvium near the pipeline, but would most likely surface into a nearly stream. In the alluvial aquifer, the contaminants would move slowly downgradient (westerly) into the James River Valley. The contaminants could migrate from alluvium to outwash because the alluvium is hydraulically connected to outwash aquifers. Because outwash and alluvial aquifers are being utilized, these deposits should be considered "geological sensitive" areas. They are "High Consequence Areas" (HCA) and need special protection.

What could be done by TransCanada and/or the State of South Dakota to protect against contamination of ground water?

ALTERNATE ROUTE

It appears that the only alternative route for the Keystone pipeline that has been proposed by TransCanada is along I-29, roughly 40 miles east of the proposed pipeline.

Another alternative route should be studied that would have minimal potential for ground water contamination. If the pipeline were moved about 8 miles to the east of the proposed pipeline, there would no stream crossings where alluvium would be encountered. [See Figure 1 (to be presented at the December hearing).]

This alternative route, along the western edge of the Prairie Coteau, is underlain by lateral and stagnation moraines that are composed of till (Rahn, 1977; Gries, 1996). Due to the extremely low permeability of till, in the event of a pipeline rupture, there would be little opportunity to contaminate permeable alluvial deposits.

After reviewing the information available to you on the TransCanada- Keystone Project, what conclusion have you reached and what recommendation would you offer?

CONCLUSION

I urge the PUC to deny the application by TransCanada until another alternative route is studied. The alternative route that I am proposing is about 8 miles east of the route proposed by TransCanada. The route I am proposing takes into account the geology. It is a vastly superior route because the pipeline would be excavated into glacial till. It would not cross 17 miles of alluvium like the route proposed by TransCanada. Hence, in the event of a leak, the oil would have much less opportunity to contaminate the aquifers.

Does this conclude your direct testimony?

Yes.

Would you be available to present testimony and respond to questions on a dated schedule during the formal hearing process set for December 3 to December 14, 2007?

Yes

Date this 13th day of November, 2007.

_____

Perry H. Rahn, Ph.D, Professional Engineer

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(1) Perry H. Rahn is a Professional Engineer and a Certified Professor Geologist. He has a PhD in geology from the Pennsylvania State University (1965). He taught in the Department of Geology & and Geological Engineering at the South Dakota School of Mines and Technology since 1968. He retired as Professor Emeritus in 1997. He specialized in Ground Water and Engineering Geology.

NORTH DAKOTA
MONTANA
WYOMING
MINNESOTA
NEBRASKA
GEOLOGIC MAP OF
SOUTH DAKOTA

September 11, 2007

VITA

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Education

B.A., (Geology) Lafayette College, 1959
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Ph.D., (Geology) Pennsylvania State University, 1965

Professional Organizations and Honors

1. Fellow, Geological Society of America (Engr. Geol. Div.), 1965 to present.
2. Member, Association of Engineering Geologists, 1965 to present.
3. Member, American Institute of Professional Geologists, 1977 to present (Cert. Prof. Geol. Sci. #3724).
4 Member, South Dakota Academy of Science, 1969 to present.
5. Member, National Society of Professional Engineers, 1980 to present (President, Black Hills Chapter, 1993). [Registered Professional Engineer, #SD 4513]
6. Recipient of Assoc. Engr. Geologists "Claire P. Holdredge Award" for book "Engineering Geology, an Environmental Approach", 1987.
7. Member, Restoration Advisory Board, Ellsworth AFB Superfund Site, 1990-present.
8. Recipient of Eng. Geol. Div., Geol. Soc. Am. "E.B. Burwell, Jr." award for book "Engineering Geology, an Environmental Approach", 1990.
9. "Engineer of the Year" by Black Hills Chapter of S.D. Engr. Soc., 1995.
10. Editorial Board for "Engineering Geology" (% Elsevier Publ. Co., Netherlands), 1995 to present.
11. "Drinking Water Protection" committee, City of Rapid City, 2000 to present.
12. Richard H. Jahns Lecturer, Eng. Geol. Div., Geological Society of America and Association of Engineering Geologists, 2002.
13. Distinguished Practice Award, Association of Engineering Geologists, 2003.

Work Experience

1. Engineering Geologist, Calif. Dept. of Water Resources, Oroville, CA, 1959-61.
2. Assistant Professor, University of Connecticut, Storrs, CT, 1965-68
3. Assistant Professor, S.D. School of Mines and Tech., Rapid City, SD, 1968-70
4. Associate Professor, S.D. School of Mines and Tech., 1970-79
5. Professor, S.D. School of Mines and Tech., 1979-1997.
6. Professor Emeritus, S.D. School of Mines and Tech., 1997-present.

7. Visiting Scientist, Division of Environmental Impact Studies, Argonne National Laboratory, Argonne, Illinois, 1977-78 (15 months)
8. Hydrologist, U.S. Geological Survey, Phoenix, AZ, Summer 1963
9. Visiting Professor, Pennsylvania State University Geology Field Camp, Red Lodge, Montana, Summer 1965
10. Glacial Geologist, Conn. Geological Survey, Middletown, CT, Summer 1967
11. Hydrogeologist, S.D. Geological Survey, Vermillion, SD, Summers 1968-72
12. Geomorphologist, S.D. Remote Sensing Institute, Summers 1973-74
13. Hydrogeologist, S.D. School of Mines & Technology research projects, Summers 1975, 1976, 1979, 1980, 1981, 1984-1993
13. Visiting Professor, Bucknell U., Lewisburg, PA., Spring Semester, 1989
14. Director, Black Hills Nat. Science Field Station, 1995 to 1999.

Publications

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **REBUTTAL TESTIMONY OF L.A. GRAY**

1. State your name and occupation.

A: L.A. Buster Gray, Senior Vice President, Universal ENSCO, Houston, TX.

2. Did you provide direct testimony in this proceeding?

A. Yes

3. In rebuttal, to whose direct testimony are you responding?

A. I am responding to the direct testimonies of Delwin Hofer, and Tim Hofer, Kirk Madsen and Kim Madsen, Ron Schaeffer, the South Dakota Association of Towns and Townships, Tom Janssen and John Muehlhausen.

4. In their testimonies in this matter, Delwin Hofer and Tim Hofer testified regarding a concern about access to farmland during construction. Can you comment on that?

A. Should a landowner be concerned the pipeline construction right of way will block access to his farm to maintain crops or livestock, the landowner should make that issue known to the land agent during easement negotiations. The land agent has a construction restriction binding agreement specifically for issues like this. The land agent documents the issue and this

issue is transferred to a construction line list that is part of the construction contract. During construction, a section of pipe and a whole in the spoil piles will be left open to allow ingress and egress by the landowner. When this pipe section is later installed by a tie in crew, the access point will only be disturbed for a few hours.

5. In his testimony in this matter, Delwin Hofer indicates his concern that the proposed pipe bending will damage the pipe's integrity and coatings. Can you comment?

A. The bending of line pipe is restricted to 1.5 degrees per 2.5 feet of length of line pipe and in accordance with company specifications and federal codes. This bending radius is very small and does not weaken the line pipe at the bend location. Additionally, pipe coatings are manufactured to have elasticity and do not crack under the small field bending angle.

6. In his testimony, Tim Hofer testifies that he has concerns about the return of the farmland to its original condition. Are those concerns addressed by Keystone?

A. Yes, they are addressed. Keystone's Construction Mitigation & Reclamation Plan includes many mitigation steps in order to return the farmer's land to its original production. These include topsoil removal and replacement, compaction of the trench line, decompaction of the working area, and tilling the topsoil after replacement. There are hundreds of thousands of miles of existing pipelines in the U.S. with the largest portion of these miles through rural farm areas in which the pipeline right of way has been restored and agricultural production returned to pre-construction yields. However, should, for whatever reason, Keystone fail to return the farm land to pre-construction agricultural production, Keystone would be liable to work with the landowner to restore the lands further or compensate the landowner for the loss of yield.

7. In their prefiled testimony, Kim Madsen and Kirk Madsen relate that there is no road to the proposed site of Pump Station No. 21 near their farm. Is that so? And if so, what does Keystone propose to address that condition?

A. Pump station 21 has been sited just south of the Madsen property and requires constructing an access road approximately 1,000 feet long, in a westerly direction, from 415th Avenue (a public road).

8. In his testimony, Kirk Madsen states that there is a very high water table in the vicinity of his farm and is concerned about pipeline construction and operation as a result. Can you comment on that?

A. Pipelines are constructed in all types of terrain including across lakes, rivers, wetlands, and lands with high water tables. During design, this will be assessed and, should the pipeline require negative buoyancy to install the pipe and keep it from floating during and immediately after construction, the pipe will be either coated with concrete or concrete or sack weights placed on the pipe to prevent flotation. During construction, heavy equipment will work off of timber mats if necessary to support the considerable weight.

Additionally, during construction, when highly saturated soil conditions are experienced, equipment will work off of timber mats if necessary to support the heavy equipment.

9. In his testimony, Ron Schaeffer testified that his plans to tile land for drainage may be impacted by the construction of the pipeline. Is that the case?

A. Pipelines exist in states that have a predominance of a drain tile including Minnesota, Iowa and Illinois. Typically, the pipeline is installed beneath existing drain tile systems. In this instance of a proposed drain tile system, Keystone will work with the landowner to determine the proposed layout of the drain tile system and work to install the pipeline in a manner not to interfere with the future installation of the drain tile system including installing the pipeline at extra depth where necessary. Section 5 of the CMRP addresses mitigation and reclamation requirements installation in areas of agricultural drain tile and Section 5.3.4 specifically addresses landowners planning future drain tile systems.

Excess subsoil material (spoil) created by the placement of the 30" line pipe in the trench is feathered across the 110 feet construction right of way (standard pipeline industry practice) during cleanup operations. The area of the 30" line pipe is approximately 4.9 square feet (or 4.9 cubic feet for each linear foot of pipeline). When spread across the 110 feet construction right of way, this volume of spoil is about 0.5 inches in depth.

10. The South Dakota Association of Towns and Townships has an interest in road crossings. What does Keystone propose for the crossings of roads in rural South Dakota?

A. Keystone must seek permits from all counties and townships to cross their roads with the pipeline. This permitting process generally specifies the county's and township's requirements for crossing the roads (boring or open cut, etc) as well as the requirements for restoration for the roads. At this same time, counties and townships can require Keystone enter into agreements regarding the use and restoration of their roads during construction. These agreements may include requirements for grading during construction and replacement of surfacing materials during and after construction.

11. Staff expert Tom Janssen testified to a concern regarding dust control and covering open bodied trucks. Can you comment on that?

A. Most of the region of South Dakota crossed by the Keystone pipeline is rural and mostly agricultural. Additionally, most rural roads are not paved. Dust from open bodied trucks is inconsequential relative to dust from agricultural operations or from dust created by wheels from vehicles on non-paved roads.

12. Mr. Janssen also testified to concerns about topsoil removal over the trench and the spoil requirements. Can you discuss that?

A. There are varying best management practices for topsoil removal and salvage to aid in salvaging topsoil resources to aid in conserving the lands agricultural capability. There are 3 methods used by the pipeline industry as follows:

1. Stripping of Trench Only: This involves stripping topsoil only in the area above the trench line. This is the least disturbance and handling of topsoil.

2. Stripping of Trench and Spoil Side: This involves stripping topsoil in the area above the trench line and where the trench spoil will be placed.

3. Stripping of Full right of way: This involves stripping the entire construction work area. This is the greatest disturbance and handling of topsoil.

Topsoil conservation stripping procedures is highly dependent on landscape topography, soil resources present, land management practices and land use and practical restrictions related to construction equipment limitations. The standard topsoil conservation procedures mentioned above possess numerous benefits and constraints and need to be determined based on the site

specific issues to ensure conservation is attained. It is widely known that reducing the amount of soil disturbance diminishes the potential risks in affecting agricultural land capability. It is Keystone's position to let the landowner determine the topsoil stripping method that is preferred on his land and not dictate the method to him.

13. Mr. Janssen also testified to concerns about easement and workspace requirements in wetlands and forested areas. Can you discuss that?

A. A 75 feet wide construction right of way through wetlands was a requirement in FERC's guidelines for natural gas projects developed in the early 1990s. Pipeline construction has proven this standard width requirement of one size fits all (whether the pipeline is 4" or 42") is not sufficient in many instances for large diameter pipeline projects. A contractor simply cannot excavate the trench for large diameter pipe, and place the spoil, particularly in non-cohesive soils, and maintain the workspace, all within 75 feet.

After construction, Keystone will be maintaining a 20-30 foot wide corridor in an herbaceous state to provide adequate visibility for monitoring the pipeline right of way by aerial patrol. In forested wetlands, Keystone has committed to maintaining a 10-foot wide corridor in an herbaceous state and selectively cutting and removing trees greater than 15 feet in height within 15 feet of the pipeline.

14. Staff expert John Muehlhausen testified to his concern that Keystone should monitor the post-construction crops except where waived in writing. Can you comment on that?

A. Keystone is responsible for restoration of the land and returning the land to its original productivity under its easement agreement and as found in Section 4.15 of the CMRP.

Keystone's land acquisition program compensates landowners for crop loss damages at 100% for the year of construction, 75% for the first year after construction, and 50% for the second year after construction. Experience in the pipeline industry has shown that most land will return to its original productivity in this timeframe. Should crop yield losses occur after this period, the best party to monitor and assess crop's productivity after this period is the landowner and, should there be a productivity loss issue, the landowner will advise Keystone. Keystone, in consultation with the landowner, will resolve the issue through implementation of additional land reclamation procedures or by compensation.

15. Mr. Muehlhausen also testified to his concern regarding mitigations for pipeline construction activities near residences. Can you comment on that?

A. Mitigations for pipeline construction near residences are outlined in Section 4.14 of the Construction Mitigation Plan. Mitigations include:

- reduction of width of construction right of way
- fencing the edge of the construction right of way
- posting warning signs
- maintaining access
- installation of line pipe near the residence with a special crew minimizing construction activity in the area
- preserving mature trees and landscaping where possible
- limiting the hours of operation of construction equipment
- utilizing dust control mitigation
- initiating restoration immediately after installation of the pipeline

16. Mr. Muehlhausen also testified regarding road maintenance and repairs as needed after construction. Can you provide comment on that?

A. See my answer to question 10 above regarding "road program maintenance and repair". Keystone will restore roads as near as practical to their original condition but cannot commit to restoration of roads to "better" condition. This would be committing to improve all roads used by the construction spread whether damaged or not. That is clearly not practical.

Keystone will adhere to road crossing permit requirements for keeping paved public roads clean and free from dirt and debris.

17. Does this conclude your rebuttal testimony?

A. For this round, yes, it does.

Dated this 14 day of November, 2007.

L.A. "Buster" Gray

BEFORE THE PUBLIC UTILITIES COMMISSION
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IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	HP 07-001 **REBUTTAL TESTIMONY OF MICHAEL KOSKI**

Q1. State your name and occupation

A: Michael Koski. Trow Engineering Consultants, Inc., 1300 Metropolitan Boulevard, Suite 200, Tallahassee, Florida, 32308.

Q2. Did you provide direct testimony in this proceeding?

A. Yes

Q3. To whose direct testimony are you responding in this rebuttal testimony?

A. I am responding, in part, to the direct testimony filed by Scott Anderson.

Q4. Which portion of Mr. Anderson's testimony are you responding to?

A. I am responding to Mr. Anderson's statement that the land he rents would not produce because of the heat from the pipeline.

Q5. What is your response to that statement?

A. I do not anticipate that the operation of the pipeline will result in significant effects to soil temperatures. Accordingly, I do not anticipate any significant overall effects to crops and vegetation associated with heat generated by operating the pipeline.

Q.6 Does the relevant research support your opinion?

A. Yes. A review of research concerning the effects of elevated temperatures on crops and vegetation reflects results that are consistent with Keystone's expectations stated above. Table 1

summarizes typical results of some of these studies and is organized according to common vegetation and crop types that will be crossed by the Keystone pipeline. These data provide insight with respect to typical relevant trends. Specific responses of vegetation establishment and success to soil temperature in each study are also influenced by factors such as soil type, soil moisture, land management practices or competition with other vegetation species.

Table 1. Effects of elevated soil temperature on typical vegetation crossed by the Keystone pipeline

Reported Effects of Elevated Soil Temperature on Vegetation.		
Vegetation/Crop Type and Experimental Soil Temperature Range	**Enhanced Growth Effects**	**Negative Growth Effects**
Big bluestem: Tall-grass prairie species (44° to 95° F)[a]	• Earlier germination and emergence. • Faster growth rate. • Higher net photosynthesis. • Greater total biomass. • Strong growth dependence on soil temperature.	• No negative effects reported although optimum soil temperatures for greatest biomass production were 77° F.
Black oak, northern red oak, white oak: Deciduous forest species (65° to 95° F)	• Improved ectomycorrhizal development and root system length.[b] • Root initiation and growth increased with increasing temperatures (55° to 75° F).[c, d] • Root elongation rate linearly related to soil temperature.[e] • Root growth contributing factor to drought resistance.[e]	• None reported, although temperatures above 63° F had less effect on root growth in white oak than did soil water.[e] • Optimal temperatures typically 70° to 80° F.
Various pothole wetland species (41° to 86° F)[f]	• Stem density increased with increasing soil temperature. • Total and annual species richness positively correlated with temperature.	• None reported although perennial species richness was unresponsive to temperature increases.
Corn (50° to 105° F)	• Warmer early-season soil temperatures hasten plant emergence and development.[g] • Optimum germination occurs at soil temperatures of 85° F.[h] • Yield increases with higher soil temperatures at planting (75° to 85° F).[i] • Soil temperatures late in summer less important than air temperature.[i]	• None reported. Effect of high soil temperatures in late summer secondary to effects of high air temperature, low soil moisture, and corresponding drought.

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Soybeans (50° to 109° F)	• Optimum soil temperatures for germination is 82° F.[j] • Soybean has competitive advantage over weeds when soil temperatures promote soybean germination.[k]	• None reported. Similar to corn, effect of high soil temperatures in late summer secondary to high air temperature, low soil moisture, and corresponding drought.[l]

a (Delucia et al. 1992); b (Dixon et al. ca 1980); c (Larson 1974); d (Teskey 1978); e (Teskey 1981); f (Seabloom 1998); g (Bollero 1996); h (Parsons 2001); i (Riley 1957); j (Tyagi & Tripathi 1983); k (Berglund & Helms 2003); l (www.ces.ncsu.edu/disaster/drought)

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Q.7 Will the Keystone pipeline be artificially heated?

A. No.

Q.8 Does that conclude your rebuttal testimony?

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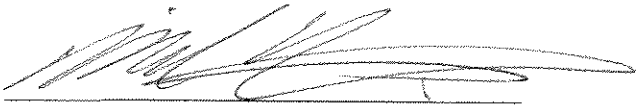
A. Yes.

Dated this 14 day of November, 2007.



MICHAEL KOSKI

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	HP 07-001 **REBUTTAL TESTIMONY OF SCOTT ELLIS**

1. State your name and occupation

A: Scott Ellis, Senior Program Manager, ENSR, Fort Collins, CO.

2. Did you provide direct testimony in this proceeding?

A. Yes

3. In rebuttal, to whose direct testimony are you responding?

A. I am responding to the direct testimonies of George Piper, Chris Hastings, Ben Grote and Tim Hofer.

4. In his testimony in this matter, George Piper indicates his concern that the proposed route crosses the habitat of several protected species. Can you comment?

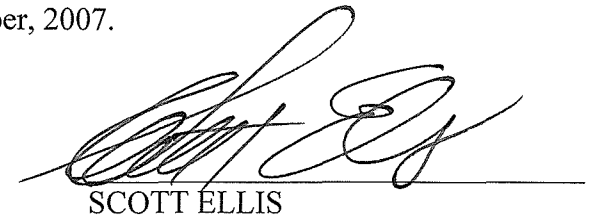
A. In compliance with the federal Endangered Species Act, Keystone has consulted with the U.S. Fish and Wildlife Service to identify potential threatenend and endangered species that could be affected by project construction. Surveys were conducted for the bald eagle, Dakota skipper, western prairie fringed orchid, and Topeka Shiner in 2006 and 2007. The results of this work were incorporated into a Biological Assessment that was submitted to the Service. The

Biological Assessment included measures to avoid or reduce effects on listed species. It is anticipated that the Service will prepare a Biological Opinion that will include measures to ensure habitat restoration for these species.

5. In their testimonies in this matter, Chris Hastings, Ben Grote and Tim Hofer testified regarding a concern that oil will warm the soil over and around the pipeline and that noxious weeds would grow and flourish as a result. Can you comment on that?

A. Keystone witness Koski testified that the operation of the pipeline is not anticipated to result in significant effects to soil temperatures or significant overall effects to crops and vegetation. Keystone does acknowledge that noxious weeds may be present in construction right of way, and that there may be potential for noxious weed population expansion after construction is completed. Keystone's Construction Mitigation and Reclamation Plan (CMRP) filed with the Department of State includes measures for noxious weed identification and control along the construction right of way prior to construction; construction equipment cleaning to prevent the further spread of noxious species, and for noxious weed monitoring and control on the land underlying any Keystone aboveground facilities. In conjunction with post-construction monitoring programs, Keystone has stated that "Weed control measures shall be implemented as required in conjunction with the landowner" (CMRP, page 35

Dated this 14th day of November, 2007.



SCOTT ELLIS

010563

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **REBUTTAL TESTIMONY OF HEIDI TILLQUIST**

1. State your name and occupation

A: Heidi Tillquist, Senior Project Manager and Environmental Toxicologist, ENSR, Fort Collins, CO.

2. Did you provide direct testimony in this proceeding?

A. Yes

3. In rebuttal, to whose direct testimony are you responding?

A. I am responding to the direct testimonies of Dan Hannan, Bryan Murdock, Brenda Winkler, David Wade and Jerauld Glanzer.

4. Mr. Dan Hannan, at p. 3 of his testimony, discusses drain tiles and jurisdictional ditches and indicates a need to account for these in the risk assessment. Can you comment?

A. As discussed in Jenny Hudson's testimony, transport along drain tiles has been accounted for through the proximity criteria. Section 4.3.4 of the Risk Assessment states that "*Keystone will develop and implement a risk-based integrity management program (IMP). The IMP will use state-of-the-practice technologies applied within a comprehensive risk-based*

methodology to assess and mitigate risks associated with all pipeline segments including HCAs." Broadly, the risk assessment process is an iterative procedure in which information is continually updated and refined in an effort to continually improve the realism and accuracy of the assessment. As Keystone collects additional information to support the risk assessment through additional engineering design work and environmental field surveys, the preliminary risk assessment and its supporting reference documents will continue to evolve. Refinements to the preliminary assessment will include site-specific information, such as the location of drain tiles and jurisdictional ditches.

Further, Appendix C of the Integrity Management Rule (49 CFR Part 195) provides guidance on factors an operator should consider in determining whether a pipeline can affect an HCA, such as drain tiles. Keystone's Integrity Management Plan will meet or exceed requirements of federal pipeline safety regulations.

5. Mr. Hannan, at page 6, indicates that downstream planning distances should be increased in the risk assessment. Can you comment?

A. As discussed in Jenny Hudson's testimony, it is acceptable for a preliminary risk assessment to use assumptions, such as the proximity criteria. Downstream proximity criteria (transport distance) selected for the preliminary risk assessment was 5 miles. This value would overestimate transport distance in intermittent streams when they are not flowing (representing the majority of type of streambeds crossed and intermittent streams flow 50 percent of the time or less), but could underestimate transport distance in flowing streams, depending on stream flow. As this assessment is refined, stream flow data and other site-specific information will be incorporated.

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To comply with the Integrity Management Rule (49 CFR Part 195), Keystone is responsible for considering the specific circumstances of the pipeline in the vicinity of high consequence areas (HCAs), and determining the analytical assumptions that are appropriate. Keystone will incorporate stream flow rates and terrain to assure the analysis is reasonably conservative. PHMSA may review the technical basis for these assumptions during integrity management inspections.

6. Mr. Hannan, at page 7, indicates that consultation is required with the South Dakota Department of Game, Fish and Parks for emergency response planning. Can you comment?

A. HCAs were developed by PHMSA in cooperation with federal, state, and non-governmental organizations. Ecological HCAs (known as Unusually Sensitive Areas [USAs]) were identified utilizing the data from these information sources, including the Natural Heritage database. Further, Keystone has continually consulted with SD DGFP since September 2006 regarding sensitive species. Emergency response planning will account for response to protect ecological USAs.

7. Mr. Bryan Murdock, at page 2 of his testimony indicates that Source Water Protection Areas in South Dakota need to be identified. Can you comment?

A. Keystone has consulted with the SD DENR regarding water resources. With specific regard to source water protection areas (SWPAs), Keystone initially contacted Brian Walsh with SD DENR in February 2006 to identify SWPAs along the original alignment. More recently, Keystone requested SWPAs within one mile of the DOS-filed centerline. The following table identifies these SWPAs. Keystone's current alignment is located upgradient of these sites or at a

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reasonable distance, with the possible exception of the SWPA in Kingsbury County, SD. Nevertheless, this area was previously identified as a sensitive location through the HCA evaluation process, due to the location of the Town of Iroquois and the South Fork Pearl Creek, and is therefore subject to protection under the Integrity Management Rule (49 CFR Part 195). Keystone will continue to coordinate with the SD DENR.

Table 1. Summary of SWPAs within One-Mile of Keystone Centerline

County	Distance from Centerline (feet)
Marshall	2235
Marshall	3218
Clark	3068
Kingsbury	4777
Yankton	1078 (inactive)
Yankton	3569

PHMSA uses recognized organizations and data sources for mapping HCA information. PHMSA-identified HCAs include surface and groundwater USAs (sensitive water resources are also classified as USAs) and ecologically sensitive USAs in SD. If previously unidentified HCAs are identified by Keystone through the consultation process with SD DENR or other agencies, Keystone will incorporate any new HCAs within one year of their identification as required by federal regulations (i.e., 49 CFR Part 195.452 (d) (3)).

8. Mr. Murdock also indicates at page 3 that Keystone has not fully mitigated for sensitive species. Is that the case?

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A. Keystone has been in continuous consultation with SD DGFP since September 2006. Consultation for sensitive species under Section 7 is coordinated with the USFWS. A draft Biological Assessment (BA) that includes proposed mitigation for sensitive species was submitted to the USFWS. The USFWS has provided comments on the BA, the final BA will be submitted to the USFWS in early December 2007, and Section 7 consultation is expected to be completed by mid-December 2007.

9. Mr. Murdock also discusses the drain tile and jurisdictional ditches with respect to risk assessment. Is the answer the same as it was for Mr. Hannan?

A. Yes.

10. Mr. Murdock raises the issue of field verification of topography. Will Keystone perform field verification of HCAs?

A. Yes. Each HCA will be specifically reviewed, including field (on foot) verification, to ensure the adequacy of the IMP. To comply with the Integrity Management Rule (49 CFR Part 195), Keystone is responsible for considering the specific circumstances of their pipeline in the vicinity of HCAs and determining the analytical assumptions that are appropriate. Keystone will incorporate stream flow rates and terrain to assure the analysis is reasonably conservative. PHMSA may review the technical basis for these assumptions during integrity management inspections.

11. Mr. Murdock at page 4 also raises the issue of increasing the distance in downstream transport distance for the risk assessment. Is the answer the same as for Mr. Hannan in his testimony?

A. Yes.

12. Mr. David Wade, Manager of the BDM Rural Water System indicates that he's concerned about the Middle James Aquifer and recharge in the specific region where Keystone will cross it. Can you comment?

A. Yes. As Mr. Wade states, the area in northwestern Marshall County through which the anticipated ROW will pass does serve as a recharge area for the James Aquifer. ENSR reviewed the South Dakota Geological Survey report for Marshall County, Bulletin 23, 1975. The report provides maps and cross-sections that indicate the general direction of groundwater flow in the area, and the general lithology underlying the anticipated ROW.

One lens of the James Aquifer, located 5 or 6 miles further east of the anticipated ROW, appears to be hydraulically connected to permeable surficial fine sands that occur in the ROW area itself at the very northern border of the county. However, groundwater movement there generally heads northeastward away from the BDM water supply locale (which is to the southeast). Consequently, if a spill from the Keystone Pipeline occurred and it penetrated to groundwater prior to containment and cleanup, any contamination would move away from and not toward the BDM water supply area.

The James Aquifer is generally confined under 50 to 100 feet of clay or till along the ROW through Marshall County. Except for a couple of miles of the centerline that are located further south of the county line, the remainder of the ROW crosses clay or till, through Marshall

county. Consequently, groundwater contamination of the James Aquifer is unlikely due to the depth of the aquifer and due to the presence of confining layers.

Based on the location of the ROW with respect to the James Aquifer and water supply withdrawals for the BDM Rural Water District, impacts on BDM water supplies from the Keystone Pipeline are unlikely.

13. Mr. Wade is also concerned about Keystone crossing BDM's utility system, and specifically the effects of a crude oil spill on the BDM system's PVC (polyvinylchloride) pipes. Can you comment on his concerns?

A. Yes. According to the American Water Works Association (AWWA) paper (Gaunt et al. 2006), attached to my rebuttal testimony, permeation incidents on PVC pipes are rare and no permeation incidents were reported with ductile iron, regardless of the type of gasket used. PVC pipe is highly resistant to gasoline, benzene, and toluene and their water solutions. The study states "Laboratory results indicate that PVC and ductile iron pipes can be safely used in areas of soil contamination regardless of the level of contamination."

PVC is highly resistant to permeation by benzene, toluene, and other compounds in all but the most extreme conditions of contamination. The American Water Works Association Research Foundation (AWWARF) has recently completed a report on the impacts of hydrocarbons on PVC pipes and pipe gaskets (AWWARF 2007: Website: www.awwarf.org/research/topicsandprojects/execSum/2946.aspx). The research found that "*PVC itself is impervious to gasoline, BTEX, and trichloroethylene (TCE) in groundwater at commonly encountered levels of contamination*". The concentration of BTEX in gasoline is not high enough to cause swelling of PVC pipe since the total concentration of BTEX has to exceed

40% to initiate a "moving front" in PVC (moving fronts are discussed in the paper). Since the concentration of BTEX in crude oil is less than one percent and is significantly less than BTEX in gasoline, PVC pipes would be impervious to crude oil contamination.

AWWARF also examined the impacts of hydrocarbons on water main gaskets. The report states " *PVC or ductile Iron (DI) mains with styrene-butadiene-rubber (SBR) gaskets and minimal average flow can be used in any level of gasoline contamination without exceeding BTEX MCLs* [maximum contaminant levels—drinking water standards]." Further the AWWARF report states that "*Laboratory results and utility experiences showed that the common practice of specifying DI mains with nitrile rubber (NBR) or fluoroelastomer rubber (FKM) gaskets in contaminated areas is generally unnecessary. SBR gaskets are satisfactory*". Again, since the BTEX concentrations in crude oil are significantly lower than in gasoline, there is no expectation that special gaskets are necessary to prevent contamination.

In summary, impacts from Keystone on outlying water supply pipelines are not anticipated, even if a spill near the water mains were to occur. Consequently, there is no reason to support the mitigation methods or associated costs that Mr. Wade recommends.

14. Ms. Brenda Winkler, at page 2, indicates that additional measures should be undertaken to assess the thickness of geologically sensitive areas and confirm the thickness of overburden and bedrock thickness along the ROW. Can you comment?

A. The information submitted for the DEIS clearly indicates that the entire anticipated ROW through South Dakota is within a glaciated province. Exposures of Niobrara Formation fissures, although they might occur in other parts of South Dakota or in other states, are highly unlikely along the ROW. For example, while the Niobrara Formation does occur in the counties

mentioned, it is typically a confined aquifer in areas under or near the pipeline. As such, it is restricted from the surface by one or more relatively impermeable layers. To clarify, the reviewers should note that the literature cited for the occurrence of "karst features" is national in scope. Therefore, the interpretation of what constitutes a karst feature in that source is quite broad, and basically includes any carbonate rock at the surface or at depth. Along most of the ROW through South Dakota, the Niobrara Formation is buried under restrictive glacial till deposits, and/or restrictive shale beds of the Pierre Formation. It generally consists of marl, chalk, or calcareous shales. This is not the typical karstic terrain that geologists are often concerned with. Further, while the Niobrara Formation is multi-state in extent, its setting along the proposed route is generally deep and isolated from the proposed pipeline.

15. Mr. Jerauld Glanzer in his direct testimony discusses Wolf Creek with regard to the Keystone oil spill response plans. Can you comment?

A. The Wolf Creek drainage is considered a sensitive surface water resource. As such, segments of the Keystone Pipeline that have the potential to affect Wolf Creek if a release were to occur are subject to the Integrity Management Rule (49 CFR Part 195). Thus, risk to the Wolf Creek drainage is mitigated by increased regulatory requirements.

16. Does this conclude your rebuttal testimony?

A. Yes it does.

Dated this 14th day of November, 2007.

HEIDI TILLQUIST

010572

Impact of Hydrocarbons on PE/PVC Pipes and Pipe Gaskets [Project #2946]

Ordering Information:
ORDER NUMBER: 91204
DATE AVAILABLE: Fall 2007

Printed Report		PDF
Subscribers	Order Report	N/A
Non-Subscriber	N/A	N/A

PRINCIPAL INVESTIGATORS:
Say Kee Ong, James A. Gaunt, Feng Mao, Chu-Lin Cheng, Lidia Esteve-Agelet, and Charles R. Hurburgh

OBJECTIVES:
The objective of this project was to study the impact of hydrocarbons on polyethylene (PE) and polyvinyl chloride (PVC) pipes and elastomeric gaskets. Specific tasks were to (1) survey water utilities to learn about their experiences with plastic pipes and permeation of mains and services, (2) study permeation through PE and PVC pipes exposed to hydrocarbon contamination, (3) develop laboratory tests to predict permeation of pipes and gaskets, and (4) study permeation through pipe gaskets exposed to hydrocarbons.

BACKGROUND:
Some of the factors for the increased use of plastic pipes in water distribution systems are their ease of installation and handling, durability, and good resistance to the chemicals used in water treatment, such as chlorine. In many urban areas, plastic pipes may come into contact with contaminated soils as a result of leaks from underground storage tanks, chemical spills, and improper disposal of used chemicals. These pollutants from leaking storage tanks and contaminated soils can and have posed serious threats to the longevity and structural integrity of plastic pipes and elastomeric gaskets which, in turn, can affect the water quality in the distribution system. Although there are research studies and case studies documenting the permeation of organic compounds through plastic pipes and elastomeric gaskets, there is still a lack of understanding of the performance of PE and PVC pipe materials and elastomeric gaskets in hydrocarbon-contaminated soils commonly encountered under field conditions.

HIGHLIGHTS:
Either PVC or ductile iron (DI) water mains can be safely used in any level of gasoline contamination, even free product, as long as there is a minimal average water flow in the mains. Although benzene, toluene, ethylbenzene, and xylenes (BTEX) will permeate the gaskets, USEPA MCLs will not be exceeded. Similarly, PVC and DI pipes can be used with periods of stagnation (i.e., service connections) for any level of groundwater contamination by gasoline. PVC itself is impervious to gasoline, BTEX, and trichloroethylene (TCE) in

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groundwater at commonly encountered levels of contamination.

APPROACH:

The research team surveyed utilities by mail and telephone to obtain information about their use of plastic pipes and experiences with permeation incidents and successful uses in known hydrocarbon-contaminated areas. Case histories with relevant laboratory data were developed. Permeation of PE and PVC pipes exposed to soil and water contamination was studied in pipe-bottle apparatuses. Novel pipe-drum apparatuses were used to study permeation of gasketed pipe-joints. New laboratory tests were developed to measure and predict permeation through PVC pipe. The moving front test was used in studies that revised and extended the understanding of the theory of permeation in PVC pipes, the thresholds of environmental contamination that might impact engineering decisions, and the impact of combinations of BTEX compounds on PVC pipe.

RESULTS/FINDINGS:

Surveys and Case Histories

One permeation incident per 14,000 miles of mains and 0.9 incidents per million service connections were reported by 151 utilities. The most common contaminant was gasoline. Laboratory data were not sufficient for conclusions regarding contamination thresholds upon which engineering decisions could be based.

PVC Pipe

PVC pipe material is impervious to gasoline because there is not enough BTEX in gasoline to swell PVC and cause permeation. Spills of benzene, toluene, or TCE permeate PVC pipe by direct contact with solvent or groundwater concentrations with greater than 60 percent of maximum solubility.

PE Pipe

Utilities should replace PE service connections immediately in case of hydrocarbon spills. MCLs are quickly exceeded before odor is detectable. Flow may dilute contamination in mains below MCLs.

Gasketed Pipe

PVC or DI mains with styrene-butadiene-rubber (SBR) gaskets and minimal average flow can be used in any level of gasoline contamination without exceeding BTEX MCLs. SBR gaskets can be used for 8 hour stagnation in gasoline-saturated groundwater. Utilities should use DI with NBR for stagnation in free product gasoline.

Predictive Tests (PVC)

The moving front test directly visualizes permeation progress using reflected light microscopy and can quantify differences in relative permeability. Sorption and near infrared tests are indirect measures of permeability.

IMPACT:

Laboratory results and utility experiences showed that the common practice of specifying DI mains with nitrile rubber (NBR) or fluoroelastomer rubber (FKM) gaskets in contaminated areas is generally unnecessary. SBR gaskets are satisfactory and engineering considerations other than permeation should usually govern pipe material selection. PVC pipe is suitable for all but the most unusual contamination conditions. There is no safe level of hydrocarbon contamination for PE service connections.

Longstanding recommendations and practices for use of plastic pipe and gaskets in hydrocarbon contamination have been shown to be unnecessarily conservative. New recommendations and theoretical understandings

should reduce unnecessary costs to the industry.

PARTICIPANTS:

- City of Ames, Iowa
- EPCOR Water Services, Edmonton, Alta., Canada
- Griffin Pipe, Council Bluffs, Iowa
- Hultec S&B Technical Products, Fort Worth, Texas
- Uni-Bell PVC Pipe Association, Dallas, Texas

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Performance of Plastic Pipes and Pipe Gaskets In Hydrocarbon Contamination: Field Experience and Laboratory Studies

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Abstract

Water utilities were surveyed and laboratory studies were undertaken to determine the limits of hydrocarbon contamination in which polyvinyl chloride (PVC) and polyethylene (PE) pipes and various types of pipe gaskets can be used successfully, without customer complaints or laboratory data exceeding U.S. EPA MCLs. Permeation incidents were reported at a frequency of one per 14,000 miles of mains and one per 1,000,000 PE/PVC service connections. Successful use of water mains in contaminated areas was reported at a frequency of one per 1,800 miles of mains and one per 2,500,000 plastic service connections. Gasoline was the most frequently reported contaminant. Laboratory studies showed that PVC pipe is highly resistant to gasoline and water saturated with gasoline. PVC pipe is also resistant to water solutions of benzene, toluene, and TCE but the most extreme levels of environmental contamination. The rate of progress of the moving front in PVC pipes exposed to pure benzene, toluene, and TCE is a function of the square root of time, whereas it is linear with time for aqueous solutions of those solvents. A method is described for predicting the resistance of PVC pipe to permeation based on visualization of the progress of the moving front during the first 24 hours of exposure to a contaminant.

Water Utility Experiences

Methods

A postal survey was used to obtain information from water utilities in the United States and Canada regarding their experiences with the performance of polyvinyl chloride (PVC) and polyethylene (PE) pipes and various types of pipe gaskets in soils contaminated with petroleum-based hydrocarbons. The four-page survey requested contact information, information about mains and service connections in the distribution system, and information about permeation incidents and successful uses in contaminated soils. Extensive follow up by telephone was required to obtain responses that were broadly distributed geographically and by utility size.

A permeation incident was defined as an occurrence that resulted in customer complaints of bad taste, odor, or illness or of laboratory data exceeding U.S. EPA MCLs, any of which could be attributed to permeation of water mains or services by hydrocarbons. A successful use was defined as an occurrence in which water mains or services were known to be in contact with hydrocarbon contamination without resulting in a permeation incident.

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Results and Discussion

Survey Response

Survey responses were received from 151 water utilities in 50 U.S. states, three Canadian provinces, and the District of Columbia. The location and relative size of the responding U.S. utilities are presented in Figures 1 and 2. Five Canadian utilities responded, including utilities from the provinces of Alberta, Manitoba, and Saskatchewan. Because a water utility's risk of a permeation incident depends on both the miles of mains and the number of service connections (SCs), the relative size of utilities was classified in Figures 1 and 2 according the product (miles x SCs) of those numbers.

Mains

The 151 utilities responding to the survey reported 83,360 miles of mains, and 70% of these reported having at least some plastic mains. PVC and ductile iron (DI) pipes accounted for 18% and 16% of miles of mains reported, respectively (Figure 3). PE accounted for only 0.18% of miles of mains reported. Respondents considered only 0.54% of mains to be at risk of permeation.

Reports of permeation of water mains were rare, approximately 1 report per 14,000 mi. of mains. Of the 6 reported permeation incidents, 3 involved gasoline, 1 involved chlorinated solvents, and 2 involved unknowns. The pipe materials involved in permeation incidents were PVC (4), asbestos cement (AC) (1), and cast iron (CI) (1) (Figure 4).

Reports of successful uses were infrequent, about 1 report per 1,800 mi. of mains. Nearly all successful uses involved gasoline or chlorinated solvents. Isolated cases involving diesel fuel, polynuclear aromatics, and acetone were also reported. The pipe materials involved in successful uses were DI (32), PVC (9), CI (5), and steel (1) (Figure 4).

Protocols for use of mains in contaminated soils were reported by 19% of responding utilities (Figure 5). Use of DI with resistant gaskets (either NBR of FKM) was the most commonly reported protocol (10), followed by use of DI with no comment regarding gaskets (8), use of "no plastic" (4),and steel (2). Other protocols were reported by 4 utilities, including casing, "double wrapping", and "specifying alternate materials." Utilities specifying "no plastic" presumably use DI.

Service Connections (SCs)

The 151 utilities responding to the survey reported 5,444,218 SCs, and 49% of these reported allowing plastic SCs. PE and PVC pipe accounted for 6% and 5% of reported service connections, respectively (Figure 6). Respondents considered only 0.31% of SCs to be at risk of permeation.

Reports of permeation of PVC or PE SCs were rare, about 0.9 reports per million total SCs (Figure 7). Reports of permeation of all types of SCs were about 8 reports per million SCs. Of

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the 44 reported permeation incidents, 36 involved permeation of polybutylene (PB) by gasoline. The permeation incidents involving PE (3) and PVC (2) SCs involved gasoline. There were 2 reports of permeation of DI/SBR SCs by chlorinated solvents. There was one report of permeation of an EPDM gasket on a copper SC by asphalt solvents which had entered the curb box. No reports of permeation of SCs due to use of termiticides were received. In all cases, the corrective action for permeation of plastic service lines was replacement with copper.

Reports of successful uses of plastic SCs were very rare, about 0.4 reports per million total SCs (excluding the large number of reports involving copper SCs) (Figure 7). There were 2 reports of successful uses involving plastic pipe, one each involving PE and PB pipe. While DI accounted for only 0.11% of reported service connections, there were 13 reports of successful uses of DI SCs in contaminated soils. Similar to mains, utilities favor the use if DI pipe, often with FKM gaskets, for large services in hydrocarbon-contaminated areas.

Quantitative Data

Of 25 utilities reporting incidents or successful uses, 10 had laboratory data relating to 18 cases. Table 1 shows the availability of laboratory data for permeation incidents and successful uses involving mains and services, and for the three sample matrixes: soil, ground water, and potable water.

Table 2 anonymously presents all analytical data reported by utilities, indicating the sample matrix and the pipe and gasket materials involved. Utilities are identified only by relative size (Figure 2) and the US E.P.A. regions in which they are located. The reference numbers were assigned arbitrarily and serve to group data from individual occurrences.

Table 1. Laboratory Data Associated With Successful Uses Of Mains

Materials[1]	Highest Reported Concentrations In Ground Water
SBR Gaskets w/DI or CI Pipe[2]	15.4 mg/L PCE, 0.30 mg/L total BTEX, 25.8 µg/L benzene
DI/SBR Service Line	14 µg/L VOC[3], 25.8 µg/L benzene
PVC/FKM	1.5 mg/L total chlorinated (Sum of: 0.952 mg/L PCE, 0.133 mg/L TCE, 0.386 mg/L c-DCE, 0.034 mg/L VC)
DI/FKM Service Lines	0.30 mg/L total BTEX, 25.8 µg/L benzene, 0.715 mg/L total VOC[3]

1. Uses are for mains, except where noted. 2. Soil PCE, 3.6 mg/Kg.
3. Contaminants were unspecified chlorinated solvents.

Table 2. Laboratory Data Associated With Permeation Of Service Connections

Materials	Soil	Ground Water
SBR Gaskets w/DI or CI Pipe	0.036 - 3.6 mg/Kg PCE	0.90 - 15.4 mg/L PCE 0.17 - 0.30 mg/L total BTEX 25.8 µg/L benzene
PE Pipe	7.7 mg/Kg total BTEX 24 mg/Kg TPH	57.7 mg/L total BTEX 45 mg/L TPH

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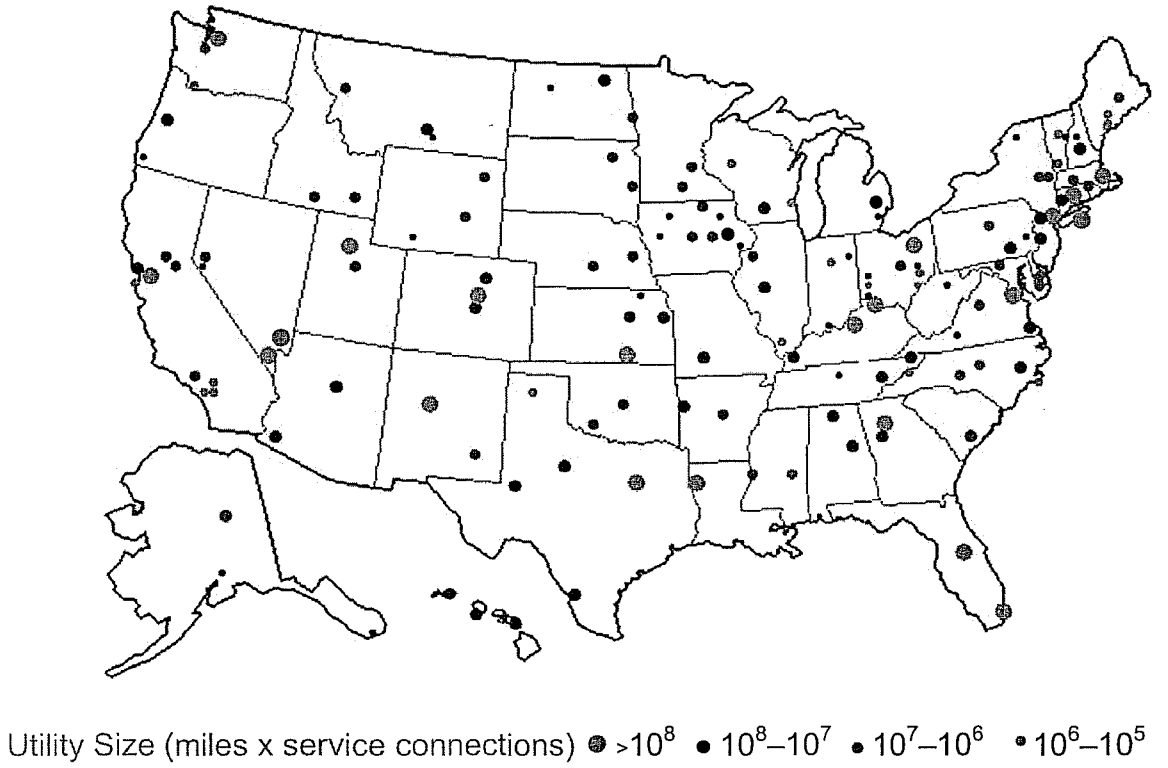

Figure 1. Geographical distribution of the responding utilities

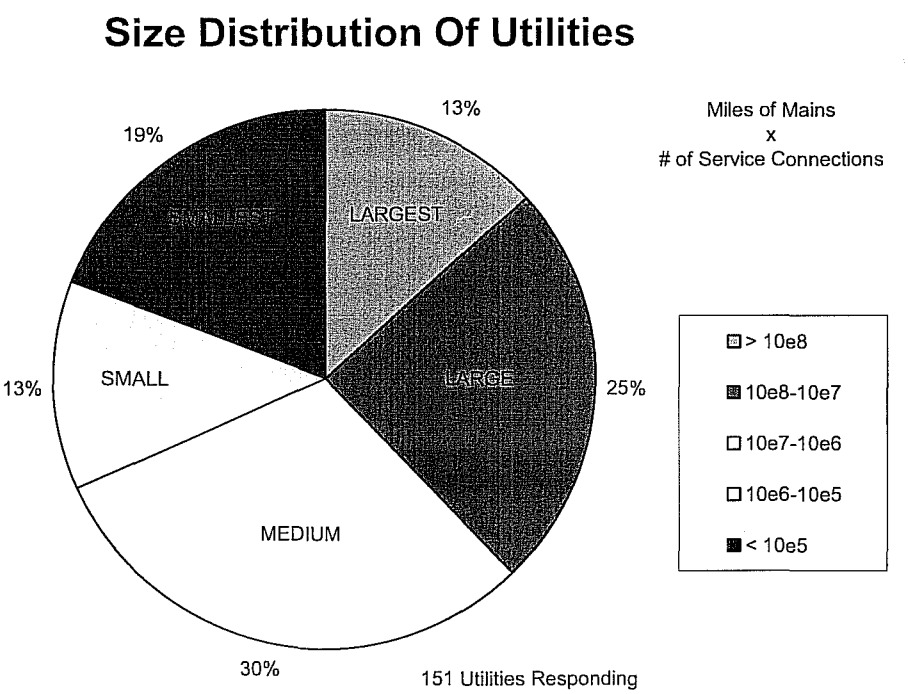

Figure 2. Relative size distribution of the responding utilities

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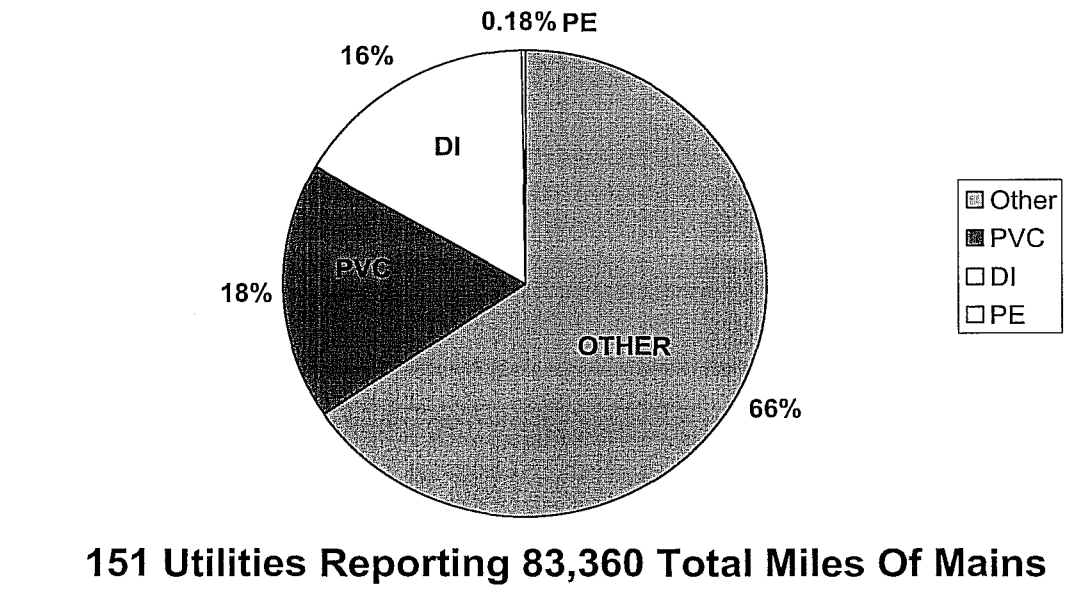

Figure 3 Pipe Materials Reported for Mains

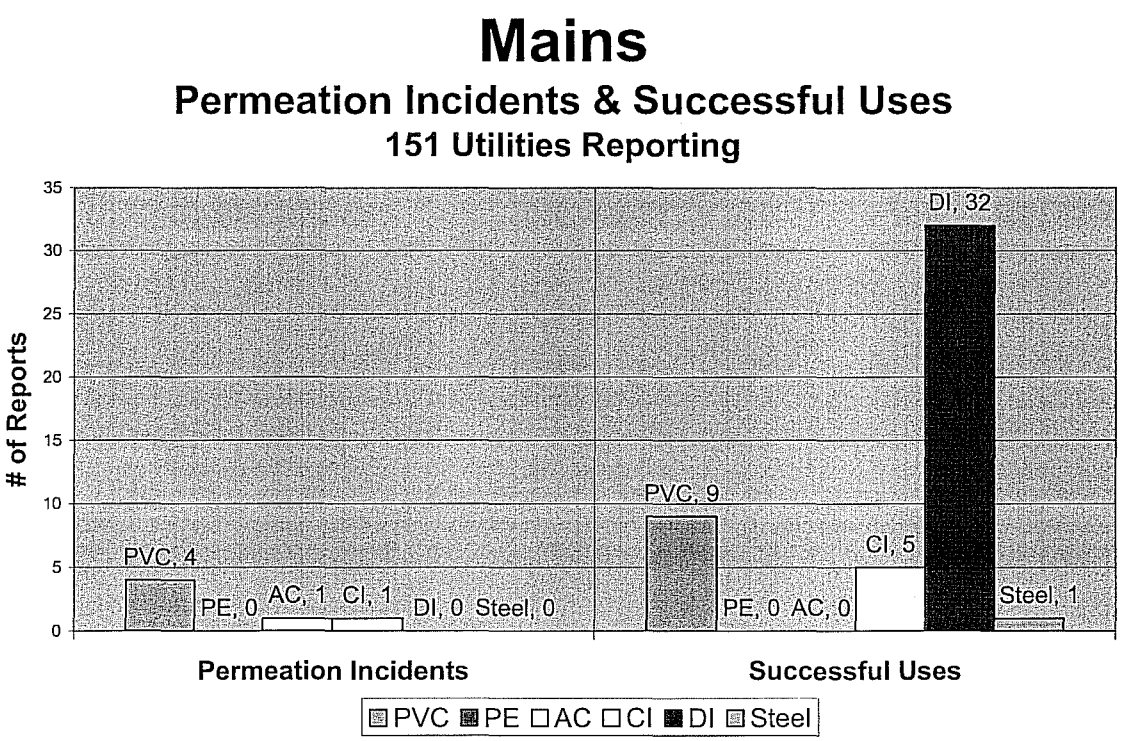

Figure 4 Permeation Incidents and Successful Uses Involving Mains

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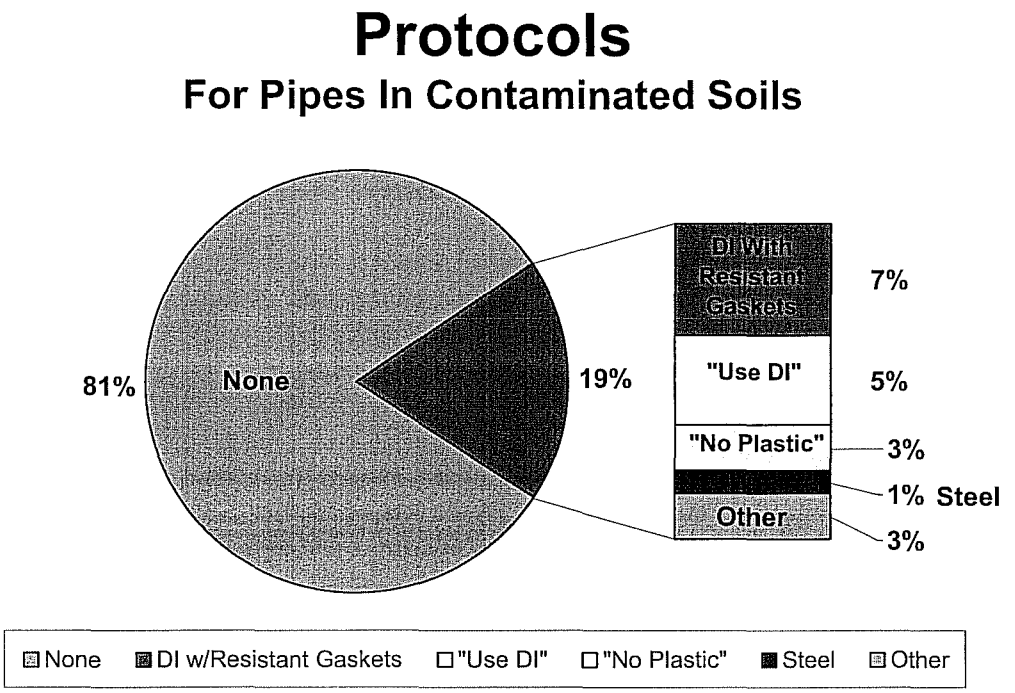

Figure 5. Protocols For Use Of Mains In Contaminated Soils

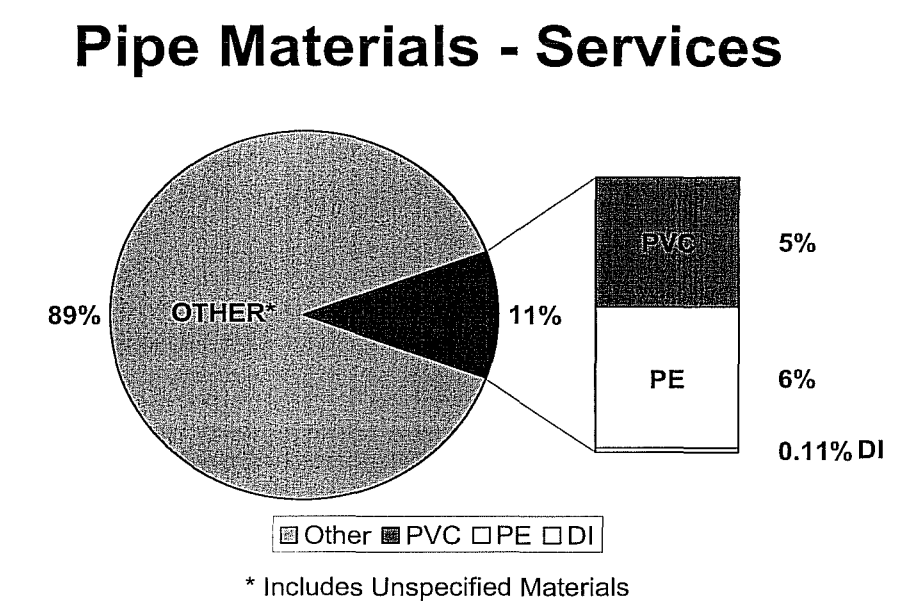

Figure 6. Pipe Materials Reported For Service Connections

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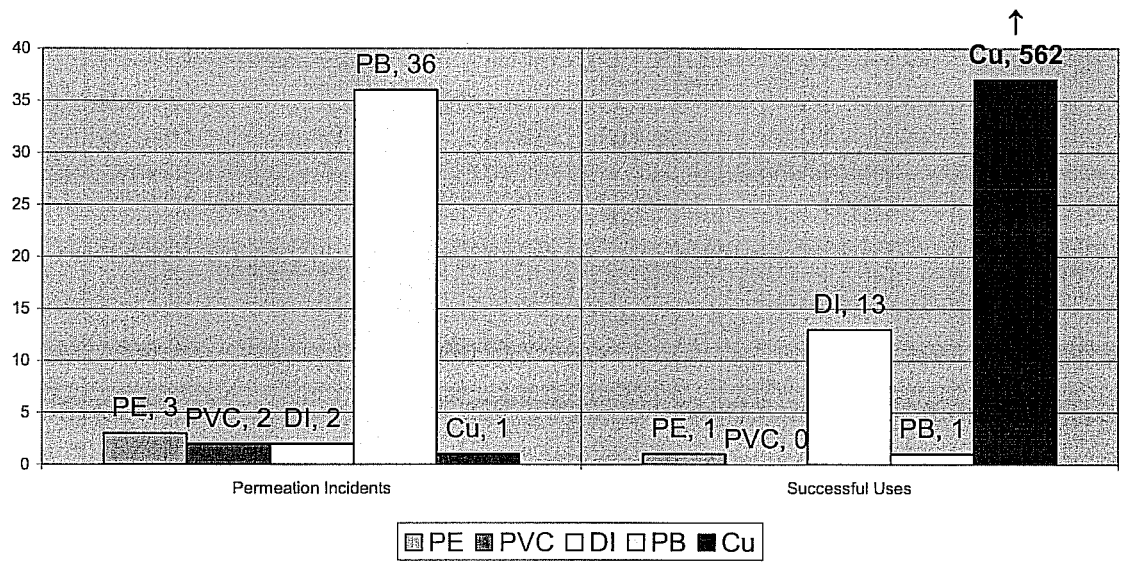

Figure 7 Permeation Incidents and Successful Uses Involving Service Connections

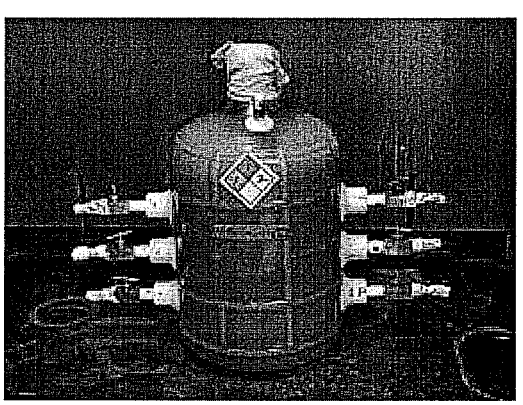

Figure 8 Pipe-Bottle Apparatus

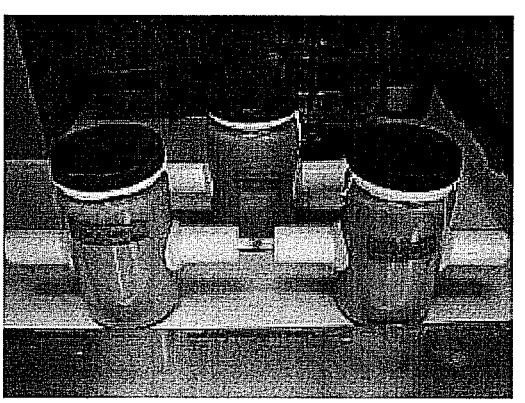

Figure 9 Mini Pipe-Bottle Apparatus

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PVC Pipes - Laboratory Studies

Methods

Simulated Environmental Studies

PCV pipes were tested using pipe-bottle apparatuses (Figure 8) consisting of 10 L glass bottles and 1 in. PVC pipes mounted horizontally through holes drilled in the glass and sealed with epoxy putty. The pipe ends were sealed with PTFE plugs equipped with brass fittings and needle valves for filling and draining the pipes. Similar apparatuses were first used by Vonk (1985). Smaller versions of this apparatus using 1 L glass jars with PTFE-lined caps were also used (Figure 9). The pipes were filled with deionized water which was periodically drained for analysis and replaced, using air pressure for the 10 L apparatus and a syringe for the 1 L apparatus. The contamination medium was placed in the bottles so as to surround the pipes being tested.

Benzene, toluene, ethylbenzene, o-xylene, m-xylene, and p-xylene (BTEX) and trichloroethylene (TCE) were determined by purge-and-trap gas chromatography using a photoionization detector (PID).

Moving Front Test

Specimens of pipe were cut to a length of 1 cm with a miter saw and then immersed in 50 mL of the test solvent in a glass jar with a Teflon-lined lid. At various times, the specimens were removed from the solvents, wiped dry with paper towels, and examined using reflected light microscopy. The regions of the test specimens that had been swollen, or rubberized, by the organic solvents appeared darker than the un-swollen portions. The thicknesses of the swollen and un-swollen regions were measured by using the calibrated reticule of the eyepiece of the microscope.

Sorption test

Specimens of pipe were cut to a length of 1 cm with a miter saw. The specimens were washed with detergent, rinsed with tap water and distilled water, placed on a paper towel to air dry, and weighed using an analytical balance. The volume was determined gravimetrically by a water displacement method using an overflow can. Specimens were immersed in 50 mL of the test solvent in a glass jar with a Teflon-lined lid. At various times, the specimens were removed from the solvents, placed on paper towels, wiped, and allowed to air dry for thirty seconds before weighing. In all steps, the specimens were handled with stainless steel forceps. Pipe specimens were considered to have reached equilibrium absorption when three consecutive weighings differed by no more than 20 mg.

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Results and Discussion

PVC Pipes Exposed To Gasoline

PVC pipes were exposed in pipe-bottle apparatuses to premium gasoline and deionized water saturated with gasoline. No permeation of BTEX compounds was detected during the first 10 months of exposure in these continuing experiments.

PVC Pipes Exposed To Pure Solvents

Significant permeation through PVC pipes in pipe-bottle apparatuses occurred within 6.5 days of exposure to pure TCE and within 16 days of exposure to pure toluene (Figure 10). Upon breakthrough, permeation occurred at a constant rate. No permeation was detected during the first 4.5 months of exposure to saturated aqueous solutions of benzene, toluene, and TCE in these continuing experiments. However, the moving front tests discussed below predict that permeation will occur in several months.

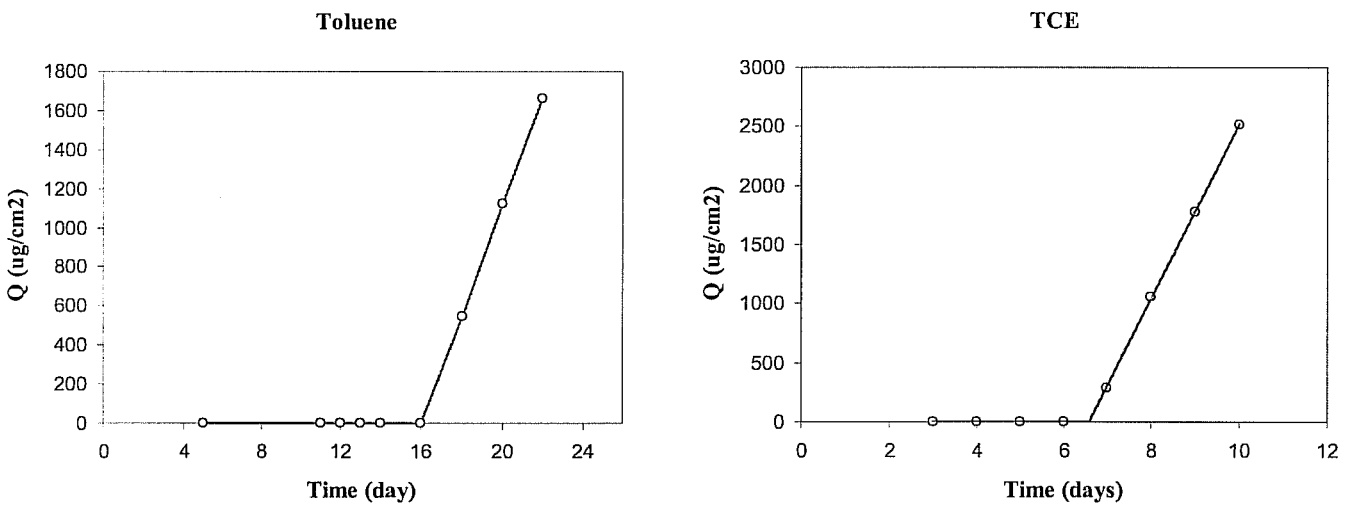

Figure 10 Cumulative Permeation Fluxes of Toluene and TCE in 1 In. PVC Pipe Exposed to Pure Toluene and TCE Solvent

Moving Front Test

(a) Pure toluene and TCE

The objective of the experiments using pure solvents was to investigate the relationship between the advancement of the moving front in the pipe material and the permeation breakthrough time obtained in the environmental simulations. For this purpose, 3.5 cm lengths of 1-inch PVC pipe were cut and the pipe ends were sealed with glass slides using a chemically resistant Epoxy, enclosing deionized water in the pipe. The pipe specimens were then immersed into pure solvent

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and periodically sacrificed to measure the progress of the moving front from the outside to the inside of the pipe.

Three parameters were measured in this experiment: the original pipe thickness (L_0), the thickness of the swollen layer at time t ($L_{s,t}$), and the thickness of the remaining glassy material (the distance from the sharp boundary to the inner wall, $L_{g,t}$) (Figure 11). The penetration distance at time t is then calculated by:

$$\text{penetration distance } (PD_t) = L_0 - L_{g,t}$$

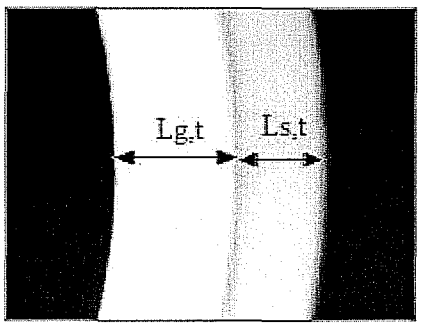

Figure 11 Definition of Lg,t and Ls,t

In pure solvents, a sharp boundary (moving front), separating the inner glassy core from the outer swollen layer, is distinctly observable as the solvents advance into the pipe. This offers an opportunity to carry out a dynamic observation of the progress of the moving front with time. Figure 12 shows the advancement of the moving front in 1 in. PVC pipe exposed to pure toluene. The moving front reached the inner wall on the 16th day, the day when the breakthrough of toluene was detected in the environmental simulation test (Figure 10). The results indicated that no detectable permeation occurred until the moving front reached the inner wall of the PVC pipe. To the authors' knowledge, this is the first experimental study directly demonstrating the non-Fickian diffusion mechanism in PVC pipe.

The thickness of the outer swollen layer ($L_{s,t}$), and the thickness of the remaining glass core ($L_{g,t}$) were measured with time. The penetration distance (PD_t) with time was calculated based the difference between the original wall thickness and $L_{g,t}$. Figure 13 shows the $L_{s,t}$ and PD_t obtained in pure toluene experiments.

The thickness of the outer swollen layer ($L_{s,t}$), and the thickness of the remaining glass core ($L_{g,t}$) were measured with time. The penetration distance (PD_t) with time was calculated based the difference between the original wall thickness and $L_{g,t}$. Figure 13 shows the $L_{s,t}$ and PD_t obtained in pure toluene experiments.

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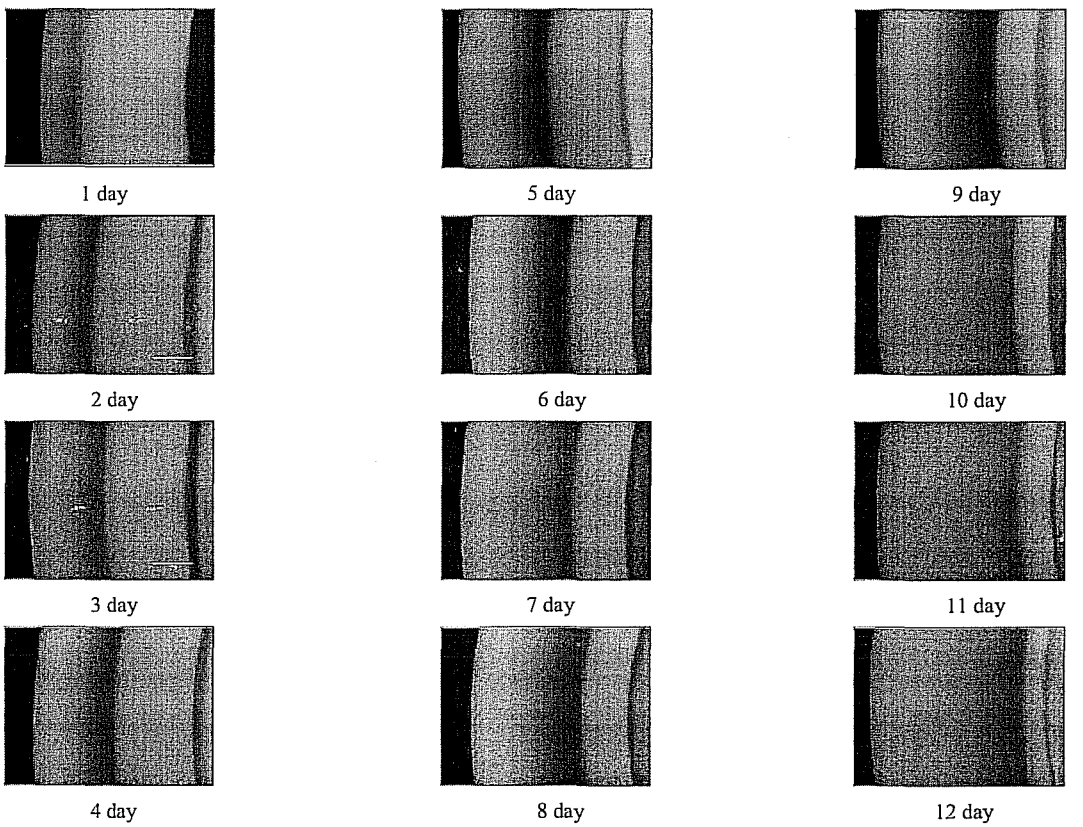

Figure 12 Advancement of Moving Front with Time in 1-inch PVC Pipe Exposed to Pure Toluene (right line: boundary of inner wall; mid line: moving front; left line: boundary of swollen outer wall. **)**

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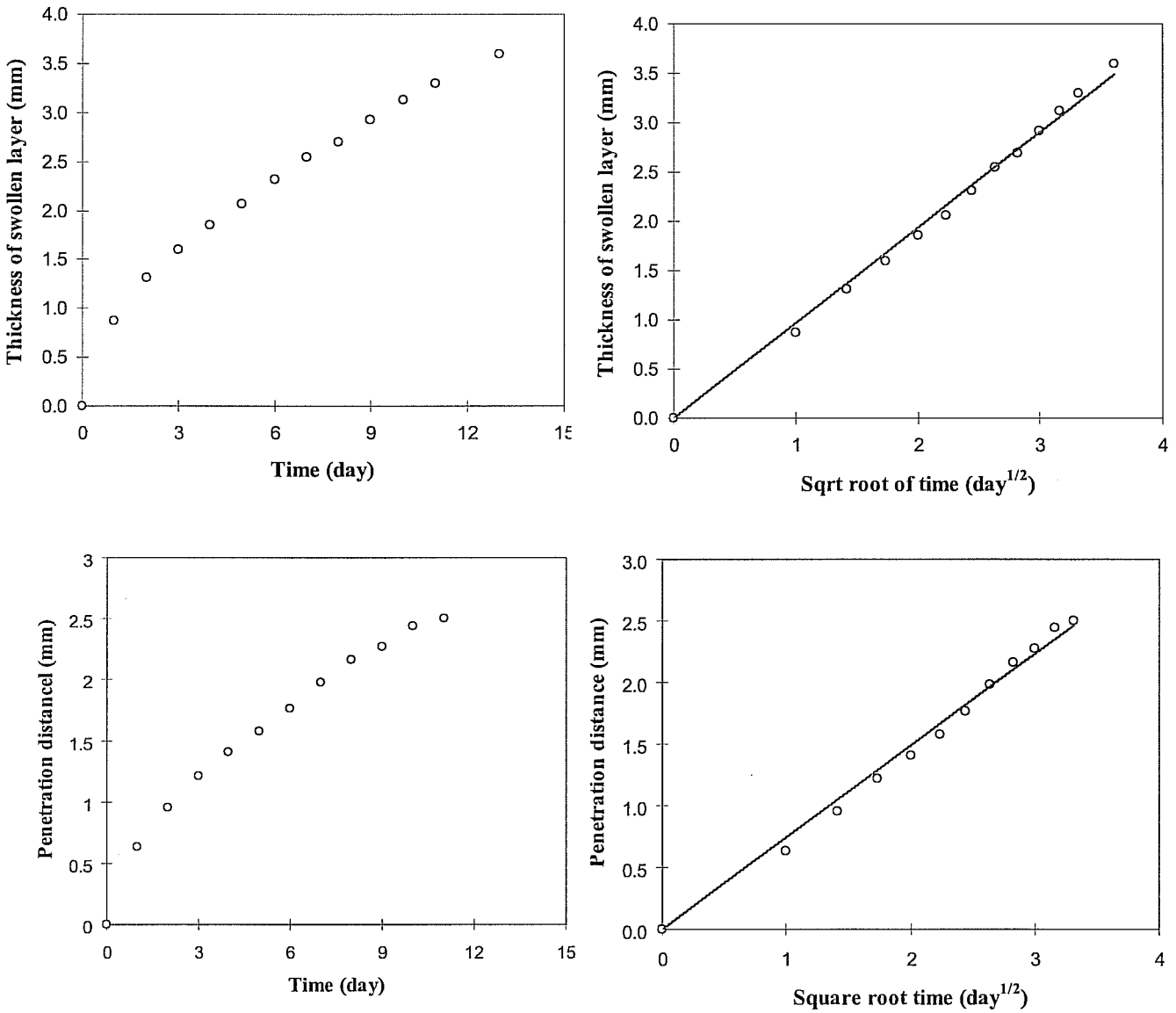

Figure 13 PVC Pipe Swollen Layer's Thickness and Penetration Distance with Time
(1 in. pipe exposed to pure toluene)

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As shown in Figure 13, strong swelling and rapid advancement of the moving front occurred initially. Plots of the results of both sets of data were linearly dependent on the square root of time. The observations seemed to deviate from case (II) diffusion, which is characterized by a constant penetration rate and has been assumed to be the dominant mechanism for permeation through PVC pipe (Berens 1985, Vonk 1985). However, it should be noted that most of experimental observations of
case II diffusion in PVC were made using thin film specimens pressed from pure powders, not manufactured PVC pipe.

The dependence of the penetration distance on the square root of time may help to predict the breakthrough time for the permeation of organic solvents in PVC pipe. To demonstrate this, a 24 hr moving front test was conducted using 1 in. PVC pipe exposed to pure TCE solvent. Figure 14 shows the advance of the moving front and the penetration distance vs. time.

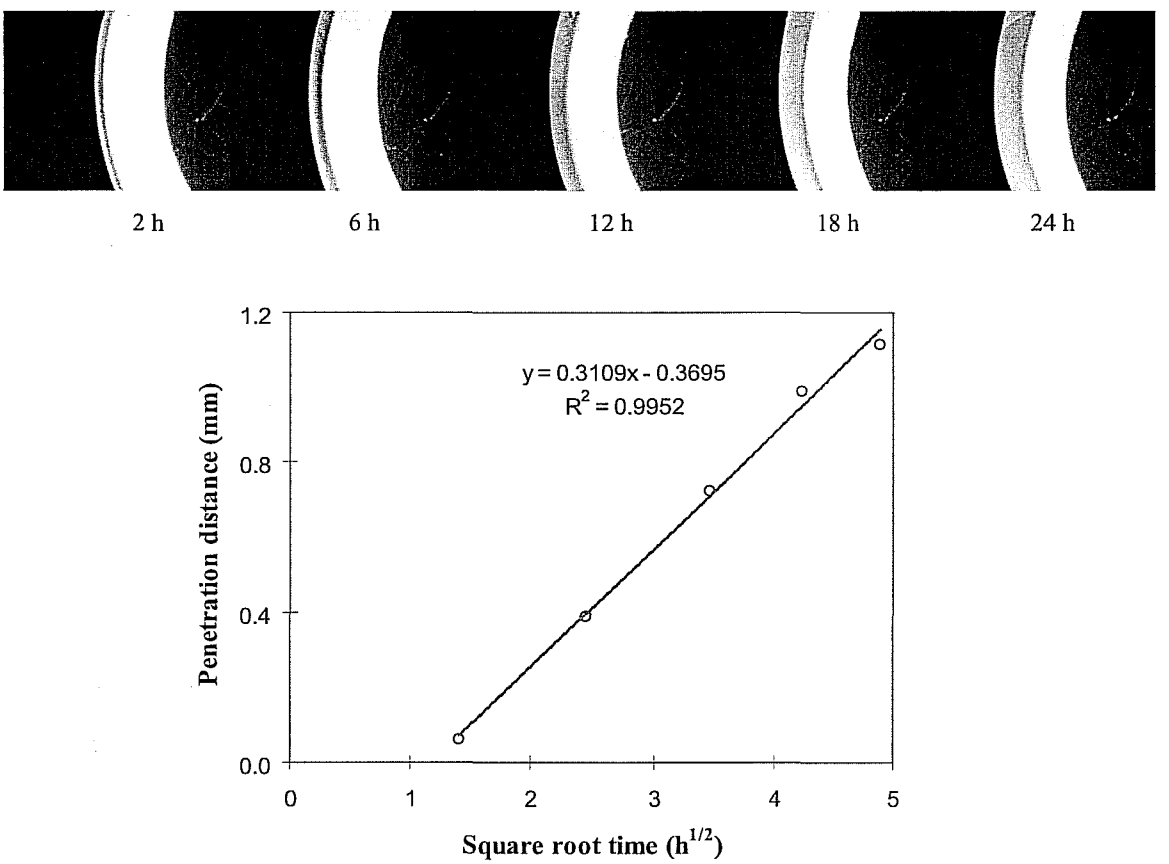

Figure 14 Advance of Moving Front in 1 in. PVC Pipe Exposed to Pure TCE

Using the regression equation obtained from Figure 14 and the pipe wall thickness of 3.5 mm, the breakthrough time was predicted to be:

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$$t = \left(\frac{3.5 + 0.3695}{0.3109} \right)^2 = 155 hours = 6.5 days$$

Breakthrough occurred in the pipe-bottle experiment between the 6th and 7th day (Figure 10). This result suggests that a short-term test such as this could be used to predict the time required for a solvent to penetrate a PVC pipe, and that such a test could be used to compare the relative resistance of PVC pipes to permeation.

PCV Pipes Exposed To Aqueous Solutions Of Solvents

Weight gain versus time was measured using the sorption test for 1 in. PVC pipe samples immersed in aqueous solutions of toluene, benzene and TCE at five strengths (100%, 80%, 60%, 40% and 20% saturation) (Figure 15). The weight gain was linear with respect to time in aqueous solutions (not a function of $t^{1/2}$ as it is in pure solvents), and much slower than in pure solvents. As shown in Figure 15, none of these sorption experiments had reached equilibrium during 3 to 4 months of exposure in these continuing experiments. Significant sorption was found only for the 100% and 80% saturation levels, while the weight gains for 60%, 40%, and 20% saturation levels were below 2%. The sorption rate (%/day) decreased logarithmically as the percent of saturation (contaminant strength) was reduced (Figure 15). The results indicate that sorption is insignificant for contaminant levels below 25% saturation. Twenty five percent aqueous saturation is considered to be an extremely high level of environmental pollution. For example, the concentrations of toluene, benzene and TCE at 25% saturation are 125 mg/L, 425 mg/L and 275 mg/L respectively, which are seldom encountered in the field except very close to an area of non-aqueous phase liquid (NAPL) or dense non-aqueous phase liquid (DNAPL).

Moving front tests were also conducted for PVC samples under the same exposure conditions described above. The formation of a moving front was strongly dependent on the weight gain from aqueous solution. The critical weight gain which resulted in the formation of an observable moving front was 2 to 3 %. In the saturated solutions of benzene and TCE, the moving front appeared during the first week of exposure. In contrast, there was an induction period for the formation of the moving front in the saturated solution of toluene, mainly due to relatively low uptake of toluene (Figure 16). The moving front was also detected in the 80% saturated solutions once the weight gain exceeded 2%. No moving front was found in the other three solutions (60%, 40% and 20%) after 4 months of exposure.

The thickness of the swollen layer versus time for saturated aqueous solutions of toluene, benzene and TCE is shown in Figure 16. Generally, the thickness of the swollen layer increased linearly with time during the initial period, although a delay behavior was observed for toluene. This was due to the delay in the formation of the moving front as discussed above, probably due to the relatively lower solubility of toluene in water. In the experiments with pure solvents, the thickness for a completely swollen 1 in. PVC sample was found to be about 4.8 mm. Assuming the same thickness for a completely swollen sample in saturated aqueous solutions, the breakthrough time in saturated solution is estimated to be 8 months, based on the rate of swelling obtained from Figure 16. This method of prediction leads to an estimated 8 month breakthrough time for saturated solutions of benzene or TCE, and 12 months for a saturated solution of toluene. Experiments using sealed pipe samples to more accurately measure the breakthrough time in saturated benzene solutions are in progress.

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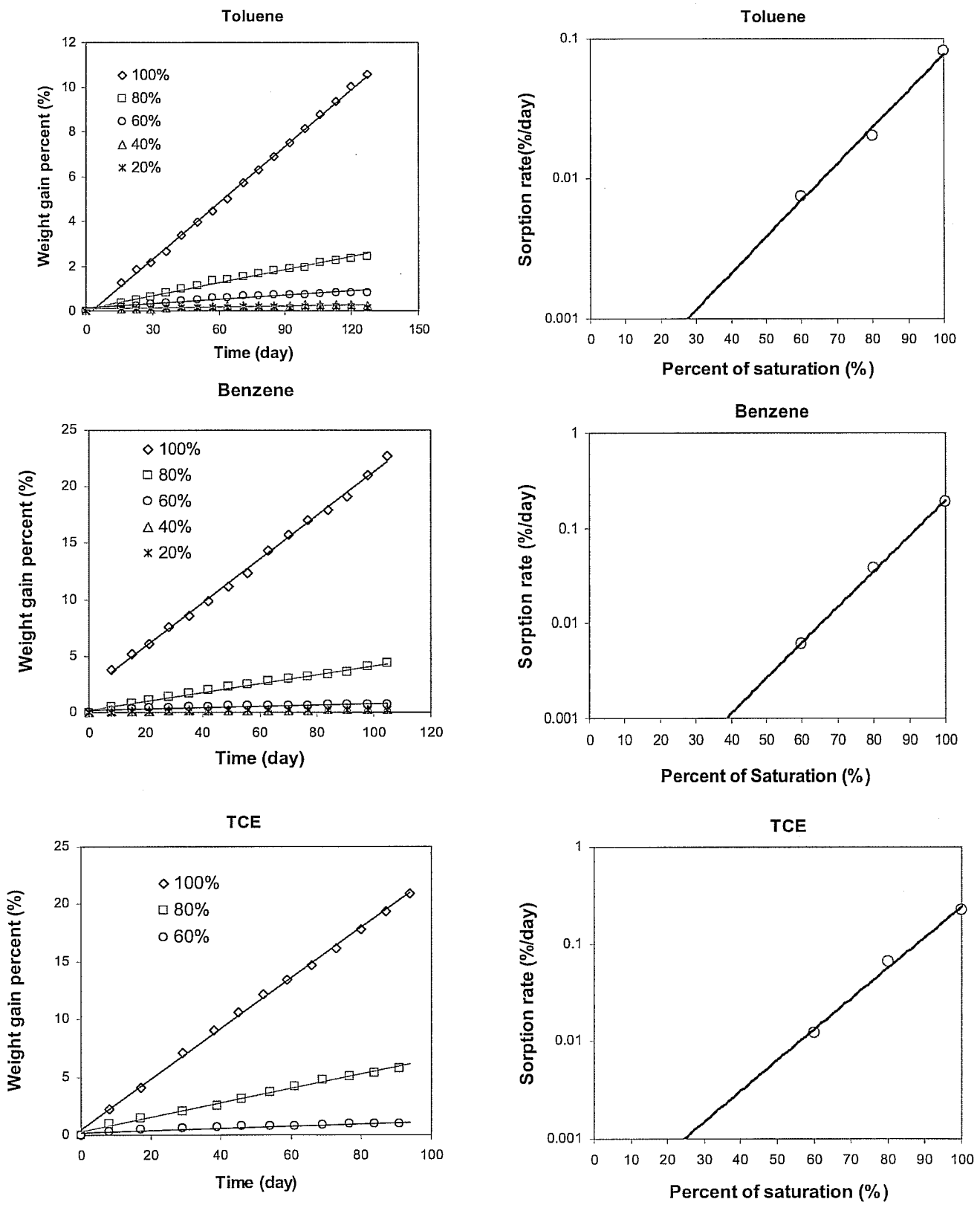

Figure 15 Sorption Data for 1-inch PVC Pipe Exposed to Toluene, Benzene and TCE Aqueous Solution (100%, 80, 60%, 40% and 20% saturation)

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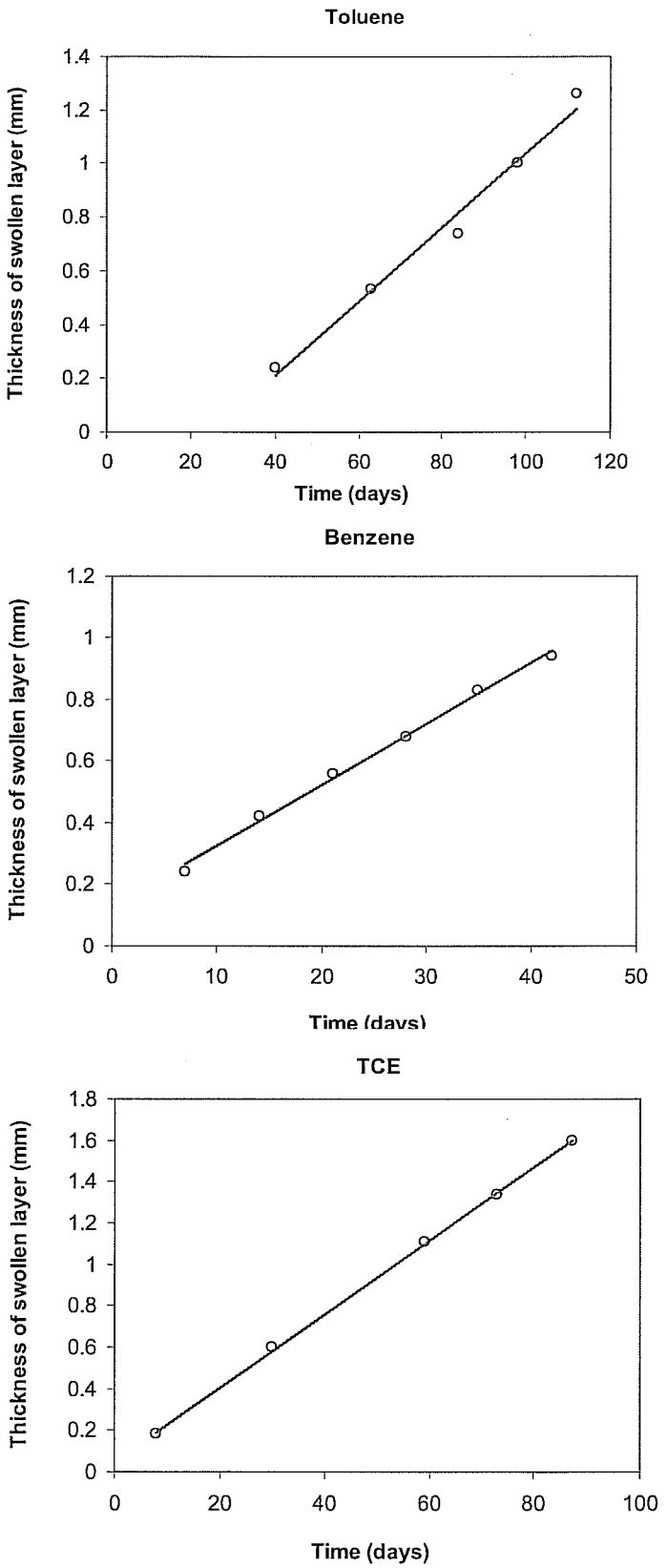

Figure 16 Thickness of Swollen Layer for 1-inch PVC Pipe Exposed to Toluene, Benzene and TCE Saturated Aqueous Solution

Polyethylene (PE) Pipes - Laboratory Studies

A paper describing the impact of gasoline on PE pipes can be found in the Universities Forum Distribution Section of these proceedings.

Gaskets - Laboratory Studies

Laboratory studies of the impact of hydrocarbons on gaskets used with DI and PVC pipe are in progress.

Conclusions

Permeation of water mains is rare and reports of successful uses in contaminated areas are infrequent. Gasoline is the most frequently reported contaminant. Chlorinated solvents and other fuels are less frequently reported. Only about 0.5% of mains are considered to be at risk of permeation. DI pipe is preferred by utilities for use in areas of known contamination, usually with resistant gaskets (especially Viton). No permeation incidents involving DI pipe were reported, regardless of the type of gaskets used. The use of PE pipe for mains is very rare.

Permeation of PE or PVC service connections is rare and reports of successful uses of plastic services in contaminated areas are extremely rare. Only about 0.3% of services are considered to be at risk of permeation. Utilities prefer copper services in areas of known contamination, and replacement with copper was the corrective action for all reported permeation incidents involving domestic services. Utilities prefer DI with Viton gaskets for large services in areas of known contamination. Soil or water analysis data associated with permeation incidents and successful uses is scarce and fragmentary.

Laboratory results indicate that PVC pipe can be safely used in soils contaminated with gasoline, regardless of the level of contamination. PVC is also highly resistant to permeation by benzene, toluene, and TCE in all but the most extreme conditions of groundwater contamination (aqueous saturated conditions). This resistance probably extends to other similar compounds that were not investigated in this study. Our work also shows that TCE and benzene are similarly aggressive toward PVC, and that the currently used recommendations for the compatibility of PVC with hydrocarbons (0.25 activity for BTEX compounds and 0.10 activity for TCE and other chlorinated compounds) may be unnecessarily conservative.

It should be possible to develop a rapid test to predict the resistance to permeation of a particular sample or formulation of PVC pipe. Visualization and measurement of the moving front using reflected light microscopy appears to be the most promising technique for this. It should be possible to develop a simple 24-hour moving front test to predict the breakthrough time of a standard solvent in any specimen of manufactured PVC pipe. Such a test should be a reliable indicator of the general resistance of that pipe to permeation and can be standardized and validated by collaborative inter-laboratory testing for inclusion in an AWWA and/or ASTM standard.

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References

Berens 1985; Berens, A. R., Prediction of organic chemical permeation through PVC pipe, JAWWA 77 (11), 57-64 (1985).

Vonk M. W.1985. Permeation of organic compounds through pipe materials, Pub. No. 85, KIWA, Neuwegein, Netherlands.

Acknowledgement

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010593

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	HP 07-001 **REBUTTAL TESTIMONY OF MEERA KOTHARI**

1. State your name and occupation

A: Meera Kothari, Professional Engineer, TransCanada, Calgary, AB.

2. Did you provide direct testimony in this proceeding?

A. Yes.

3. In rebuttal, to whose direct testimony are you responding?

A. I am responding to the direct testimonies of PUC Staff experts Dan Hannan and William Walsh.

4. Mr. Dan Hannan, at p. 3 of his testimony, discusses spill risks in the DNV risk assessment study and indicates a need to account for these excavation activities in the risk assessment. Can you comment?

A. Considering the risk from excavation: the objective of the frequency volume study was to obtain an order of magnitude, of the risk for the entire pipeline, not to specifically assess a variety of specific actions which could pose a potential for excavation damage. Land classification (ie where agriculture activities are present) and co-located pipelines or utilities is

accounted for in the analysis. Keystone will use existing TransCanada protocols and procedures for urban development. The integrity management program will include excavation operating procedures. Lastly, Keystone will use TransCanada excavation operating procedures for any emergency excavations.

5. Mr. William Walsh, at Section III of his testimony indicates that the pipe wall thickness will be .338 inches. Is he correct? Can you comment?

A. No, the calculation is not correct. Keystone is using X70 pipe grade material and not X80 so the wall thicknesses are incorrect, the pipe wall thickness will be .429 inches for the .72 design factor and .386 inches for the .8 design factor.

6. Mr. Walsh, at Section III of his testimony discusses 195.112, manufacturing standards and pipe material quality. Can you comment?

A. API 5L Product Specification level 2 is the highest specification for natural gas pipelines. Keystone will be implementing it for its crude oil pipeline. This exceeds the current crude oil specification requirement (specification level 1). The use of Level 2 ensures there are proven fracture control properties contained in the pipe compared to what would be there otherwise.

7. Mr. Walsh also indicates that 36" of cover is the code requirement at Section 195.248 for Keystone. Can you comment?

A. The code requirement for Keystone is 30", the industry standard is 36". Keystone will

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use 48" of cover to the top of the pipe, except in areas of consolidated rock, as indicated.

8. Mr. Walsh discusses the placement of valves along the pipeline with respect to Section 195.260. Can you comment?

A. Section 195.260 contains the considerations required for placement of valves. Pipeline threats and the risk to the pipeline is reassessed on an annual basis. Keystone will account for new HCAs as part of the annual reassessment, and incorporate findings back into the integrity management program to determine if further action is required.

9. Mr. Walsh discusses Section 195.304 and the pipe wall thickness in the Missouri River crossing as being .611 inches. Is he correct?

A. No, as outlined above, the differences in pipe grade would indicate a wall thickness of 0.622 for the Missouri river crossing.

10. In discussing Section 195.406, Mr. Walsh requests that Keystone include the effects of an unexpected, instantaneous loss of pumping equipment in the surge analysis. Can you comment?

A. Keystone has indeed performed a preliminary surge analysis, and intends to complete the detailed surge analysis later this year or early next year once engineering design has progressed. Keystone will include the Walsh request in that detailed surge analysis.

11. Have you reviewed Mr. Walsh's final recommendations? Do you have any comment?

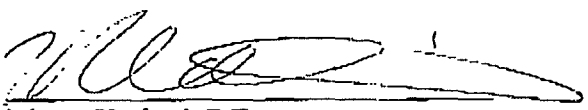
A. Yes and yes. Mr. Walsh recommended clarification on 2 points. The first was with regard to isolation times and drain out. The method of calculating outflow is conservative. His

second recommendation with respect to final surge mitigation design is, as discussed above, intended as part of the design.

12. Does this conclude your rebuttal testimony?

A. For this round, yes, it does.

Dated this 14th day of November, 2007.



Meera Kothari, P.Eng.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **CERTIFICATE OF SERVICE**

I hereby certify that the following listed documents were served upon all of the parties listed below on the 14th day of November, 2007, either electronically or by mailing a true and correct copy thereof to them by first class mail, postage prepaid, at their last known addresses, to-wit:

Rebuttal Testimony of L. A. Gray
Rebuttal Testimony of Michael Koski
Rebuttal Testimony of Scott Ellis
Rebuttal Testimony of Meera Kothari

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **REBUTTAL TESTIMONY OF MEERA KOTHARI**

1. State your name and occupation

A: Meera Kothari, Professional Engineer, TransCanada, Calgary, AB.

2. Did you provide direct testimony in this proceeding?

A. Yes.

3. In this rebuttal, to whose direct testimony are you responding?

A. I am responding to the direct testimonies of PUC Staff expert David Schramm, Edward D Miller and Curt Hohn.

4. At Question 9 of his testimony, Mr. Schramm discusses Keystone's Supervisor Qualification in the area of corrosion control. Can you comment on that?

A. Keystone will use qualified personnel from TransCanada's Asset Reliability, Engineering and Operations departments who are responsible for insuring compliance under United States Department of Transportation (US DOT) regulation 49 CFR Part 195.402(c)(3) . Supervisors are registered professional engineers or registered professional technicians who hold certifications and maintain continuing education/professional development from industry bodies such as NACE. Keystone will meet the requirement of US DOT 49 CFR Part 195.555.

5. At Question 15, Mr. Schramm questions Keystone's corrosion control test leads with respect to the Special Permit. Can you comment on that?

A. Keystone acknowledges the requirement for installation of test leads as noted in the PHMSA special permit. Keystone will use existing TransCanada's procedures for installation of test leads. These specifications will be used in accordance with the latest edition of CGA's Recommended Practice, OCC-1, For the Control of External Corrosion on Buried or Submerged Metallic Piping Systems, NACE International's Recommended Practice, RP0169 (latest edition), Control of External Corrosion on Underground or Submerged Metallic Piping Systems, NACE International's Test Methods, TM01-4-97(latest edition), Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems, and all applicable federal, state, local and district laws, codes and regulations. Keystone will meet the requirement of US DOT 49 CFR Part 195.567.

6. At Question 16, Mr. Schramm questions Keystone's requirement to examine exposed portions of buried pipe. Can you comment on that?

A. Keystone will use existing TransCanada procedures and applicable industry practices and NACE, API, ASME codes for coating examination and non destructive examination of the pipeline should excavations be required based on in-line inspection data. Non destructive methods for examination of used by TransCanada are industry best practices which include magnetic particle inspection of defects, seams and girth welds in addition to digital mapping of defects to calculate remaining strength of pipe so as to determine the appropriate repair method as required. Keystone will meet the requirement of US DOT 49 CFR Part 195.569.

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7. At Question 22, Mr. Schramm questions Keystone's coating for Atmospheric Corrosion per US DOT 195.581. Can you comment on that?

A. Liquid epoxy or FBE coating will be applied to buried piping extending to approximately 18 inches above grade at soil to air interfaces. Then, the liquid epoxy or FBE will be painted over extending down to grade level to prevent damage from damage to the corrosion coating from the sun's ultraviolet rays. Keystone will meet the requirement of US DOT 49 CFR Part 195.581.

8. At Question 23, Mr. Schramm questions Keystone's monitoring for Atmospheric Corrosion Per US DOT 195.583. Can you comment on that?

A. As part of its integrity management program, Keystone will inspect for atmospheric corrosion at least once every three years with intervals not to exceed 39 months as per US DOT 195.583(a) and will repair any coating if required. Keystone will meet the requirement of US DOT 49 CFR Part 195.583.

9. At Question 24, Mr. Schramm questions Keystone's plan to correct corroded pipe under US DOT 195.585. Can you comment on that?

A. As part of its integrity management program, Keystone has an extensive defect assessment and repair methodology. The pipeline will be in-line inspected within the first three years of operations. Any repairs resulting from the engineering analysis of the inspection data will be repaired using industry best practices in accordance with acceptable repair methods within ASME B31.4 and US DOT 49 CFR 195. Keystone will meet the requirement of US DOT 49 CFR Part 195.585.

10. At Question 26, Mr. Schramm questions Keystone's plans with respect to standards under US DOT 195.588. Can you comment on that?

A. Under Keystone's integrity management program, direct assessment could be used to assess the pipeline. Keystone will use the existing TransCanada's direct assessment procedure and follow NACE Standard RP-0502, latest edition along with the requirements of the US DOT 49 CFR Part 195. Keystone will meet the requirement of US DOT 49 CFR Part 195.588.

11. At Question 33, Mr. Miller describes failures involving TransCanada. Can you comment on that?

A. The failures Mr. Miller describes are on natural gas pipelines. These natural gas pipelines are of an older vintage of pipeline which were not constructed using today's more advanced modern construction practices or modern pipeline materials and technologies. Over the past three decades TransCanada has installed thousands of miles of pipelines through out North America of the grade proposed for Keystone and has not experienced a failure. Additional advances in pipeline technology include Fusion Bonded Epoxy external coating, and cathodic protection. These advancements in technologies make comparisons of Keystone to older pipelines invalid. Lastly, crude oil pipelines do not fail in the same manner as natural gas pipelines. Liquid pipelines carry crude oil (as specified in Keystone's Tariff) and do not ignite in an explosion or fire as crude oil is not a compressible fluid.

12. At Question 35, Mr. Miller states Keystone should not be allowed to operate the pipeline using a 0.8 design factor. Can you comment on that?

A. Keystone will meet or exceed safety requirements to operate Keystone using a 0.8 design factor as demonstrated through the extensive evaluation of its application by the US DOT Pipeline Hazardous Materials and Safety Administration in its grant of special permit and conditions to operate at the higher design factor.

13. At Question 35, Mr. Miller states the risk is significantly higher with operating hazardous liquid pipelines than natural gas pipelines with respect to the 0.8 design factor. Can you comment on that?

A. The risk is not significantly higher to operate a liquid pipeline with a 0.8 design factor. There are additional design elements Keystone will use to reduce the risk associated with operating the Keystone pipeline. Key factors mitigating risk to the pipe are:

- Keystone will use a more stringent pipe specification that is required by code for hazardous liquid pipelines.
    - American Petroleum Institute (API) code 5L Keystone will use a Product Specification Level 2 will be used which requires the pipe specification to be engineered with fracture control properties.
    - Keystone will use a more restrictive chemical composition pipe specification leading to improve weldability and minimize construction defects.
- Keystone pipe will use a more stringent specification for pipe fabrication testing.
    - The pipe mill hydrotest will be increased to 95% of specified minimum yield strength (up from 90% per API 5L).

- The pipe will undergo a mandatory ultrasonic inspection in the pipe mill with documented procedures with increased frequency of calibration and sensitivity checks.
- Pipe seams will be selectively inspected upon arrival at construction sites to check for transportation related damage.

- Keystone will use a more stringent specification for pipe construction.
  - The pipe will have 48 inches of ground cover. (minimum requirement by code is 30 inches)
  - The pipe will have a qualification requirement for field weldability testing.
- Keystone will use a more stringent specification for pipe during operation.
  - The pipe will undergo baseline high resolution magnetic flux leakage inspection within three years of commencement of operations.
  - Keystone will operate under a stringent tariff requirement of 0.5% solids and water.
- All Keystone pipe mills were pre qualified to insure quality and compliance with all US codes and regulation.

14. At Question 36, Mr. Miller notes other concerns with the application. Can you comment on this?

A. Welspun Gujarat Stahl Rohren, Ltd (Welspun) is certified by the American Petroleum Institute (API) to produce pipe for installation in the United States and posses ISO certifications. This mill located in Anjar, India has undergone prequalification by a third party (for TransCanada) to ensure it is capable of producing carbon steel line pipe to API 5L Product Specification Level 2 and all other applicable codes and standards for pipe installation in the

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United States. As part of the pre qualification process, it was determined that Welspun has produced thousands of miles of pipe that has been installed in the United States and is currently producing more pipe for transportation of hydrocarbons within the United States. Keystone will monitor pipe production at this facility by implementing a quality surveillance program under which inspectors are continuously present at the mill, performing audit functions, during all pipe production shifts. The pipe will be transported to the United States uncoated in accordance with API 5L and API 5LW specifications for land and water transportation. Upon arrival in the US, the pipeline will be inspected for any possible damage and then coated in a prequalified US coating facility. The pipe will be selectively inspected by using a non destructive ultrasonic technique to verify any damage due to transportation.

15. At Question 37, Mr. Miller describes two actual pipeline spills. Can you comment on that?

A. The Alyeska pipeline incident referred to bears little relation to the facts surrounding this application. There are significant differences and factors including the fact that Alyeska is an above ground pipeline, and thus exposed to the criminal acts of a third party. The Keystone pipeline is a buried pipeline, not at risk to the type of incident described. Similarly, the Burnaby pipeline incident referred to bears little relation to the facts of this proceeding as it paralleled a highway. The Keystone pipeline is not paralleling under any highways. However, Keystone recognizes the potential for excavation damage to its pipeline and has taken proactive measures to mitigate the risk such as the depth of cover (four feet), participation in one call programs, implementation of damage prevention programs, and observation of third party excavations, subsequent to line locates near Keystone pipeline right of way.

16. Could you comment on statements made on page 7 through 9 of Mr. Hohn's testimony related to operating pressure?

A. The maximum operating pressure for the Keystone pipeline is 1440psig. Under the United States Department of Transportation regulation 49 CFR Section 195.402, Keystone may operate up to 1584psig in an abnormal operating condition. Such abnormal operating conditions are transient and short term. The special permit granted by PHMSA does not allow the Keystone pipeline to operate at a higher operating pressure. The special permit was requested for and allows for the use of a wall thickness which varies by 0.043" from the current code requirement within the special permit area. The thinner wall thickness does not compromise safety as found by PHMSA and as discussed in other portions of this testimony.

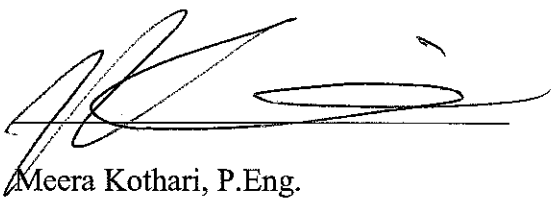
17. Could you comment on statements made on page 18 of Mr. Hohn's testimony related to valves?

A. All isolation valves placed along the Keystone pipeline in South Dakota are remotely controlled valves. Manual valves will be placed with check valves at major waterbodies, which exceeds code requirements.

18. Does this conclude your rebuttal testimony?

A. Yes, it does.

Dated this 21th day of November, 2007.



Meera Kothari, P.Eng.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	HP 07-001 **REBUTTAL TESTIMONY OF BRIAN THOMAS**

1. State your name and occupation

A: Brian Thomas, Coordinator, Oil Movements, Keystone

2. Did you provide direct testimony in this proceeding?

A: Yes

3. In rebuttal, to whose direct testimony are you responding?

A: I am responding to the direct testimony of Messer's. Hohn, Davis, Miller, Walsh and Hannan.

4. Mr. Hohn at Page 8 along with Mr. Davis at Page 2 of their testimony indicate that oil leaks as large as 372,330 gallons or 1.5% of Keystone's flow rate could continue to leak for 90 days before they are detected. Can you comment?

A: Their testimony on this issue reaches a conclusion that is unrealistic and inconsistent with the capabilities of Keystone's comprehensive leak detection program. In addition to the complimentary leak detection systems that I described at Pages 7 and 8 of my direct testimony, Keystone will also incorporate computer based, non real time, accumulated gain/(loss) volume trending to assist in identifying low rate or seepage releases below the 1.5 to 2 percent by volume

detection thresholds. This involves performing calculations on routine time intervals (approximately 30 minutes) of the volume of oil gained or lost within a pipeline segment bounded by flow measurement equipment. By accumulating these gain/(loss) results over a succession of time intervals, the cumulative imbalance of the segment can be determined. Once this cumulative imbalance exceeds a prescribed threshold, further investigation and evaluation is undertaken. Thresholds will be established based upon the accuracy and repeatability of flow measurement equipment and the extent to which flow imbalances generated by the normal operation of the pipeline can be tuned out.

The system discussed above will be similar to that described by Mr. Richard B. Kuprewicz in a paper prepared for the Pipeline Safety Trust entitled "Observations on Practical Leak Detection for Transmission Pipelines An Experienced Perspective", within the section describing Seepage or Intermittent Releases. Within this section of the document on Page 12 of 15, Mr. Kuprewicz recommends this non real time balancing approach. Fundamentally, the system is comprised of plotting an accumulated daily gain/(loss) balance across a pipeline segment over a month-to-date and year-to-date time period. This information is then displayed in a graphic format and utilized to assist pipeline operators in identifying possible leak conditions. An alarm value or limit can also be set for when the accumulated gain/(loss) exceeds a prescribed threshold indicating further investigation is warranted.

Since Keystone will employ the system described above, as well as other direct observation methodologies included at Page 8 of my direct testimony, it is not reasonable to assume a leak at 1.5% of the pipeline flow rate could continue for 90 days prior to detection.

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5. At unnumbered Page 11, beginning at Line 30 Mr. Walsh requests that Keystone include the effects of the instantaneous loss of pumping equipment in the surge analysis to ensure that pipe stress remains within acceptable limits. Can you comment?

A: Keystone will perform a comprehensive surge analysis using a transient hydraulic model of the pipeline to ensure operation within the prescribed pressure limits. This analysis will include the instantaneous loss of pumping equipment.

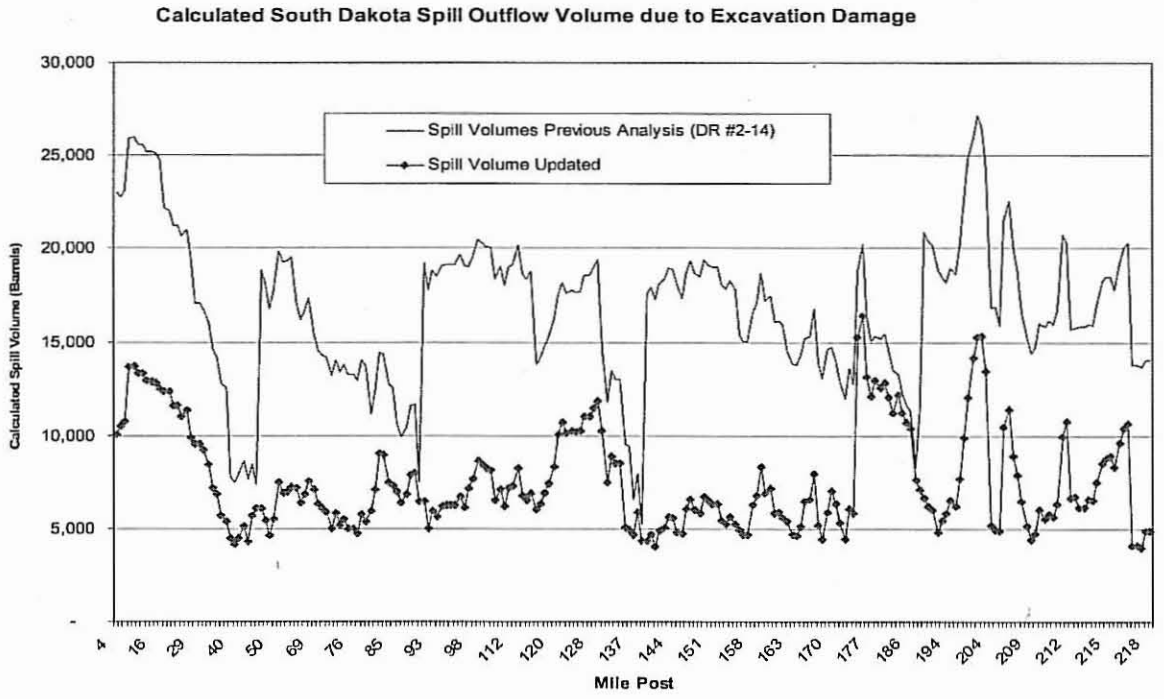
6. At unnumbered Page 9, beginning at Line 15 Mr. Walsh indicates that the emergency response team would have to excavate and clamp a large leak within 45 minutes to limit a large leak to 25,000 barrels. Can you comment?

A: Keystone's analysis of spill volumes associated with the large leak scenario was comprised of two components. The first component being the dynamic phase, which accounts for the volume escaping the pipeline while the pipeline remains in operation with pumping units on line. The second component is the static phase, which accounts for the volume draining out of the pipeline after the pipeline has been shutdown and isolation valves closed.

The leak rate and associated volume lost during the dynamic phase is calculated based upon the pressure at the leak site as determined by the pipeline operating hydraulic profile and the corresponding pipeline flow rate. The leak rate and associated volume lost during the static phase is calculated assuming a driving pressure equal to the static head after the isolation valves are closed, with no reduction in pressure during the leak. Although this would not be the case during operations, no source or other methods of control are applied and all volume with the exception of that trapped due to the elevation profile, is allowed to escape.

Following a detailed review of the information provided in response to Staffs Data Request 2-14 it was discovered that overly conservative assumptions within the large leak

scenario were incorporate by Keystone's consultant DNV. Accordingly, a revised analysis has been completed and is provided below:



In addition, a similar analysis was completed for a pipeline flow rate of 591,000 barrels per day and it has been provided below:

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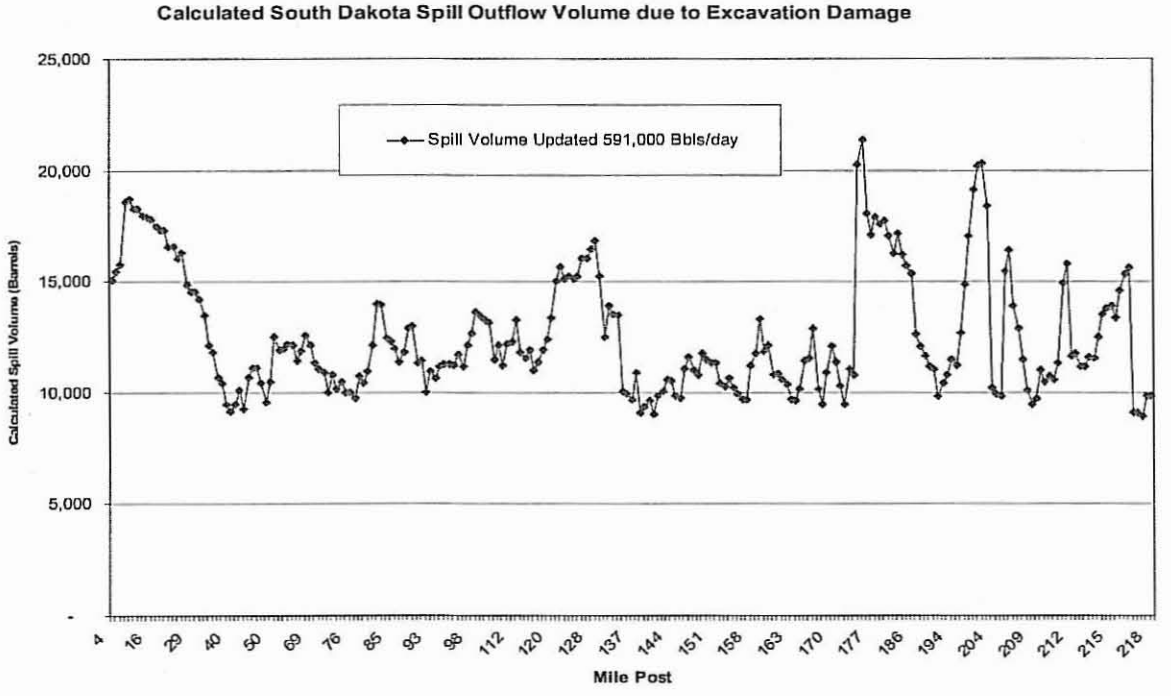

In order to provide additional background with respect to the methodology utilized to perform the above outflow analysis the following example calculation is provided for M.P. 175.29

Dynamic Phase

At this point along the pipeline, the leak rate is equal to the maximum pipeline flow rate of 24,625 barrels per hour. The leak is detected after 9 minutes with a corresponding 9 minutes allowed for shutdown of operating pumping units, followed by an additional 3 minutes for closure of isolation valves. This results in a total time of 21 minutes and yields a total volume of 8,619 barrels.

Static Phase

The length of isolated pipeline between valves located at Pump Station 23 and isolation valve 11 is 41.4 miles, however due to changes in elevation; only a volume corresponding to 2.4 miles of pipeline will escape. This yields a volume of 12,765 barrels.

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Accordingly, the total outflow volume due to a large leak at M.P. 175.29 is 21,384 barrels, which is comprised of 8,619 barrels during the dynamic phase and 12,765 barrels during the static phase.

It should also be noted that Keystone will perform additional spill outflow analysis to determine worst case discharge volumes, as the Emergency Response Plan (Oil Spill Response Plan) is updated to ensure compliance with applicable regulations, including 49CFR Part 194.

7. At Page 17, Item 25 along with Exhibit J, Mr. Miller indicates that an obvious data omission has occurred, in that the amount of time required to shut down the pumps has not been included within Keystone's spill volume calculations. Thus, Keystone's estimates could be understated by 27% to 75% depending on the size of the hole in the pipe. Can you comment?

A: Please see Item 6 of my rebuttal testimony.

8. At Line 71, Mr. Hannan indicates that: "Keystone has assumed that a pipeline response crew could be dispatched to plug small- and medium-sized holes in a reasonable amount of time. No timeframe was provided and such repair work would require considerable coordination and time to shut the line down, locate the release, uncover the line, and then make the repair. The statement implies a fairly quick fix to such an occurrence. This assumption underestimates the level of effort and time necessary to make the required repairs to the pipeline." Can you comment?

A: Keystone's Emergency Response Plan (Oil Spill Response Plan) will be developed to respond to a worst case discharge as required by regulations including 49CFR Part 194; accordingly adequate resources will be available to respond to small and medium size leaks.

010614

9. At Line 78, Mr. Hannan indicates that: "The study should be revised to better account for the likelihood of damage to the pipeline caused by the following excavation activities…" Can you comment?

A: Keystone did not include a risk associated with agricultural resources such as plowing and tilling, as it is unnecessary due to the minimum depth of pipeline burial of 48 inches.

10. Does this conclude your testimony?

A: Yes it does.

Dated this 26 day of November, 2007.

BRIAN THOMAS

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **REBUTTAL TESTIMONY OF HEIDI TILLQUIST**

1. State your name and occupation

A: Heidi Tillquist, Senior Project Manager and Environmental Toxicologist, ENSR, Fort Collins, CO.

2. Did you provide direct testimony in this proceeding?

A. Yes

3. In rebuttal, to whose direct testimony are you responding?

A. I am responding to the direct testimonies of Edward Miller and Curt Hohn.

4. Mr. Edward Miller at p. 8 and 9 of his testimony, discusses pipeline spill records from the Office of Pipeline Safety Database. Can you comment?

A. Many of the values reported by Mr. Miller are not reproducible. For example, spill volumes for hazardous liquid pipelines do not average 660 barrels as identified in Exhibit C (Table 1).

Table 1 Spill Volumes Based on the PHMSA Database

	All Hazardous Liquid Pipelines	Crude Oil Pipelines [1]
Mean (barrels)	287	164
Median (barrels)	3.0	3.0
Minimum (barrels)	0.0	0.0
Maximum (barrels)	49,000	33,000

[1] Values if database is modified to remove non-petroleum hydrocarbons (e.g., ammonia, CO2), highly volatile liquids (e.g., ethane, propane), offshore pipelines, and aboveground facilities not associated with Keystone (e.g., aboveground storage tanks).

5. Mr. Miller, in Item 22 and 23, indicates that it is inappropriate to use pipeline data sources outside of North America. Can you comment?

A. Inclusion of pipeline data from other countries is relevant. This data source was used to evaluate the probability of external force damage. This data is more robust than information available in the US. Further, the risk of external force damage is independent of the commodity transported. Thus, use of these data strengthens the DNV analysis.

Additionally, 67 percent of the pipelines in the US are pre-modern pipelines, i.e., they are constructed before 1970. These older pipelines were not manufactured, designed, constructed, or operated under the same standards as modern pipelines. Pipelines in most other countries are significantly younger in comparison and can offer insights on improved safety of modern pipelines.

6. Mr. Hohn discusses the amount of soil that could be contaminated. Can you comment?

A. The information cited by Mr. Hohn references Keystone's Risk Assessment. This assessment conservatively calculated the potential volume of soil that might be contaminated by a 2,000 barrel spill. Examination of the PHMSA database shows that these values are extremely

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conservative. For spills greater than 2,000 barrels occurring since 2002, PHMSA data indicate that the median volume of soil remediated was 2,500 cubic yards.

7. Does this conclude your rebuttal testimony?

A. Yes it does.

Dated this _26th_ day of November, 2007.

HEIDI TILLQUIST

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)	HP 07-001 **CERTIFICATE OF SERVICE**

I hereby certify that the following listed documents were served upon all of the parties listed below on the 26th day of November, 2007, either electronically or by mailing a true and correct copy thereof to them by first class mail, postage prepaid, at their last known addresses, to-wit:

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Rebuttal Testimony of Heidi Tillquist

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Rebuttal Testimony of Lillian Anderson

5 pages including cover page

PUC 866-757-6031

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPLINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	)))))))	**REBUTTAL TESTIMONY OF LILLIAN ANDERSON**

Q1. State your name and occupation

A. Lillian Anderson, 12189 – 415th Ave, Langford, SD 57454. My husband and I owner and operator a livestock and grain farm in Marshall County located west of Langford, SD.

Q2. Did you provide direct testimony in this proceeding?

A. Yes

Q3. To whose rebuttal testimony are you responding in this rebuttal testimony?

A. I am responding to the rebuttal testimony of Mr. Michael Koski.

Q4. Which portion of Mr. Koski's rebuttal testimony are you responding to?

A. I am responding to Mr. Koski's statement that he does not anticipate any significant overall effects to crops and vegetation associated with heat generated by operation of the Keystone Pipeline. In his rebuttal testimony Mr. Koski states that based on the research he cited, he does not anticipate any significant overall effects to crops and vegetation associated with heat generated by operating the Keystone pipeline. First of all, much of the literature he cited is based on studies conducted in Texas, Missouri and southeastern United States and is not representative of South Dakota soil and weather conditions. South Dakota has changing seasons with hot dry summers and bitter cold winter weather which drives frost down into the soil 4 to 5 feet deep. The cumulative effects of a higher soil temperature throughout the year

and its effect on plant development have not been taken into consideration by Mr. Koski or the applicant TransCanada-Keystone. Scott Anderson's testimony correctly stated that insects, disease and weeds could become a problem for farmer s and landowners along the route of the pipeline if the ground is unable to sustain a hard annual freeze because of the heat of the oil line buried 4 feet deep. Rodents and varmits will find the warmth of the trench line inviting which will result in colonies establishing along the heated line.

Q5: Mr. Koski's rebuttal states that while soil temperature should not adversely affect crop or vegetation growth, the information he includes does indicate that low soil moisture, corresponding drought and high air temperatures will. Do you have a response to that statement?

A: Yes. Anyone who has lived and farmed in South Dakota for any length of time has dealt with drought conditions and high air temperatures on an annual basis. As described in the Soil Survey of Marshall County published by the USDA-NRCD, several soil types which make up most of eastern Marshall County are susceptible to soil blowing and erosion. The addition of a heated buried pipeline along the pipeline route will exacerbate those conditions, drying out the top soil and make the top soil far less productive and possibly even useless for normal farm production as we know it in this area. The heat of the oil in the pipe would act much like a tube pipe system installed under a garage floor and attached to a boiler or heat source. The buried coil or pipe heats the concrete floor mass which in turn heats the room. When a car is driven into a garage during the winter with ice and snow on it by morning the ice has melted away, the floor is dry and all that is left is the road dirt and sand that has fallen off the vehicle. The heat

from the Keystone Pipeline will impact the farm land it crosses in the same way. The soil will be dry and warm year around, top soil will be dried and moisture will be gone, and the easement right of way secured or condemned by TransCanada will be of no value for agricultural purposes and acres of land will be lost to production along the 220 miles pipeline route.

Alternately, those highly fertile areas in eastern Marshall County may see reduced fertility due to the heat of the pipeline and its effects on the surrounding soil, by drying out the soils, and limited crop cover to reduce soil blowing and erosion. As noted in the Soil Survey of Marshall County, South Dakota, due to the nature of the soils in eastern Marshall County the primary concerns are conserving soil moisture, reducing evaporation, limiting runoff, controlling erosion and soil blowing.

Q6 TransCanada has indicated that the heat from the pipeline will range from 75-80 degrees.

A: Mr. David Schramm's testimony, on behalf of the SDPUC, states that TransCanada indicates a maximum temperature value on the pipeline at 100.4 degrees F. The effect on crops and vegetation with a heated oil pipeline at this temperature will have long term negative impacts on crops grown in South Dakota? Corn, soybeans, alfalfa and other crops grown and flourish with the changing seasons and changing temperature. Crops need sun light and can tolerate warm days and cool summer nights but they will not grow in soil that is a sustained 100 degree temperature. TransCanada claims that the landowner will have full use of their the right of way area to farm once the pipeline is installed but that is not true because of the pipeline will raise the temperature of the soil reducing productivity.

Q7 Does that conclude your remarks?

71 A. Yes, at this time.

72

73 Date this 29th day of November, 2007 Lillian Anderson

74 Lillian Anderson

Dustin Johnson, Chair
Gary Hanson, Vice Chair
Steve Kolbeck, Commissioner

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

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November 28, 2007

RE: TransCanada Keystone Pipeline, LP

Enclosed you will find copies of Surrebuttal Testimony of Jenny Hudson, two Surrebuttal Testimonies of John Muehlhausen, Surrebuttal Testimony of Dan Hannan, Surrebuttal Testimony of Tom Janssen, Surrebuttal Testimony of Brenda Winkler, Surrebuttal Testimony of William Walsh and Surrebuttal Testimony of David Schramm with reference to the above captioned matter. This is intended as service upon you either by mail or electronically.

Very truly yours,

Kara Semmler

Enc.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of Jenny Hudson on Behalf of the Staff of the South Dakota Public Utilities Commission

November 28, 2007

Q. Please State your name, business address, and occupation.

A. My name is Jenny Hudson. My business address is 7135 Janes Avenue, Woodridge, Illinois, 60517. I am employed as a Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design services for the oil and gas industry.

Q. Did you provide written testimony in this proceeding?

A. Yes.

Q. In surrebuttal, to whose testimony are you responding?

A. I am responding to the direct testimonies of Raymond and Lillian Anderson.

Q. On page 1 of their direct testimony, the Andersons state that Keystone will not comply with Title 49, Part 195.6 Unusual Sensitive Areas (USA's). Can you please provide comment?

A. TransCanada has addressed USAs in section 3.2 of "Appendix B Preliminary Evaluation of Risk to High Consequence Areas". Per information in this document, TransCanada has identified drinking water HCAs using the National Pipeline Mapping System (NPMS). The United States Department of Transportation (USDOT) and the Pipeline and Hazardous Materials Safety Administration (PHMSA) gathered drinking water HCA information from public agencies such as state drinking water agencies and the Environmental Protection Agency.

As part of a preliminary evaluation, the process TransCanada has used to identify USAs appears to be acceptable. Based upon the intent of §195.452, it is not required for TransCanada to have identified every HCA at this time. However, PHMSA does expect pipeline operators to have identified HCAs by the time the pipeline begins operation.

Prior to the pipeline commencing operation, PHMSA would expect TransCanada to have a process for incorporating information obtained from local knowledge. Additionally, after the Keystone Pipeline begins operation, PHMSA would expect TransCanada to monitor the status of HCAs along the pipeline. Any newly identified HCAs are required to be incorporated into the Integrity Management Plan within one (1) year of identification.

Q. On page 2 of their direct testimony, the Andersons state that the Keystone Pipeline will not comply with the following aspects of Part 195 Appendix C:

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B. The rule requires an operator to include a process in its program identifying which pipeline segments could affect a high consequence area and to take measures to prevent and mitigate the consequences of a pipeline failure that could affect a high consequence area.

1. Terrain surrounding the pipeline (USGS maps).
2. Drainage systems such as small streams and other smaller water ways that could serve as a conduit to a high consequence area.

Can you please comment?

A. Yes. I will comment strictly from a regulatory perspective. First of all, I would like to point out that the intent of Appendix C is to provide additional guidance and clarification to a pipeline operator. Although the expectation is that in most cases a prudent operator will follow the guidance in Appendix C, it is not mandatory per the Integrity Management Rule.

The excerpt from Part 195 Appendix C that the Andersons provided in their testimony draws on three main points:

1. The rule requires an operator to include a process in its integrity management program for identifying which pipeline segments could affect an HCA.
2. An operator should consider terrain surrounding the pipeline and drainage systems when identifying HCAs that could be affected in the event of a pipeline release.
3. An operator must take measures to prevent and mitigate the consequences to an HCA in the event of a pipeline release.

First I will comment on point #1. This is a requirement and is not optional. Based upon documentation provided by TransCanada, they do have a preliminary process for identifying which pipeline segments could affect an HCA along the Keystone Pipeline. The final process will need to be formally documented in their Integrity Management Program and they will need to be able to demonstrate to the Pipeline and Hazardous Materials Safety Administration (PHMSA) that this process is appropriate.

Next, I will comment on point #2. Based upon information provided on page 4 of the ENSR report "Appendix B Preliminary Evaluation of Risk to High Consequence Areas", topographical maps were used to examine the terrain surrounding the pipeline. Additionally, in Ms. Heidi Tillquist's rebuttal testimony, she discusses how TransCanada plans on reviewing each HCA. This, according to her testimony, includes a field verification of the topography. Additionally, per information provided by TransCanada, it appears they have considered drainage systems through their proximity criteria.

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Again, I point out that per the Integrity Management Rule, HCAs and pipeline segments having the ability to affect a HCA do not need to be identified until the pipeline goes into operation.

Next, I will comment on point #3. The integrity management rule requires a pipeline operator to implement measures to prevent and mitigate the consequences of a pipeline failure. Through their Integrity Management Program, TransCanada will need to demonstrate how they have identified preventive and mitigative (P&M) measures and which P&M measures have been implemented. Per the Integrity Management Rule, it is not required for TransCanada to have P&M measures identified at this time.

Q. On page 7 of their direct testimony, the Andersons state "Plans filed with the U.S. State Department and the SDPUC failed to acknowledge that the Keystone oil pipeline would cross 8 rural water systems in South Dakota, shallow aquifers and thousands of farm wells". Additionally, they go on to say "under federal law, public water supplies are considered "High Consequence Areas" and must be protected". Can you please provide comment on this statement?

A. Yes. I have not determined what should and should not be classified as an HCA along the proposed pipeline route. To do so takes a detailed analysis. However, strictly speaking from a code perspective and from the information TransCanada has provided, they have performed a preliminary identification of HCAs using data from the National Pipeline Mapping System. By code, this is permissible.

I cannot comment if theses water systems referenced by the Anderson's should be considered HCAs. Prior to the pipeline going into operation, TransCanada should incorporate local knowledge in their HCA determination process and determine if there are additional USAs along the proposed pipeline route that are not indicated by the National Pipeline Mapping System. As necessary, these USAs should be incorporated into their Integrity Management Program.

Q. On page 7 of their direct testimony, the Andersons state "under federal law, public water supplies are considered High Consequence Areas and must be protected". Can you please provide comment on this statement?

A. Again, speaking strictly from a regulatory standpoint, this is a true statement provided the public water supply meets the definition of an Unusually Sensitive Area (USA) and provided analysis determines that a pipeline release could affect the water supply. I cannot say whether or not the water supplies the Andersons are referring to should be considered HCAs.

In the final Keystone Integrity Management Plan, TransCanada will need to demonstrate they have made a good faith effort to identify all HCAs that could be affected in the event of a pipeline release. In addition to using the NPMS to

identify HCAs, TransCanada should also have a process for incorporating local knowledge into their HCA identification process.

Additionally, as stated previously, TransCanada will need to demonstrate how they have identified preventive and mitigative (P&M) measures and which P&M measures have been implemented. Per the Integrity Management Rule, it is not required for TransCanada to have P&M measures identified at this time.

Q. In your opinion, does the HCA identification process used so far by TransCanada meet the intent of code?

A. At this time, based upon the information I have reviewed, the HCA analysis performed by TransCanada meets the intent of code for this stage of the pipeline design / construction process.

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BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of John Muehlhausen on Behalf of the Staff of the South Dakota Public Utilities Commission

November 28, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

SURREBUTTAL TESTIMONY OF JOHN MUEHLHAUSEN

Q: Please state your name and business address.

A: John Muehlhausen of Merjent, Inc. of 615 First Avenue Northeast, Suite 425, Minneapolis, Minnesota 55413.

Q: Did you provide direct testimony in this proceeding?

A. Yes.

Q: In rebuttal, to whose direct testimony are you responding?

A: I am responding to the direct testimony of Curt Hohn.

Q: According to Curt Hohn's testimony, the proposed project has the potential to cause irreversible long-term damage to native grasslands in every county crossed. Can you comment on this testimony?

A: Grasslands and prairies are, according to the Nature Conservancy, considered the most threatened vegetation communities in the United States. Although statistics vary, studies suggest that only a fraction of South Dakota's grasslands remain. Most has been lost to agriculture, urbanization, and mineral exploration, or has been altered by invasions of non-native plants.

According to the Environmental Impact Statement (EIS) for the Keystone Pipeline Project prepared by the U.S. Department of State, an estimated 29 miles of native prairie and/or grasslands along the construction right-of-way would be affected by the proposed project. The EIS describes potential pipeline impacts on native prairies as "irreversible" because destruction of the sod layer during trenching may require more than a century to recover.

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As with other issues, there are varying opinions on the nature, degree, and significance of pipeline impacts on native prairies in general. Environmental Assessments and Environmental Impact Statements prepared for other pipeline projects by other agencies suggest that pipeline construction impact on native prairies and grasslands generally ranges from temporary and minor (less than 3 years) to long term (about 20 years) (for examples refer to environmental analyses prepared for Federal Energy Regulatory Commission dockets CP04-400-001, CP04-413-000, CP05-50-000, CP07-90-000, and CP07-207-000, and Bureau of Land Management case numbers COC-69548 and WYW-166510).

Pipeline impacts on prairies are probably long term. Reestablishing species diversity and rebuilding prairie sod likely would take several years. However, it is illogical to suggest that removal of the sod layer over the pipeline trench results in a total and irreversible loss of prairie. Once construction is complete, TransCanada would restore native prairie using native seed mixes specified by applicable state and federal agencies such that no net loss of native prairie habitat would occur. Prairie grass would begin to grow during the first season after construction and would start establishing habitat suitable for wildlife and livestock. Fully functional prairie vegetative cover would probably occur three to seven years following construction, although species diversity and sod/soil conditions could take several more years to become reestablished similar to preconstruction conditions.

The Department of State indicated in its EIS that it would require TransCanada to minimize impacts on native prairie by requiring the siting extra workspaces outside of native prairie habitats, minimizing the width of the construction area within native prairie

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areas, and continuing consultation with federal and state management agencies on avoidance of native prairie impacts. Where impacts on native prairie are unavoidable, the Department of State would require TransCanada to replace/restore prairie on a 1:1 basis, and monitor restoration in native prairies to ensure that native species become established and to ensure no net loss of native prairie habitats.

The South Dakota Public Utilities Commission could further enhance prairie and grassland restoration by requiring the following additional mitigation measures, which are largely consistent with the publication "Prairie Oil and Gas: a Lighter Footprint" by H.M. Sinton, 2001.

- **Limit grading and avoid soil rutting and sod disturbance in native prairies and grasslands to the maximum extent practical.**
- **Strip topsoil from over the trenchline in native prairies and grasslands to preserve roots, rhizomes, bulbs, corms, and rootstocks. Replace topsoil to its original horizon during backfilling.**
- **Conduct construction in native prairie and grasslands in the fall after seed drop to achieve better native plant re-establishment.**
- **Use prairie protector blades to reduce scalping of sod during soil replacement in native prairie and grassland. Prairie protectors are flexible plastic blades that can be attached to cat or backhoe blades.**
- **Develop a plan for salvaging a portion of the native prairie and grassland sod for use in restoration (onsite and/or offsite). Sod cutters used in the lawn industry do not work well for cutting prairie or grassland sod because they do not cut deep enough. Asphalt cutters attached to a backhoe have been**

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used successfully. The sod salvage plan should be prepared by a qualified prairie restoration specialist and submitted to the South Dakota Public Utilities Commission for review and approval prior to construction.

Q: According to Curt Hohn, the pipeline would impact "Dakota skipper" and the "western prairie fringed orchid" species found in Marshall, Day, Clark and Beadle Counties. Can you comment on this testimony?

A: The western prairie fringed orchid is a federally threatened species and the Dakota skipper (butterfly) is a candidate species eligible for federal listing. Federally threatened species are afforded more legal protection than candidate species.

As a federally listed species, the Department of State is required by Section 7 of the Endangered Species Act (Title 19 USC Part 1536(c)) to ensure that any actions authorized, funded, or carried out by the agency, including issuance of a permit to TransCanada for the Keystone Pipeline Project, do not jeopardize the continued existence of the western prairie fringed orchid or result in the destruction or adverse modification of its designated critical habitat.

According to the EIS prepared for this project by the Department of State, the proposed project has the potential to adversely affect the western prairie fringed orchid. By law, the Department of State must enter into formal consultations with the U.S. Fish and Wildlife Service, and the U.S. Fish and Wildlife Service must issue a biological opinion as to whether or not the project would likely jeopardize the continued existence of the western prairie fringed orchid or result in the destruction or adverse modification of its designated critical habitat. If a no jeopardy if found, the U.S. Fish and Wildlife Service may still require reasonable and prudent measures be implemented where an

"incidental take" may occur. If jeopardy is found, the Department of State must then confer with the U.S. Fish and Wildlife Service to identify alternatives to avoid jeopardy. The alternatives can be then implemented to avoid jeopardy. In any case, although the project may result in incidental impacts on the orchid, the project would not jeopardize the continued existence of the species.

Although highly unusual, an exemption from the Endangered Species Act could be obtained for the western prairie fringed orchid. The exemption process is seldom used, and requested exemptions are not always granted. Even when one is granted, the action agency may be required to adopt specific measures when implementing the proposed action. The exemption process begins only after a species is listed, consultation has occurred, a finding has been made that the action is likely to jeopardize a species, and it is determined that there are no reasonable and prudent alternatives to the agency action. The exemption process is the principle way in which economic factors are intended to be taken into account under the Endangered Species Act.

The Department of State is required by Section 7 of the Endangered Species Act to consult with the U.S. Fish and Wildlife Service in the same manner for candidate species as for listed species. According to the EIS, the proposed project has the potential to adversely affect the Dakota Skipper and the Department of State must complete formal consultations with the U.S. Fish and Wildlife Service and receive a biological opinion from the U.S. Fish and Wildlife Service. If the biological opinion determines that the project would likely jeopardize the continued existence of the Dakota skipper or result in the adverse modification of critical habitat proposed to be designated, the Department of State must then confer with the U.S. Fish and Wildlife Service regarding ways to reduce

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adverse effects. Following conference, the U.S. Fish and Wildlife Service is required to issue a report containing recommendations for reducing adverse effects. These recommendations would be discretionary and the Department of State would not be legally obligated to follow the recommendations. However, the Department of State could adopt the recommendations and require TransCanada to implement the recommendations as a condition of its permit.

Given the rigorous consultation process that must be undertaken between the Department of State and U.S. Fish and Wildlife Service, it seems unlikely that the proposed project would jeopardize the continued existence of the western prairie fringed orchid or Dakota skipper or result in the destruction or adverse modification of their designated critical habitats.

010639

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of John Muehlhausen on Behalf of the
Staff of the South Dakota Public Utilities Commission
November 28, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

SURREBUTTAL TESTIMONY OF JOHN MUEHLHAUSEN

Q: Please state your name and business address.

A: John Muehlhausen of Merjent, Inc. of 615 First Avenue Northeast, Suite 425, Minneapolis, Minnesota 55413.

Q: Did you provide direct testimony in this proceeding?

A. Yes.

Q: In surrebuttal, to whose rebuttal testimony are you responding?

A: I am responding to the rebuttal testimony of L.A. Buster Gray.

Q: Do you agree with L.A. Buster Gray's rebuttal testimony, which states, "the best party to monitor and assess crop's productivity after a two year period is the landowner, and should there be a productivity loss issue, the landowner will advise Keystone."

A: No, I do not necessarily agree that the best party to monitor and assess crop productivity is the landowner, although in some instances it may be. Although diminished productivity will, in many instances, be visually obvious from the crops' physical condition, that may not always be the case. Furthermore, proper monitoring requires time, money, expertise, and other resources. A landowner may or may not have time, money, expertise, or other resources at their disposal to effectively assess crop productivity. Regardless, TransCanada indicated that it would monitor the yield of land impacted by construction with the help of agricultural specialists when requested by the landowner.

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The real issue associated with crop monitoring centers around the passive nature of TransCanada's proposal, which requires monitoring only when requested by the landowner. This passive condition assumes fields have returned to preconstruction yields unless a landowner has taken the time to identify areas of diminished productivity and made an effort to complain to TransCanada. It shifts a portion of the responsibility for returning fields to preconstruction conditions from TransCanada onto the landowner. It effectively amounts to "acceptance by omission" and is further complicated by the fact that landowners may not be aware that they can or should request yield monitoring in suspected areas of diminished productivity, especially when two or more years have passed after construction.

The recommendation I provided in my direct testimony would require TransCanada to monitor the yield of agricultural lands and hay fields until successful restoration could be demonstrated, unless waived in writing by the landowner. This would keep the burden of restoration largely on TransCanada. Understandably, TransCanada may be concerned with the cost associated with monitoring of all affected agricultural lands and hay fields in South Dakota after construction. As an alternative to my original recommendation, the Commission could consider a less comprehensive, but cost-saving measure that would require TransCanada to:

- **Send a letter to all owners of agricultural land and hay fields within the project work area reminding them of their right to request yield monitoring if they believe productivity has been diminished as a result of construction. The letter should be sent in the second quarter of each year for three years following construction. Upon landowner request, TransCanada should**

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monitor the yield of agricultural lands and hay fields impacted by construction. Monitoring should be conducted until the area is successfully restored to yields which are similar to adjacent portions of the same field that were not disturbed by construction. TransCanada should compensate the landowner for reduced yields at market rate until the area is successfully restored.

Q: **Can you comment on L.A. Buster Gray's rebuttal testimony regarding mitigation for pipeline construction near residences?**

A: Yes, in his rebuttal to my direct testimony Mr. Gray did not dispute or refute any of the mitigation measures for pipeline construction near residences, he merely outlined some of the mitigation measures already contained in TransCanada's Construction Mitigation and Reclamation Plan. The Construction Mitigation and Reclamation Plan is a very good document and TransCanada should be commended on the plan. However, there is room for improvement. One area that could be improved is mitigation for pipeline construction near residences. The additional measures in my direct testimony improve, clarify, and/or emphasize residential mitigation in the plan. Following is a point-by-point discussion of the measures provided in my direct testimony.

- **TransCanada should coordinate construction work schedules with affected residential landowners prior to the start of construction.**

The Construction Mitigation and Reclamation Plan proposed by TransCanada requires only that residents be notified prior to construction; it does not require the coordination of the construction work schedules with affected residents. TransCanada should consider input from the affected residential landowner regarding the most

satisfactory time for construction through the area. Although TransCanada may not be able to satisfy all schedule requests, many requests may be easy to accommodate.

- **TransCanada should maintain access to all residences, except for brief periods essential to pipe-laying as coordinated with affected residential landowners.**

The Construction Mitigation and Reclamation Plan proposed by TransCanada requires that access and traffic flow in residential areas be maintained during construction activities, particularly for emergency vehicles. However, it is not clear if access would be maintained to each home, or if access would just be maintained on the streets in the vicinity of the homes. The idea that access to individual homes could be blocked during construction was derived, in part, from Mr. Gray's comments during the Commission's public meetings where he suggested that special arrangements could be made when access needs to be kept open to a particular home (see page 83 of the transcript to the June 27, 2007, public meeting in Britton, South Dakota). The purpose of the proposed mitigation is to clarify that, if TransCanada would block access to a residence, they should do so only for the brief period essential to laying the pipe and should coordinate the timing of the closure with the affected residential landowners.

- **TransCanada should install temporary safety fencing to control access and minimize hazards associated with an open trench in residential areas.**

The Construction Mitigation and Reclamation Plan proposed by TransCanada requires fencing the edge of the construction work area adjacent to residences for a distance of 100 feet on either side of the residence and fencing or plating open ditches during non-construction activities. These are important safety precautions, but may not

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be sufficient in all locations. Some residential areas may have swing sets, sand boxes, barbeque pits, outdoor patio sets, trampolines, or other areas that should be fenced but are more than 100 feet from the residences. The mitigation in my direct testimony is general in nature and is intended to account for fencing these areas as well, although being more specific could also be beneficial.

- **TransCanada should notify affected residents in advance of any scheduled disruption of utilities and limit the duration of any interruption to the smallest time possible.**

The Construction Mitigation and Reclamation Plan proposed by TransCanada does not address disruption of utilities. If TransCanada would disrupt utilities, TransCanada should notify affected residents in advance and limit the duration to the smallest time possible.

- **TransCanada should repair any damages to property that result from construction activities.**

The Construction Mitigation and Reclamation Plan requires TransCanada to restore all lawn areas, shrubs, specialized landscaping, fences, other structures, *etc.* consistent with its preconstruction appearance or the requirements of the landowner (presumably as specified in TransCanada's construction agreement with the landowner). This is consistent with the recommendation in my direct testimony.

- **TransCanada should restore all areas disturbed by construction to preconstruction conditions or better.**

The Construction Mitigation and Reclamation Plan requires TransCanada to restore all lawn areas, shrubs, specialized landscaping, fences, other structures, *etc.*

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consistent with its preconstruction appearance or the requirements of the landowner. This is consistent with the recommendation in my direct testimony.

Q: Can you comment on L.A. Buster Gray's rebuttal testimony regarding restoration of roads?

A. Mr. Gray's rebuttal testimony was in response to my direct testimony in which I recommended that TransCanada be responsible for "restoring [road] deterioration caused by construction traffic such that the road is returned to its preconstruction condition or better." Based on his rebuttal, Mr. Gray is concerned that the mitigation, as written, would require road improvements on every road where a project-related vehicle has traveled, and all roads would be required to be restored to their exact preconstruction state. This is not the intent of the mitigation. The mitigation is intended to require TransCanada to restore evident, discernible damage and deterioration caused by construction traffic such that the restored road would be of a makeup, quality, and integrity consistent with its preconstruction condition or a better condition. The mitigation could be clarified as follows:

- **TransCanada should implement a regular program of road maintenance and repair throughout active construction to keep paved and gravel roads in an acceptable condition for travel by the public. Following construction, TransCanada would be responsible for restoring evident, discernible damage and deterioration caused by construction traffic such that the restored road would be of a makeup, quality, and integrity consistent with its preconstruction condition or a better condition. Repairs during and after construction would be consistent with federal, state, and local requirements.**

010646

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of Dan Hannan on Behalf of the Staff of the South Dakota Public Utilities Commission

November 28, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

SURREBUTTAL TESTIMONY OF DAN HANNAN

Q: Please state your name and address.

A: Dan Hannan, 1087 100th St., Roberts, WI 54023

Q: Did you provide direct testimony in this proceeding?

A. Yes.

Q: To whose rebuttal testimony are you responding?

A: I am responding to the testimony of Curt Hohn, and the rebuttal testimony of Heidi Tillquist.

Q: In the second paragraph of page 7 of Curt Hohn's testimony, Mr. Hohn states "TransCanada is asking South Dakota to accept an unreasonable risk of a crude oil leak or spill occurring resulting in irreversible damage to 220 miles and thousands of acres of productive farmland, millions of acre feet of ground water, hundreds of creeks and streams, wetlands, and the groundwater aquifers, rivers, creeks, wetlands and private property in eastern South Dakota." Can you comment on Mr. Hohn's statement that a crude oil leak or spill would result in "irreversible damage"?

A: Yes. The petroleum industry has been responding to releases of varying sizes for many years. Many petroleum remediation and containment technologies have been successfully used to mitigate petroleum impacted soil, surface water, and groundwater. Spills or releases of petroleum pipelines vary in size and complexity. The remediation technique selected for a spill or release is site specific and based on environmental risk factors. In many cases, spills or releases are remediated quickly and the release area is

restored to pre-existing conditions. Where the short term remediation of petroleum cannot completely remove all impacted materials, groundwater monitoring systems, remediation systems, or other forms of mitigation are employed to facilitate an environmental gain. The level of effort required of the pipeline operators to achieve the appropriate level of remediation that is protective of the environment and public health will be dictated by the South Dakota Department of Environment and Natural Resources. An example of how recovery, remediation and restoration efforts can mitigate the damage caused and create an environmental gain is provided below.

A 150,000 gallon crude oil release occurred near Little Falls, Minnesota in June of 2006 from a Koch Pipeline (operated by Minnesota Pipeline). The site location was a 75 acre farmstead that contained stands of aspen trees and pothole wetlands. The release was the result of a sudden rupture that prompted the immediate shut down of the pipeline. The release was initially contained via heavy equipment with the construction of earthen berms. The initial cleanup phase of the incident involved the recovery of approximately 79,000 gallons of crude oil via vacuum trucks, the excavation of approximately 31,000 tons (20,000 cubic yards) of heavily impacted soil, the removal of approximately 212,000 gallons of contaminated ground water from dewatering activities at the base of the excavation and from adjoining wetlands. Soil samples were collected from the excavation boundaries to confirm the removal of impacted soils and the excavation was backfilled. The Minnesota Pollution Control Agency found the soil clean up acceptable and required the installation and quarterly testing of a groundwater monitoring network in July 2007.

Although the results of groundwater monitoring identified low levels of petroleum constituents in the shallow groundwater (a non-drinking water aquifer located near the

ground surface), site specific conditions revealed that only limited migration of contaminants would occur. No further remediation was required and ongoing monitoring was required to assess the success of natural attenuation of groundwater impacts.

The crude oil release primarily impacted farmland with some damage being caused to aspen trees and a small wetland. Restoration objectives included the restoration of the impacted wetland and uplands to a condition as good as or better than existed at the time of the release. In this case, Koch Pipeline was required to create a new wetland and upland wildlife habitat (totaling eight acres) to offset the temporary loss of ecological function of the four acres actually impacted for the time between the oil release and the completion of cleanup and restoration activities. This restoration also included establishing native plant communities appropriate to the region and the property.

Q: **Ms. Heidi Tillquist's rebuttal testimony (item 5) included comments on downstream planning distances relating to pipeline releases. Her rebuttal testimony confirms that Keystone plans to further assess and determine the appropriate downstream planning distances for releases associated with the pipeline. It appears Keystone intends to meet the objectives of 49 CFR Part 195. Do you have additional comments and reasonable recommendations for Keystone that would be protective of the South Dakota environment and public health?**

A: Planning requirements per 49 CFR parts 194 and 195 require pipeline operators to take appropriate actions to prevent and be prepared to respond to releases from their line including a "worst case discharge" during inclement weather. A release from a pipeline rupture is capable of approaching those of fixed facilities with large storage tank capacity (one million gallons plus). Under the 40 CFR part 112 regulations (OPA 90), fixed

facilities are required to calculate downstream planning distances for worst case discharge scenarios. For large river systems the planning distances often exceed 20 miles or more. Rivers can experience quickly changing conditions (100 year rain events, spring melt or floods) that can make containment and recovery on a river very challenging even for the most experienced on-water personnel. For these reasons, and those described below, planning distances beyond 5 miles are greatly encouraged.

The length of time it takes to mobilize and deploy equipment: and the driving distances and logistics of reaching launch and recovery locations can take considerable time. River current velocities can exceed 5 knots (greater than 5 miles) per hour. That means that after one hour, the leading edge of a release would be 5 miles down river. Inclement weather and the dynamics of the waterway including river size (depth and width), current velocities, seasonal effects (water volume, speed) and the presence of structures such as wing dams, locks and dams, "dead heads" (submerged or floating trees), sand bars, back water channels, etc. can all prove to be very challenging. In some cases, strong winds can result in oil blowing upstream of the release point a considerable distance. Although relatively simple in concept, the effective deployment of containment booms requires regular practice on varying types of river systems and during different times of the year/weather conditions.

For releases to moving waterways time is of the essence. Mobilization and deployment of distant response resources equates to a potential greater degree of environmental impact. The training and staging of response resources with local first responders (fire departments) has been employed in the neighboring state of Minnesota. The collective efforts of the River Defense Network and Wakota CAER in Minnesota utilize no less than 18 independent community fire departments and 10 industry partners to stage

equipment, drill and respond in time of need while providing hundreds of miles of protection for the Mississippi River. It has been identified in Minnesota that the most effective planning occurs when those that have a vested interest are involved, including local environmental resource managers, contracted spill response personal, and first responders. We recommend that in addition to the minimum requirements for release response planning, Keystone follow the model program implemented by the River Defense Network and Wakota CAER in Minnesota.

Q: Does this conclude your testimony?

A: Yes.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of Tom Janssen on Behalf of the
Staff of the South Dakota Public Utilities Commission
November 28, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

SURREBUTTAL TESTIMONY OF TOM JANSSEN

Q: Please state your name and business address.

A: Tom Janssen of Merjent, Inc. of 615 First Avenue Northeast, Suite 425, Minneapolis, Minnesota 55413.

Q: Did you provide direct testimony in this proceeding?

A. Yes.

Q: In surrebuttal, to whose rebuttal testimony are you responding?

A: I am responding to the rebuttal testimony of L.A. Buster Gray.

Q: Can you comment on L.A. Buster Gray's rebuttal testimony regarding dust control.

A: Mr. Gray's rebuttal testimony on dust control suggests that covering open bodied trucks to control dust is not necessary because dust from open-bodied trucks is inconsequential relative to dust from agricultural operations or from dust created by wheels from construction vehicles on non-paved roads.

Agricultural operations occur in fields, frequently away from the public roads, residences, buildings, developments, *etc.* Hauling soil and sand to and from the project area, on the other hand, would occur on public roads which pass by residences, buildings, developments, *etc.* As such, dust from hauling would be more likely to affect the public and would not necessarily be inconsequential relative to dust from agricultural operations. Furthermore, dust-generating agricultural operations typically occur during certain periods in the spring and fall. Hauling soil and sand would likely occur throughout the construction season (spring, summer, and fall).

Mr. Gray is correct that fugitive dust from open-bodied trucks could be inconsequential relative to dust created by wheels from construction vehicles on non-paved roads. However, this is not the case on paved roads, where fugitive dust would be created mainly from the open-bodied trucks.

The dust control mitigation recommended in my direct testimony was intended to be consistent with the mitigation also recommended by the United States Department of State in its Environmental Impact Statement for the project. However, when trucks are traveling on the construction right-of-way in the remote locations away from roads, residences, businesses, *etc.*, or when trucks are traveling on non-paved roads, the need to cover open-bodied trucks is greatly diminished. As such, the South Dakota Public Utilities Commission may want to consider less stringent mitigation. Following is a suggested less-stringent alternative:

- **Keystone should cover all open-bodied trucks while in motion on paved roads to reduce fugitive dust emissions.**

Q: Can you comment on L.A. Buster Gray's rebuttal testimony regarding topsoil segregation?

A: In his rebuttal to my direct testimony Mr. Gray stated that it is Keystone's position to let the landowner determine the topsoil stripping method that is preferred on their land. The mitigation in my direct testimony stated, "unless the landowner specifically approves otherwise, topsoil shall be segregated either along the full right-of-way or from the trench and subsoil storage area in actively cultivated or rotated crop lands and pastures, residential areas, hayfields, and other areas at landowner request." This mitigation is entirely consistent with Mr. Gray's rebuttal and allows the landowner

to specifically approve a preferred topsoiling method. However, in the absences of a landowner preference, Keystone would be required to conduct topsoil segregation in accordance with my original testimony. I would like to clarify that some areas, such as wetlands and native prairie, may contain special resources that could require topsoiling methods different from my recommendations. Topsoil methods to protect special resources should supersede the generic methods recommended in my original testimony.

Q: Can you comment on L.A. Buster Gray's rebuttal testimony regarding easement and workspace requirements in wetlands and forested areas?

A. Mr. Gray's rebuttal testimony was in response to my direct testimony in which I recommended the width of the construction right-of-way shall be limited to 75 feet or less in standard wetlands unless a wetland is actively cultivated/rotated cropland or non-cohesive soil conditions require utilization of a greater width.

In his rebuttal testimony, Mr. Gray stated that a 75-foot-wide construction right-of-way through wetlands was a requirement developed by the Federal Energy Regulatory Commission in the early 1990s. This is true. In 1992, the Federal Energy Regulatory Commission began requiring a 75-foot-wide construction right-of-way through wetlands for pipelines of all sizes, including large-diameter pipelines. This limitation was required even prior to 1992, although it was not "written policy" until the Federal Energy Regulatory Commission issued the first version of its Wetland and Waterbody Construction and Mitigation Procedures in 1992. The Federal Regulatory Commission has reaffirmed its position on a 75-foot-wide construction right-of-way through wetlands for pipelines of all sizes by including this requirement in all revisions of its "Wetland and Waterbody Construction and Mitigation Procedures," the most recent of which was

issued in 2003. Furthermore, the Federal Energy Regulatory Commission has incorporated by reference this requirement into its regulations (see 18CFR 157.206 and 18 CFR 380.12), which applies to all interstate natural gas pipeline construction, large and small.

In his rebuttal testimony, Mr. Gray stated that a contractor cannot excavate a trench for large diameter pipe, place spoil, and maintain workspace within 75 feet, particularly in locations of non-cohesive soils. The mitigation in my direct testimony stated that the width of the construction right-of-way should be limited to 75 feet or less in wetlands, unless non-cohesive soil conditions require utilization of greater width. As written, the mitigation addresses Mr. Gray's concern that extra workspace may be needed in areas of non-cohesive soils. Where wetlands do not contain non-cohesive soils, the pipeline right-of-way should be limited to 75 feet.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of Brenda Winkler on behalf of the
Staff of the South Dakota Public Utilities Commission

November 28, 2007

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

SURREBUTTAL TESTIMONY OF BRENDA WINKLER

Q: Please state your name and occupation.

A: Brenda L. Winkler, PG, Project Manger, Bay West Inc., Whitefish, MT 59937

Q: Did you provide direct testimony in this proceeding?

A: Yes.

Q: To whose testimony are you responding?

A: I am responding to the direct testimony of David Wade and Curt Hohn, and the rebuttal testimony of Heidi Tillquist.

Q: Mr. David Wade, General Manger, BDM Rural Water System, Inc expressed concerns about the Middle James aquifer. "This is our only source of drinking water and could easily become contaminated in the event of a crude oil or fuel spill. The Middle James aquifer is very close to the surface in the proposed crossing area. Most recharge to the James aquifer is by percolation of precipitation in ranges 58 and 59 W of T 128 N. This puts the proposed pipeline directly through the most important part of our drinking water source." Can you comment?

A: Although the Middle James Aquifer was not identified as a High Consequence Area (HCA) in the Draft Environmental Impact Statement (DEIS), the Middle James Aquifer could be considered a potential hydrogeologic sensitive area in northern Brown County where there is approximately 6 to 7 miles of Aeolian Sand deposits present at the ground surface. The Aeolian Sands have an average thickness of 45 feet and could be hydraulically connected to the water bearing zone of the Middle James Aquifer.

The Middle James Aquifer is a drinking water resource within the proposed pipeline corridor that is mainly located within Lacustrine silt and clay deposits. The water bearing zone of the Middle James Aquifer occurs in the lenticular sand and gravel deposits located within the Lacustrian silts and clays. The Middle James Aquifer is described as an artesian aquifer that is fed by the lower bedrock aquifers and, in Brown County, by the Elm aquifer to the west. In addition to the hydrologic connection from the Elm and

bedrock aquifer the Middle James also receives recharge from percolation of precipitation through the Lacustrine Silts and Clays.

Review of the *Geology and Water Resources of Marshall County, South Dakota,* South Dakota Geological Survey (SDGS), 1975, which is adjacent to Brown County, indicates that the Middle James Aquifer is not under artesian conditions and that the water bearing sands and gravels are in contact with the Aeolian Sand deposits. Therefore, it is possible that the Aeolian Sand deposits in Brown County are also in contact with the water bearing sands and gravels. If this geologic condition exists, the Middle James Aquifer could be potentially sensitive to a crude oil release. Review of the lithological cross section completed by the SDGS, Figure 13 (G-G') *Geology and Water Resources of Brown County, South Dakota*, indicates clay and silt deposits (< 1 meter) separate the sand units. In addition, this cross section along with a review of the bedrock maps of Brown County indicate that there is approximately 60 to 70 feet of separation between the land surface and the first occurrence of the Middle James Aquifer. Based on this degree of separation the risk to the aquifer is reduced.

With the exception of the 6 to 7 miles of Aeolian Sand deposits present in northern Brown County, a majority of the proposed pipeline route crosses Lacustrian and Glacial Till deposits primarily consisting of silts and clays. Groundwater is generally present in water bearing sand and gravel lenses and buried stream channels that are present within these Lacustrian and Glacial Till deposits. The silts and clays will typically inhibit the downward migration of groundwater and/or contaminants to any underlying groundwater adding a layer of protection for the water table aquifer in the event a release occurs.

Q: Mr. Curt Hohn, at page 2 of his testimony stated that "One of the few sources of quality water in the area is the glacial drift area that makes up the James Aquifer and the Deep James Aquifer located along the west edge of Marshall, Day and Clark Counties." Is the answer the same as it was for Mr. David Wade?

A: Yes.

Q: Mr. Curt Hohn, at page 12 of his testimony stated that "..the aquifer ranges from 8 to 50 feet from the soil surface and offers a reliable water supply..." Can you comment on this?

A: Although the water table is measured in some areas near the surface it is generally measured within the Lacustrine and Glacial Till silts and clays. Potable groundwater is obtained from the water bearing sand and gravel lenses and buried stream channels that are present within these Lacustrian and Glacial Till deposits. The silts and clays will typically inhibit the downward migration of groundwater and/or contaminants to any underlying water bearing sands and gravel zones, thereby adding a layer of protection in the event a release occurs.

Q: Ms. Heidi Tillquist, at page 6 of her rebuttal testimony responded to Mr. David Wades concerns regarding the Middle James Aquifer and concludes that any contamination would move away from, not toward the BDM water supply area and that the James Aquifer is generally confined under 50 to 100 feet of clay or till along the ROW through Marshall County and that groundwater contamination of the James Aquifer is unlikely due to the depth of the aquifer and due to the presence of confining layers. Can you comment?

A: Although the pipeline may be downgradient of (water moves away from) the BDM water supply area, it may be upgradient of (water moves towards) other users. In addition, the Middle James Aquifer could be considered a hydrogeologic sensitive area in northern Brown County where there is approximately 6 to 7 miles of Aeolian Sand deposits present at the ground surface that could be hydraulically connected to the Middle James Aquifer. Although the Middle James aquifer may not be considered a HCA, Keystone should consider voluntarily identifying this sensitive area in their integrity management plan and appropriately planning to further protect this resource.

Other areas of the proposed pipeline route have Glacial Till deposits primarily consisting of silts and clays that will add a layer of protection for resource groundwater aquifers in the event a release occurs.

Q: Ms. Heidi Tillquist, at page 8 of her rebuttal testimony responded to your concerns regarding geologically sensitive areas, the Niobrara formation in particular. Can you comment?

A: Subsequent discussions with Derik Isles, South Dakota Geologic Survey (SDGS) confirm there are no karst features and/or karst areas within the proposed pipeline route. The map that was included in the DEIS was an older regional United States Geological Survey map which identified geologic units that contained rock types seen in karst areas. However, karst areas do not exist in South Dakota in association with the Niobrara Formation.

Q: Does this conclude your testimony?

A: Yes it does.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of William Walsh on Behalf of the Staff of the South Dakota Public Utilities Commission

November 28, 2007

Q. State your name and occupation.

A. My name is William Walsh. My business address is 7135 Janes Avenue, Woodridge, Illinois, 60517. I am employed as a Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design services for the oil and gas industry.

Q. Did you provide direct testimony in this proceeding?

A. Yes.

Q. In surrebuttal, to whose rebuttal are you responding?

A. I am responding to the rebuttal testimony of TransCanada Engineer Meera Kothari and TransCanada Coordinator of Oil Movements, Brian Thomas.

Q. Ms. Meera Kothari, in Section 5 of her rebuttal, points out that the calculations for pipe wall thickness is incorrectly based on X80 grade pipe where Keystone is using X70 grade pipe for the project. Can you comment?

A. Ms. Kothari correctly provides the pipe wall thicknesses for the X70 design as 0.429 inches for the .72 design factor and 0.386 inches for the 0.80 design factor. I acknowledge the correction and thank her for bringing the point to my attention. The corrected design calculations based upon the X70 grade pipe are presented

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below. The 10% reduction in wall thickness between the .72 and .80 design factors remains unchanged.

80% SMYS design

- SMYS of the steel = 70,000 pounds per square inch (psi)
- OD = 30 inches
- Maximum Operating Pressure (MOP) = 1440 psi
- Design Factor F = 0.80
- Pipe Wall Thickness = 0.386 inches

72% SMYS design

- SMYS of the steel = 70,000 pounds per square inch (psi)
- OD = 30 inches
- Maximum Operating Pressure (MOP) = 1440 psi
- Design Factor F = 0.72
- Pipe Wall Thickness = 0.429 inches

(0.386" – 0.429") / 0.429" = -0.10 = 10% wall thickness reduction

Q. Ms. Kothari, in Section 6 of her rebuttal, discusses the use of API 5L Product Level Specification 2 in the Keystone project. Can you comment?

A. TransCanada is required by Condition 2 of the 80% SMYS Special Permit to use the requirements of API 5L Product Level Specification 2 in areas where the 80% SMYS allowance is permitted.

Q. Ms. Kothari, in Section 7 of her rebuttal, discusses depth of cover for the pipeline as specified in 49 CFR 195.248. Can you comment?

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A. The specification for depth of cover for buried liquid pipelines is 36" for normal excavation and 30" for rock excavation. TransCanada is required by Condition 20 of the 80% SMYS Special Permit to maintain a minimum depth of cover of 48" in all areas except consolidated rock in areas where the 80% SMYS allowance is permitted.

Q. Ms. Kothari, in Section 9 of her rebuttal, indicates that the pipe wall thickness for the Missouri River crossing is 0.622 inches. Can you comment?

A. Ms. Kothari indicated in her response to Data Request 6-19 that the wall thickness at the Missouri River crossing was 0.622 inches. The 0.611 inches reported in my testimony was a typographical error. I acknowledge the correction and thank her for bringing the point to my attention. The hydrostatic test pressure at the Missouri River crossing of 1981 psi for the 30 inch diameter, 0.622 inches, X70 grade pipe results in a stress in the pipe wall that is 68% of SMYS, not 60% as stated in my testimony.

Q. Ms. Kothari, in Section 11 of her rebuttal, indicates that the method of calculating outflow is conservative. Can you comment?

A. As stated in my testimony, the calculation for outflow was based on equations presented in the Frequency-Volume Study filed with the Keystone Siting Application. My request in the testimony was for Keystone to provide the

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assumptions that are used to produce the plot of spill volume estimates shown in Figure 2 of the response to Data Request 2-14. These assumptions apparently reduce the conservatism of the equations used in the Frequency-Volume Study, resulting in lesser estimated spill volumes. The rebuttal testimony of Mr. Thomas addresses the assumptions in more detail.

I would like to emphasize that these spill volumes are based on a 10 inch diameter hole in the pipe, similar to what might be caused during excavation damage. The depth of cover of 48 inches required reduces the likelihood of such an occurrence.

Mr. Thomas indicates that the leak model has been revised from that presented in the 'Frequency- Volume Study' submitted with the initial siting application. The model still consists of a dynamic phase and a static phase. The dynamic phase refers to the period of the release prior to pump shutdown and valve closure. The static phase accounts for the draining of the product after isolation.

The dynamic phase leak rate is determined by the pressure at the leak site based on the hydraulic profile and the corresponding pipeline flow rate. The maximum leak rate is equal to the flow rate – the pipeline can not leak more product than is flowing through the pipe. At locations on the pipeline where the pressure is below approximately 70 psi (near the suction side of a pumping station), the leak rate is determined by the orifice equation and may be lower than the flow rate. Mr. Thomas presents an example at South Dakota M.P. 175.29 (= M.P 392.29

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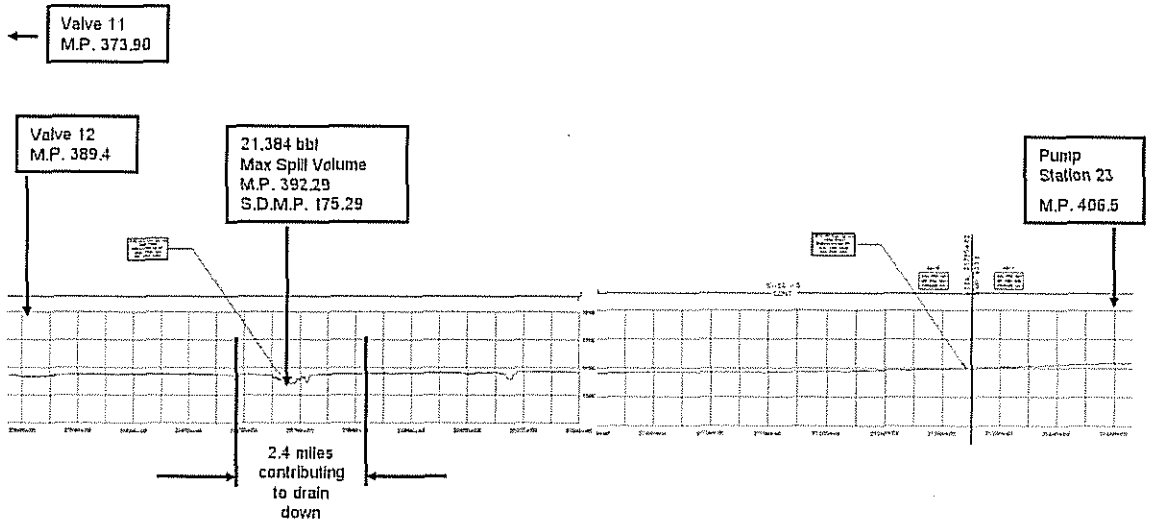
total pipeline) using a pipeline flow rate of 591,000 barrels per day. The leak rate during the dynamic phase is based on a 21 minute shutdown period. The product escaping during this time is estimated to be 8,619 barrels based on the flow rate. This is a reasonable estimate for the dynamic phase.

The amount of product escaping during the static phase is based on the volume between valve locations. All the volume is allowed to escape except that volume trapped due to the elevation profile. In the example, of the 41.4 miles between Pump Station 23 (M.P. 406.5 – total pipeline) and isolation valve 11 (M.P. 373.90 – total pipeline), all but 2.4 miles are trapped due to the elevation profile. This converts into a volume of 12,765 barrels released during the static phase from drain down. The total spill volume is estimated as 21,384 barrels - 8,619 barrels during the dynamic phase and 12,765 barrels during the static phase. The figure below illustrates the situation on the hydraulic profile sheet provided by Keystone in response to Data Request 6-35.



The figure assumes that South Dakota M.P 1 used in Mr. Thomas's rebuttal is equal to M.P. 217 based on the total pipeline. The example location South Dakota M. P. 175.29 would correspond to pipeline M.P. 392.29. If the mile post number conversion is correct, the pipeline segment lies between Valve 12 at M.P. 389.4 and pump station 23 at M. P. 406.5 as shown above.

The rebuttal testimony of Mr. Thomas includes a plot showing the maximum calculated spill volume along the pipeline in South Dakota assuming a pipeline flow rate of 591,000 barrels per day. The maximum spill volume corresponds to the example location above (South Dakota M.P. 175.29) of 21,384 barrels.

The example illustrates the following:

- At pipeline locations where no static phase discharge volume is expected, the maximum spill volume is the dynamic phase release volume of 8,619 barrels. This would correspond to locations at high local elevations. The plot of maximum calculated spill volume shows that this value is the minimum volume expected.
- The maximum estimated spill volume results from a static phase (drain down) release of 2.4 pipeline miles of product. This is the estimated maximum at any point along the pipeline in South Dakota.

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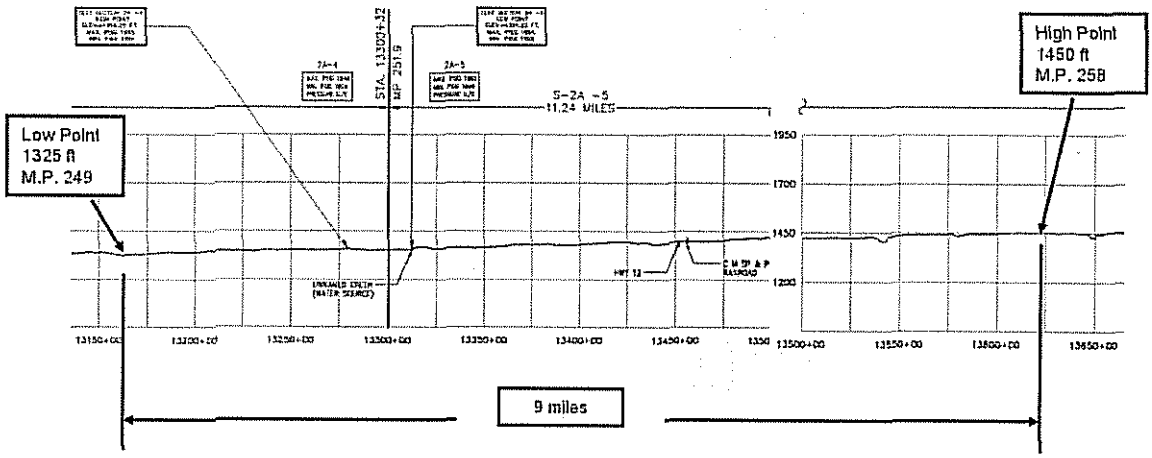
In my original testimony, I stated that the estimated leak value estimates were low, particularly for pipeline regions in the northern portion of the state. The revised estimates are lower still. Below is a plot of the pipeline segment on the hydraulic profile plot from M.P. 249 to M.P. 258. The difference in elevation is 125 feet between the locations. The gradual slope is relatively constant between these 2 locations. The Keystone model suggests that the total volume of drain down is less than 2.4 miles for this segment even if a leak occurred at the low point.



It is not obvious that any of the pipeline volumes shown above would be trapped due to the elevation profile. I therefore repeat my request that Keystone submit the assumptions used in the calculations of the spill volumes for review prior to the hearing. These assumptions may include criteria for determining what constitutes a trapped volume due to an elevation profile or any vacuum or siphon effects.

Q. Does this conclude your testimony?

A. Yes it does.

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BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP07-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITY ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT

Surrebuttal Testimony of David Schramm on Behalf of the Staff of the South Dakota Public Utilities Commission

November 28, 2007

I. Surrebuttal Testimony

Q. WHAT IS YOUR NAME AND OCCUPATION?

A. David Schramm, Vice-President and Senior Project Manager, Pipeline Integrity and Corrosion for EN Engineering.

Q. DID YOU PROVIDE DIRECT TESTIMONY IN THIS PRECEEDING?

A. Yes.

Q. IN THIS SURREBUTTAL, TO WHOSE REBUTTAL TESTIMONY ARE YOU RESPONDING?

A. In this surrebuttal, I am responding to the rebuttal testimony of Meera Kothari who has provided additional information in response to my direct testimony questions 9, 15, 16, 22, 23, 24 and 26.

Q. CAN YOU COMMENT ON THE ADDITIONAL INFORMATION PROVIDED WITH REGARD TO YOUR DIRECT TESTIMONY, QUESTION 9?

A. In my direct testimony, additional documentation with regard to Keystone's Supervisor Qualifications in the area of corrosion control was recommended as a condition of issuing a construction permit.

With regard to this recommendation, the rebuttal testimony of Meera Kothari provides additional information documenting the intent of Keystone to use qualified personnel from TransCanada's Asset Reliability Engineering and Operations Department to address §195.402(c)(3). Supervisors are to be registered professional engineers or registered professional technicians who hold certification and maintain continued education/professional development from industry bodies such as the National Association of Corrosion Engineers (NACE). Keystone acknowledges the requirements of USDOT 49CFR Part 195.555.

Based on the review of this additional information, Keystone's intent meets the requirements of this section of code (§195.557) and the conditional recommendations in my direct testimony are removed from Question 9.

Q. CAN YOU COMMENT ON THE ADDITIONAL INFORMATION PROVIDED WITH REGARD TO YOUR DIRECT TESTIMONY, QUESTION 15?

A. In my direct testimony, additional documentation with regard to corrosion control test leads (§195.567) was recommended as a condition of issuing a construction permit.

With regard to this recommendation, the rebuttal testimony of Meera Kothari provides additional information documenting the intent of Keystone to meet the requirements for the installation of test leads as required in the PHMSA Special Permit and commits to the use of industry recognized standards for their specification, location and use including: CGA's recommended practice, OCC-1, NACE Internationals Recommended Practice, RPO169, NACE International's Test Methods under TMO-4 and all applicable federal, state, local and district laws, codes and regulations.

Based on the review of this additional information, Keystone's intent meets the requirements of this section of code (§195.567) and the conditional recommendations in my direct testimony are removed from Question 15.

Q. CAN YOU COMMENT ON THE ADDITIONAL INFORMATION PROVIDED WITH REGARD TO YOUR DIRECT TESTIMONY, QUESTION 16?

A. In my direct testimony, additional documentation with regard to the examination of exposed portions of buried pipe was recommended as a condition of issuing a construction permit.

With regard to this recommendation, the rebuttal testimony of Meera Kothari provides additional information documenting the intent of Keystone to use existing TransCanada procedures and applicable industry practices and NACE, API, ASME codes for coating examination and non-destructive examination of the pipeline should excavations be required based on in-line inspection data. It is indicated that the non-destructive methods for examination which will be used by TransCanada are industry best practices and include magnetic particle inspection of defects, seams, and girth welds; and in addition, digital mapping of defects to calculate remaining strength of pipe so as to determine the appropriate repair methods required. Keystone indicates that they will meet the requirements of US DOT 49 CFR Part 195.569.

Based on the review of this additional information, Keystone's intent meets the requirements of this section of code (§195.569) and the conditional recommendations in my direct testimony are removed from Question 16.

Q. CAN YOU COMMENT ON THE ADDITIONAL INFORMATION PROVIDED WITH REGARD TO YOUR DIRECT TESTIMONY, QUESTION 22?

A. In my direct testimony, additional documentation with regard to Atmospheric Corrosion per US DOT 195.581 was recommended as a condition of issuing a construction permit.

With regard to this recommendation, the rebuttal testimony of Meera Kothari provides additional information documenting the intent of Keystone's atmospheric corrosion program. With regard to the special considerations of air-to-soil interfaces, Keystone's intent is to use liquid epoxy or FBE coating applied to the buried pipe extending to approximately 18 inches above grade. Afterwards a liquid epoxy will be painted (as a protective coating) down to grade level to prevent damage (*to the liquid or fusion bonded epoxy)* from the sun's ultraviolet rays. Keystone acknowledges its intent to meet the requirements of US DOT49 CFR Part 195.581.

Based on the review of this additional information, Keystone's intent meets the requirements of this section of code (§195.581) and the conditional recommendations in my direct testimony are removed from Question 22.

Q. CAN YOU COMMENT ON THE ADDITIONAL INFORMATION PROVIDED WITH REGARD TO YOUR DIRECT TESTIMONY, QUESTION 23?

A. In my direct testimony, additional documentation with regard to monitoring for atmospheric corrosion (§195.583) was recommended as a condition of issuing a construction permit.

With regard to this recommendation, the rebuttal testimony of Meera Kothari provides additional information documenting the intent of Keystone, as part of its integrity management program, to inspect for atmospheric corrosion at least once every three years but with intervals not to exceed 39 months as required under US DOT 195.583(a). Keystone indicates its intent to repair any coating as required by this inspection and indicates that they will meet the requirements of US DOT 49 CFR Part 195.583.

Based on the review of this additional information, Keystone's intent meets the requirements of this section of code (§195.583) and the conditional recommendations in my direct testimony are removed from Question 23.

Q. CAN YOU COMMENT ON THE ADDITIONAL INFORMATION PROVIDED WITH REGARD TO YOUR DIRECT TESTIMONY, QUESTION 24?

A. In my direct testimony, additional documentation with regard to US DOT 49 CFR Part 195.585 - repairs to corroded pipe was recommended as a condition of issuing a construction permit.

With regard to this recommendation, the rebuttal testimony of Meera Kothari provides additional information documenting the intent of Keystone, to conduct

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as part of its integrity management program, in-line inspection of the pipeline within the first three years of operation. Any repairs resulting from engineering analysis of the inspection data will be repaired using industry best practices in accordance with acceptable repair methods within ASME B31.4 and US DOT 49 CFR 195. Keystone indicates its intent to meet the requirement of US DOT 49 CFR Part 195.585.

Based on the review of this additional information, Keystone's intent meets the requirements of this section of code (§195.585) and the conditional recommendations in my direct testimony are removed from Question 24.

Q. CAN YOU COMMENT ON THE ADDITIONAL INFORMATION PROVIDED WITH REGARD TO YOUR DIRECT TESTIMONY, QUESTION 26?

A. In my direct testimony, additional documentation with regard to the standards that will apply for the use of direct assessment (DA) under the provisions of §195.588 was recommended as a condition of issuing a construction permit.

With regard to this recommendation, the rebuttal testimony of Meera Kothari provides additional information documenting the intent of Keystone to use TransCanada's direct assessment procedure and follow the NACE Standard RP-0502. Keystone indicates its intent to meet the requirements of US DOT 49 CFR Part 195.588

Based on the review of this additional information, Keystone's intent meets the requirements of this section of code (§195.588) and the conditional recommendations in my direct testimony are removed from Question 26.

Q. IS THERE ANYTHING ELSE YOU WOULD LIKE TO ADD WITH REGARD TO THIS SURREBUTTAL?

A. There are two (2) items that I would like to add:

1. For the most part, Subpart "H" of US DOT CFR 49 Part 195 focuses on the operational aspects of a pipeline facility; and as such, how a pipeline company responds to this section is typically detailed in the Company's operating procedures (i.e., policies, procedures, standards, and specifications).

   To date, Keystone (TransCanada) provides only high level summary information to document their intent to meet code requirements along with appropriately referenced supportive industry standards. Keystone has not provided any significant detail as to actual Company operational procedures, guidelines and actions that will be followed especially with regard to the TransCanada procedures or documents as referenced. Operating documents of this type are required under US DOT CFR Part 195.402. With respect to these Company Operating documents I cannot provide any comment or response.

   As such, the focus of my testimony has been on the discovery and intent contained in those documents submitted as part of testimony, rebuttal or surrebuttal and those originally provided as part of the revised April 10, 2007 – Petition of Trans Canada and the April 30, 2007 – PHMSA Grant of Waiver as it relates to US DOT CFR Part 195, Subpart "H".

   As documented, Keystone has the intent to meet the code requirements contained in US DOT CFR Part 195, Subpart "H" and provides applicable and appropriate industry reference documents and standards that Keystone will use. For some sections of code, Keystone is taking a more proactive approach to exceed code requirements whether done voluntarily or as directed under the Grant of Waiver.

2. In the TransCanada 7-10 data request, Keystone's proposed pipeline routing response to collocation with existing pipelines indicates three (3)

locations of collocation. These locations were discussed in my testimony under Question 20 and Exhibit M.

Based on follow-up review, several other pipeline crossings within the State of South Dakota were noted. These are:

Other Pipeline Crossing Locations

Approximate MP	Operator	Description
260.2	Northern Natural Gas (MidAmerican Pipeline)	Lateral to Webster
274.2	Northern Border Pipeline	Interstate Transmission Line (42")
292.9	Northern Natural Gas (MidAmerican Pipeline)	Mainline from Sioux Falls to Aberdeen
319.6	Northern Natural Gas (MidAmerican Pipeline)	Lateral to Huron
375.7	Northern Natural Gas (MidAmerican Pipeline)	Lateral to Mitchell

Collocation or cohabitation is when differently operated pipelines, or even electrically and independently isolated pipelines are installed in common rights-of way. When multiple pipelines are installed in common rights-of-way, additional measures are required to ensure that representative pipe-to-soil potentials are obtained over the line being inspected. At times, this can also increase the difficulty in locating the pipeline. This is not an issue as TransCanada indicates that there are only three (3) actual pipeline collocations with other regulated pipeline facilities in South Dakota and minimal common rights-of-way congestion.

Code requires a 12-foot minimal spacing between electrically independent structures. Although spacing between facilities plays a role in stray current interference, the detection of stray current interference relies more on the understanding of where foreign operated cathodic protection systems are located with respect to the pipeline being tested and, based

on those locations, where interference might occur. Once determined, specific site testing is performed to confirm or rule-out if this condition exists. Typically, uncongested rights-of-way (as in the case reported by TransCanada) reduce the number of locations that would need to be assessed. This condition is also affected by the soil resistivity values along the pipeline rights-of-way.

Based on the information provided by TransCanada, the testing as proposed is consistent with that required to detect, monitor and mitigate stray current interference at the additional locations referenced above.

Q. Does this conclude your surrebuttal?

A. Yes it does.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	CERTIFICATE OF SERVICE HP07-001

I hereby certify that copies of Surrebuttal Testimony of Jenny Hudson, two Surrebuttal Testimonies of John Muehlhausen, Surrebuttal Testimony of Dan Hannan, Surrebuttal Testimony of Tom Janssen, Surrebuttal Testimony of Brenda Winkler, Surrebuttal Testimony of William Walsh and Surrebuttal Testimony of David Schramm were served on all individuals listed on the attached e-mail list and mailing list either electronically or mailing the same to them by United States Post Office First Class Mail, postage thereon prepaid, at the addresses shown on this the 28th day of November, 2007.

See Attached List.

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HP07-001

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE PIPELINE PROJECT	))))))	HP07-001 **SURREBUTTAL TESTIMONY OF EDWARD D MILLER**

1. Please state your name for the record.

Answer: My name is Edward D. Miller.

2. Did you provide direct testimony in this proceeding?

Answer: Yes.

3. Whose rebuttals are responding to?

Answer: I am responding to the rebuttals of Meera Kothari, Heidi Tillquist, and Brian Thomas.

4. At question 11, Ms Kothari states that TransCanada has installed thousands of miles of pipe over the last three decades and has not experienced a failure. How do you respond?

Answer: TransCanada had several problems with pipe that was installed about 30 years ago in the 1970s, including ruptures, explosions and fires. However, TransCanada also owns and operates the Foothills pipeline, which

experienced a significant failure in 1994 including an explosion, major fire and TSB investigation (report number P94H0003.) The failure occurred 12 years after installation of the pipeline, which was built in 1982.

5. At question 11, Ms Kothari states that liquid pipelines carry crude oil and do not ignite in an explosion or fire. How do you respond?

Answer: Explosions and fires do happen on crude oil pipelines. An explosion and fire on an Enbridge pipeline in Minnesota on November 28, 2007 resulted in significant damage, including the loss of human life. The pipeline involved in the incident (Line 4) delivers heavy Canadian crude oil to the US, much like the proposed Keystone pipeline will.

It is important to note that accident rates on hazardous liquid pipelines are significantly higher than rates on natural gas pipelines (EXHIBIT C of my direct testimony.)

6. At question 13, Ms Kothari states that the risk is not significantly higher to operate a pipeline with a 0.8 design factor.

Answer: There is additional risk; it is a matter of whether that additional risk can be mitigated by the measures that she listed.

7. At question 15, Ms Kothari states that the Alyeska and Burnaby pipeline incidents referred to bear little relation to the facts surrounding this application. How do you respond to this?

Answer: The Alyeska incident is actually part of the DNV Frequency

Volume Analysis that accompanies TransCanada's application. As shown on the cover of that report, Ms. Kothari was the client contact. The study included three examples of crude oil spills, all of which involved Alaska, including the Alyeska spill. It appears that DNV selected 3 crude oil spills as far away from the proposed Keystone pipeline as possible. A far more relevant selection of crude oil spill examples would include those listed on my EXHIBIT D and EXHIBIT M.

Since the Alyeska spill is included in the Frequency Volume Analysis, it can be used to point out additional flaws in that study. For instance, in the study TransCanada assumes that it will be able to clamp or gel block every small and medium leak anywhere on the entire pipeline within four hours of notification. That is an aggressive assumption that is not supported by actual experience. In fact, the Alyeska pipeline continued to leak for about 36 hours after discovery even though the exact spill site had been identified, the site was easily accessible, no excavation was needed, and weather conditions were favorable.

The Burnaby spill points out the fact that no matter how advanced your pipe materials or your installation techniques are, third party activities including excavation remain a risk regarding pipelines. Despite having Kinder Morgan personnel at the construction site, the incident still occurred. Even though the spill happened in July, there are still 5 families who have not been able to return to their homes yet (BurnabyNow, Nov 10, 2007.) Another important issue regarding this spill is the dispute over who will have to pay for the cleanup, the city or the pipeline company.

8. At question 4, Ms Tillquist states that many of the values reported in EXHIBIT C are not reproducible. How do you respond to this testimony?

Answer: I support my EXHIBIT C as is. In order to reproduce the numbers, it is critical to use the exact same data file and reporting criteria. EXHIBIT C was calculated using the Jan 2002 – Sep 2007 Office of Pipeline Safety incident database for hazardous liquid pipelines (without modification.) The top report in EXHIBIT C was calculated by including all records reported to the OPS in barrels, in the new reporting format, where the amount spilled is 5 barrels or more. The bottom report is the same, except that it includes crude oil spills only. Data records reported in gallons are not included on either report on EXHIBIT C.

The result of using a smaller reporting threshold is shown in EXHIBIT Q, which is included here. This report is identical to EXHIBIT C, except that the reporting threshold shown in EXHIBIT Q is all the way down to 1 gallon (the smallest possible non-zero spill.) As shown in this report, the smallest possible average hazardous liquid pipeline spill (2002-2007) is 282 barrels. All non-zero spill records in the entire database are included on this report. The bottom report in EXHIBIT Q is for crude oil spills only (of 1 gallon or more.)

9. At question 5, Ms Tillquist states that pipelines in most other countries are significantly younger than pipelines in the US. How do you respond?

Answer: Hazardous liquid pipelines in Europe are similar in age profile to

the figures listed by Ms Tillquist for pipelines in the US. The European group CONCAWE recently published a report (report no. 4/07) showing that about 70% of pipelines in Europe are at least 30 years old. Nearly forty percent of hazardous liquid pipelines are more than 40 years old. However, based on information in that same report, incident rates on CONCAWE pipelines are much lower than those in the US.

10. At question 7, Mr. Thomas responded to your EXHIBIT J, which shows a data omission example in the Frequency Volume Analysis. How do you respond?

Answer: Mr. Thomas provides a detailed scenario of a pipeline spill including the dynamic and static phase of the incident. As part of the dynamic phase, his example appropriately includes the nine minutes of time required to shut down the pumps. During that time, his analysis shows that 3,684 barrels or about 155,000 gallons of oil are spilled.

11. Does that conclude you testimony?

Answer: Yes it does.

Dated this 29th day of November, 2007.

_____/ signed /_____

Edward D Miller

PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Hazardous Liquid Spills - 1 gallon or more

Year	Number of Accidents	Water Involved	HCAs Involved	Property Damage	Gross Loss Barrels	Net Loss Barrels	Ave Spill Barrels	Ave Spill Gallons
2002	443	43	56	$49,106,732	92,929	73,926	210	8,810
2003	422	44	64	$52,526,342	81,310	50,951	193	8,092
2004	362	53	66	$145,515,991	89,228	68,941	246	10,352
2005	359	47	67	$150,498,599	138,062	46,239	385	16,152
2006	333	29	60	$49,798,528	137,486	54,253	413	17,341
2007	230	23	43	$27,520,068	66,974	48,617	291	12,230
Totals	**2149**	**239**	**356**	**$474,966,260**	**605,989**	**342,927**	282	**11,843**
		11%	**17%**	**$221,017**				

PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Crude Oil Spills - 1 gallon or more

Year	Number of Accidents	Water Involved	HCAs Involved	Property Damage	Gross Loss Barrels	Net Loss Barrels	Ave Spill Barrels	Ave Spill Gallons
2002	184	18	13	$30,368,412	20,404	8,943	111	4,657
2003	179	14	13	$19,493,734	28,976	14,180	162	6,799
2004	158	32	20	$104,040,222	31,857	19,805	202	8,468
2005	183	27	22	$103,324,012	103,031	19,323	563	23,646
2006	164	15	21	$26,091,468	84,432	5,996	515	21,623
2007	117	11	16	$10,115,181	12,307	1,488	105	4,418
Totals	**985**	**117**	**105**	**$293,433,029**	**281,006**	**69,735**	285	**11,982**
		12%	**11%**	**$297,902**				

Database Generated on 10/19/2007
There are 2,218 accident records in this database.
There are 69 records that have 0 in the LOSS field/column. They are not included on this report.

EXHIBIT Q

Diana Steskal ~ Testimony on the HP14-001

Hello, my name is Diana Steskal, from Stuart Nebraska, a concern citizen of the United States, acting as an individual intervener. I would like to state that I am not an expert farmer or photographer; I am here today to testify about my concerns of accepting the certification of a permit for TransCanada to construct the Keystone XL pipeline. I feel that TransCanada has not been a good neighbor to the people of United States. They have made statements about land reclamation ~ "How they will leave the land in better shape than it was before they started the project." I have witness an area in Miner County, where a land reclamation on an easement of the Keystone I, it has been on going since 2009. On November 7, 2014 ~ I visited the Mike and Sue Sibson farm, I asked question of the Sibson's, and took pictures of the easement area. This easement crosses native grass, farm ground, a wetland, native grass and ends up going thru a wetland and waterway. I believe that this easement area in 2014 after 5 years is NOT in better shape than before construction started, you can see by comparing it to the native grasses on the outer edge of the easement, shown in the pictures of Exhibit G. The easement looks like it has weeds, sparse habitat growing, and holes in the ground over the pipeline, due to the varmints burrowing into the higher temperature soil.

I would like to share from my Exhibit F ~ Reclamation Timeline by Sue Sibson:

1). September 30, 2009 ~ Reclamation and seeding native grasses
2). 2010: Easement area full of weeds not much grass growing. TC sprayed the easement area.
3). August 2011 ~ TC was back to do total reclamation on the mile and a quarter easement area. Native grass was once again reseeded (wrong seed mixture was planted in 2009).

4). August 2011 ~ Right of way ridges were leveled off, the ground cracks ~ areas were deep ripped to fill voids and leveled.
5). In 2009 ~ TC and landowner signed construction agreement ~ all rock was to be hauled away. Michels Construction Co. pushed and buried the rocks into the easement area during construction. August 2011~ 75 ton of rock was hauled off easement area.
6). September 2012 ~ TC is back again to do some more reclamation. The easement area by the county road is now dry enough to work on the land. Mowing, dirt work and native grass reseeding is the plan. The 80 acres will be reseeded over the top of the grass seed planted in 2011. There is little native grass growing in the easement area. The crop ground showed loss of crop again.
7). August 2013 ~ Frank Maddox & Eric Munz looked at easement area. The thickspike wheat grass is becoming more of a problem. Very little if any other native grass growing.
8). May 2014 ~ Easement area sprayed with roundup and area mowed. Frank has had trouble trying to get rid of the thickspike wheat grass using spray. Area had to be sprayed twice.
9). August 2014 ~ Easement area replanted with native grass mixture ~ have a tag.
10). Novemeber 7, 2014 ~ Terry & Cheri Frisch, Byron Steskal and myself visited the easement area. Took pictures (Exhibits G)

When we were visiting with the Sibson's they expressed concerns that it has taken 5 years for the reclamation of the ROW easement of their land which has been reseeded 4 times, along with loss of pasture for their cattle, (which the cattle would not eat the grasses that have been planted), and also having a crop loss. Commissioner Johnson in 2010 toured the Sibson easement ROW; he had concerns about Keystones ability to maintain quality control when it comes to clean up and reclamation. He discussed with the Sibson's some of their hardships they felt had suffered during the process from the trespass early in the project, trash left on the

ROW, and the reclamation issues they had in 2010. In September 2014, Commissioner Gary Hansen visited the Sibson farm to look at the ROW easement area, as it had been replanted in August of 2014.

I believe there is a big concern if TransCanada has the ability to have a quality control of their contractors when it comes to reclamation of the land therefore I believe that this is just one small tip of an iceberg of many things that need to be addressed before renewing TransCanada's Keystone XL permit.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

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HP 14-001

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT,

DIRECT TESTIMONY OF HEIDI TILLQUIST

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Pursuant to the Commission's Order Granting Motion to Define Issues and Setting Procedural Schedule, Petitioner TransCanada Keystone Pipeline, LP, offers the following direct testimony of Heidi Tillquist.

1. Please state your name and address for the record.

Answer: My name is Heidi Tillquist. My business address is Stantec Consulting Services Inc., 2950 E. Harmony Road, Suite 290, Fort Collins, CO 80528.

2. Please state your position and provide a description of your areas of responsibility with respect to the Keystone XL Project.

Answer: I am a contractor of Keystone. I am employed as an environmental toxicologist and Director of Oil & Gas Risk Management with Stantec Consulting Services Inc. I have provided environmental consulting services to Keystone with respect to the Keystone XL Project. I am responsible for evaluating risk posed by the Project to human and environmental resources.

010698

3. Please state your professional qualifications and experience with pipeline operations.

Answer: My professional background is stated in my resume, a copy of which is attached as Exhibit A. My education consists of a bachelor's degree in fishery and wildlife biology, and a master's degree in environmental toxicology. In general, I have over 25 years of experience in environmental consulting, including environmental toxicology and conducting environmental risk assessments and water quality assessment and analysis. I have previously testified before the Commission in the permit proceedings concerning the Keystone Pipeline in Docket HP 07-001 and concerning the Keystone XL Pipeline in Docket HP 09-001.

4. Are you responsible for portions of the Tracking Table of Changes attached as Appendix C to Keystone's certification petition?

Answer: Not directly. In general, I can testify to the risk assessments related to the Keystone XL Pipeline, including spill frequency. I am familiar with the design changes addressed in the Tracking Table as a result of Keystone's decision to withdraw its Special Permit application with PHMSA, as well as the minor route variations in South Dakota. The design and route changes have not affected the overall conclusion of the spill frequency analysis to which I testified in connection with the permit application. With respect to Finding No. 50, the minor route changes have caused slight changes resulting in a reduced probability of a spill occurring within High Consequence Areas. As a result, the statement that a spill that could affect an HCA would occur no more than once in 250 years would now be altered to no more than once in 460 years, based on 15.8 miles of HCAs crossed in South Dakota. The 2009 Keystone XL Risk

Assessment, which is Appendix P to the Final Supplemental Environmental Impact Statement, and its conclusions remain valid. .

5. Are you able to address issues related to worst case spill scenarios, environmental cleanup in the event of a spill, and the potential impacts to groundwater resources?

Answer. Yes. I participated in answering discovery in this proceeding with respect to all of these issues. While nothing with respect to these issues has changed since the Amended Final Decision and Order, I can answer questions at the hearing related to these issues.

6. Are you aware of any reason that Keystone cannot continue to meet the conditions on which the Permit was granted by the Commission?

Answer: No. I have reviewed the conditions contained in the Amended Final Decision and Order. With respect to risk assessment and environmental toxicology, the changes discussed in the Tracking Table do not affect Keystone's ability to meet the conditions on which the Permit was granted.

7. Does this conclude your prepared direct testimony?

Answer: Yes.

Dated this 31 day of March, 2015.

Heidi Tillquist

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Stantec

Ms. Tillquist has over 24 years of experience in environmental consulting, including environmental permitting, environmental toxicology, environmental risk assessment, water quality assessment and analysis, fisheries and wildlife biology. She has evaluated risk and environmental consequences of contaminant releases in 28 states of the U.S. and 6 Canadian provinces. Ms. Tillquist routinely provides technical assistance in support of complicated environmental issues. She has successfully negotiated changes in surface water quality criteria for mining companies and has helped develop water quality criteria for several metals. She has managed numerous projects, such as environmental permitting and compliance for TransCanada's Keystone Pipeline Project and multiple third-party Environmental Impact Statements (EISs). Ms. Tillquist's work requires an in-depth understanding both the engineering and environmental aspects of pipeline projects. Ms. Tillquist breadth of knowledge and ability to effectively communicate between diverse stakeholders (project engineers, environmental staff, regulatory agencies) has resulted in collaborative efforts that focus on potential benefits, constraints and feasibility issues, and short- and long-term costs. Ms. Tillquist believes that development and environmental protection are not mutually exclusive, but are hallmarks of a well-designed and executed project. She has conducted multiple risk assessments for regulatory agencies and mining and the oil and gas industry and provides technical expertise regarding potential environmental impacts. Ms. Tillquist routinely provides expert witness support for issues related to environmental toxicology and risk assessment.

EDUCATION

MS, Environmental Toxicology, Colorado State University, Fort Collins, Colorado, 1992

BS, Fishery and Wildlife Biology, Colorado State University, Fort Collins, Colorado, 1987

REGISTRATIONS

Certified Wildlife Biologist #114667, The Wildlife Society

Certified Fisheries Professional #044814, American Fisheries Society

MEMBERSHIPS

Member, The Wildlife Society

Member, American Fisheries Society

Member, Society for Environmental Toxicology and Chemistry

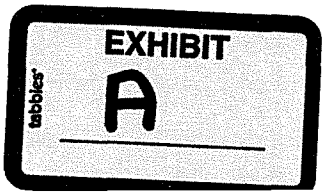
PROJECT EXPERIENCE

Pipeline Projects

TransCanada, Energy East and Related Pipeline Projects, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and New Brunswick, Canada

Senior technical advisor, pipeline risk assessment lead. TransCanada proposes to repurpose an existing natural gas pipeline, construct new build pipeline and terminal facilities to transport various crude oils from Alberta to terminals in Quebec and New Brunswick. Ms. Tillquist and her staff evaluate risk for project components as part of the National Energy Board (NEB) filing. For each project, Stantec will i) identify high consequence areas, ii) assist engineers with valve siting, and iii) conduct a pipeline risk assessment that assesses failure frequency, probable spill volumes, and spill impacts to terrestrial, freshwater, and marine environments. After the final route is approved, Ms. Tillquist and her staff will conduct detailed flow path modeling to identify pipeline segments with the potential to impact High Consequence Areas per 49 CFR 195. Ms. Tillquist role on this project is to advise TransCanada, addressing and resolving substantive issues, helping to maintain consistency of analysis, and providing TransCanada with legacy information to facilitate and improve the overall project.

* *denotes projects completed with other firms*



Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Grand Rapids, Heartland, and Northern Courier Pipeline Projects, Alberta, Canada

Senior technical advisor, pipeline risk assessment lead. TransCanada and its affiliates propose to develop multiple pipeline projects in Alberta. For each project, Stantec will i) identify high consequence areas, ii) assist engineers with valve siting, iii) conduct a pipeline risk assessment that assesses failure frequency, probable spill volumes, range of environmental impacts, and mitigation, and iv) map groundwater vulnerability along the ROW. Ms. Tillquist role on this project is to advise TransCanada, addressing and resolving substantive issues, helping to maintain consistency of analysis, and providing TransCanada with legacy information to facilitate and improve the overall project.

TransCanada, Keystone XL Pipeline Project*, Montana, South Dakota, Nebraska, Oklahoma, Texas

Senior Technical Advisor and Lead Pipeline Risk Assessor for the project, attending numerous public meetings and providing expert witness testimony for public utility commissions in South Dakota as well as a variety of condemnation hearings. TransCanada proposed the construction and operation of a 36- inch crude oil pipeline from the Alberta oil sands into the U.S., terminating in the Gulf Coast region in Texas. The pipeline would have a nominal maximum throughput of 830,000 barrels per day. Within the U.S., the pipeline would cross portions of Montana, South Dakota, Nebraska, Oklahoma, and Texas. Because the project crosses the U.S.-Canada border, the Department of State is the lead federal agency. Ms. Tillquist was involved with TransCanada's Keystone XL crude oil pipeline since its initial design phase. Ms. Tillquist conducted an environmental risk assessment estimated spill frequency and spill volumes and the subsequent environmental consequences, particularly to sensitive areas. The risk analysis was used to support Keystone's Presidential Permit Application, various state permitting processes, and for refinement of the project design. As a result of this early interaction, Ms. Tillquist's risk assessment work helped control construction costs while reducing potential impacts of a spill, thereby reducing potential future environmental damages. Ms. Tillquist prepared the South Dakota Public Utilities Commission Application and participated in public meetings and hearings. She provided expert witness testimony in support of environmental and spill risk issues.

Hess Corporation, Hawkeye Pipelines, North Dakota

Senior technical advisor, PHMSA compliance lead, pipeline risk assessment lead. Hess proposes to construct several co-located pipelines to transport crude oil, natural gas liquids, and natural gas from the Bakken Formation. Stantec is leading the environmental permitting process. Ms. Tillquist role on this project is to advise, address, and resolve substantive issues, such as perceived risk associated with crossing of the Missouri River, tribal concerns, and PHMSA compliance.

Bureau of Land Management (BLM), BakkenLink Pipeline, North Dakota

PHMSA Compliance Lead/ Lead Risk Assessor. BakkenLink proposed to construct and operate a 12-inch crude oil pipeline from Frybery to Beaverlodge, North Dakota, with a 8-inch lateral to Belfield. Ms. Tillquist prepared a risk assessment that evaluated failure frequency and environmental consequences of a release, particularly to High Consequence Areas. The risk assessment was successfully used in the Environmental Assessment for the federal NEPA process. Ms. Tillquist also prepared BakkenLink's Emergency Response Plan which was reviewed and approved by PHMSA. Ms. Tillquist will provide technical support for BakkenLink with their Emergency Response Training exercises.

TransCanada, Keystone Pipeline System, US and Canada

Lead Pipeline Risk Assessor, PHMSA Compliance. Ms. Tillquist prepared hazard assessments for both new build and existing pipeline segments associated with the Keystone Pipeline System in the US and Canada. In Canada, Ms. Tillquist created a procedure to identify highly sensitive receptors, based on economic, public health, and ecological concerns. Using fate and transport analyses, segments of pipeline that were capable of potentially affecting the highly sensitive areas (Canada) or PHMSA-defined High Consequence Areas (US) were identified, risk quantified, and pipeline segments prioritized to facilitate operations and maintenance activities. The analysis incorporated both new build and existing infrastructure. Ms. Tillquist assisted TransCanada with PHMSA audits and provided technical responses to information requests. Ms. Tillquist documented legacy information regarding environmental compliance requirements. Ms. Tillquist coordinated with emergency response team. Provided updated to hazard assessments as required by federal regulations. Ms. Tillquist's work on this project continues with Stantec as the project continues to evolve.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

TransCanada, Keystone Crude Oil Pipeline Project*, North Dakota, South Dakota, Nebraska, Kansas, Missouri, Illinois, Canada

Environmental Permitting Project Manager and Pipeline Risk Assessor. As the Environmental Project Manager for the project, Ms. Tillquist was responsible for all environmental permitting and surveying within the U.S., including pre-construction siting and post-construction monitoring and compliance. Ms. Tillquist worked with TransCanada's Keystone crude oil pipeline since its initial design phase. As a result of this early interaction, route selection and intelligent valve placement helped control construction costs while reducing potential impacts of a spill, thereby reducing potential future environmental damages. Further, TransCanada successfully used Ms. Tillquist's environmental risk assessment to justify modification of the pipeline's design factor from 0.72 to 0.8 for the majority of the route. This modification reduced capital costs associated with the pipe by $50 million.

Texas Offshore Port System (TOPS)*, Texas

Lead Pipeline Risk Assessor, Senior Technical Advisor. The Texas Offshore Port System (TOPS) Project consisted of the construction and operation of a proposed deepwater port, receiving up to 1,700,000 barrels of crude oil per day and transporting the oil to a receiving terminal and transmission facility via 50 miles of on- and off-shore pipelines. Ms. Tillquist prepared a risk assessment document to support TOPS in permitting the project through the Maritime Administration and US Coast Guard. The document evaluated risk of a pipeline disruption and its potential environmental consequences. The report presented the results of a pipeline incident frequency and spill volume analysis based on TOPS' design and operations criteria and applies the resulting risk probabilities to an environmental consequence analysis, incorporating project-specific environmental data. Specifically, the report evaluated the risk of crude oil spills during pipeline operations, including contribution of natural hazards to spill risk, and the subsequent potential effects on humans and other sensitive resources, particularly High Consequence Areas, that include highly and other populated areas, municipal drinking water intakes (surface and groundwater), and/or ecologically sensitive areas.

Enterprise Products Company, Seaway Pipeline – Segment 7, Texas

Lead Pipeline Risk Assessor. The Seaway Pipeline - Segment 7 is a crude oil pipeline that will loop an existing- 30-inch pipeline for approximately 60 miles in length from Mont Belvieu to Nederland, Texas. Ms. Tillquist was hired as a subcontractor by Project Consulting Services, Inc. (PCS) to identify valve sites to ensure regulatory compliance and to minimize potential impacts to the environment, particularly to High Consequence Areas.

Enterprise Products Company, ATEX Express Pipeline*, Ohio, Indiana, Texas

Lead Pipeline Risk Assessor, Project Manager. The ATEX Express Pipeline (ATEX) is designed to transport ethane from the Marcellus and Utica shale regions in Pennsylvania, West Virginia and Ohio to the U.S. Gulf Coast. The approximately 1,230-mile, 16-inch diameter pipeline will have an initial capacity of 125,000 barrels per day of ethane and will deliver ethane to Enterprise's natural gas liquids storage complex at Mont Belvieu, Texas. Ms. Tillquist was hired as a subcontractor by Project Consulting Services, Inc. (PCS) to identify valve sites and perform a precursory HCA analysis for the purposes of selecting valve locations along Segment 3, approximately 117 miles in length through southwestern Ohio and southeastern Indiana, and Segment 6, approximately 55 miles in length through southeastern Texas.

Enterprise Products Company, Lone Star West Texas Pipeline and Laterals, Texas

Lead Pipeline Risk Assessor, Senior Technical Review. The Lone Star West Texas Pipeline and Laterals project will deliver natural gas liquids across Texas. As a subconsultant to Project Consulting Services, Inc., Ms. Tillquist was responsible for evaluating the placement of valve sites in relation to 1) federal pipeline regulations and 2) protection of environmental resources. Ms. Tillquist also provided senior technical review of a preliminary risk report.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

FERC and BLM, Entrega Natural Gas Pipeline Environmental Impact Statement*, Colorado and Wyoming

Project Manager and Lead Pipeline Risk Assessor. Entrega Gas Pipeline Inc. (an affiliate of Encana Natural Gas) proposed to construct and operate a 328-mile 36- to 42-inch-diameter natural gas transmission pipeline. The pipeline transports up to 1.5 billion cubic feet per day of natural gas from the Piceance Basin in Colorado to interconnections in Wamsutter and near Cheyenne, Wyoming. As the Project Manager, Ms. Tillquist supervised the preparation of the EIS as a third-party contractor to the FERC (lead agency) and the BLM (cooperating agency). Major issues include potential impacts to threatened and endangered species (water depletion issues), noxious weed management, and socioeconomic impacts. Because Western Interstate Company (a subsidiary of El Paso Corporation) also proposed to build a large diameter pipeline from the Piceance Basin to Wamsutter, cumulative impacts were also an issue. The project was approved and construction completed in 2007.

BLM and USFS, ONEOK, Overland Pass Natural Gas Liquids Pipeline*, Wyoming, Colorado, and Kansas

Project Manager, Lead Pipeline Risk Assessor. ONEOK and Williams proposed to construct and operate a 760-mile transmission pipeline for transportation of up to 150,000 barrels per day of natural gas liquids from western Wyoming, through Colorado, to Conway, Kansas. As the Project Manager, Ms. Tillquist supervised the preparation of the EIS as a third-party contractor to the BLM (lead agency) and the U.S. Forest Service (cooperating agency). Major issues included potential impacts to cultural resources, threatened and endangered species, and fisheries impacts. The Final EIS was published in 2007, with the pipeline constructed and is currently in-service.

FERC, Piceance Basin Expansion Natural Gas Pipeline Environmental Impact Statement*, Wyoming and Colorado

Senior Technical Advisor. Wyoming Interstate Company (WIC, a subsidiary of El Paso Corporation) proposed to construct and operate a 141.7-mile 36-inch-diameter natural gas pipeline to transport up to 350 million cubic feet per day of natural gas from the Piceance Basin in Colorado to interconnections near Wamsutter, Wyoming. As The Senior Technical Advisor, Ms. Tillquist supervised staff in the preparation of the EIS (concurrent with the Entrega Pipeline EIS) as a third-party contractor to the Federal Energy Regulatory Commission, with the Bureau of Land Management as a cooperating agency. Major issues include potential impacts to threatened and endangered species (water depletion issues), noxious weed management, and socioeconomic impacts. Because Entrega Pipeline Company Inc. also proposed to build a large diameter pipeline from the Piceance Basin to Wamsutter, cumulative impacts also were an issue.

BLM, Inland Resources, Castle Peak and Eightmile Flat Oil Expansion Project*, Utah

Lead Pipeline Risk Assessor. Ms. Tillquist conducted a pipeline risk assessment, evaluating pipeline failure threats, mitigation, failure frequencies, and probable environmental impacts in the event of a failure. The BLM's Vernal Field Office commissioned the preparation of the EIS that examined potential impacts associated with a proposed expansion of oil field development operations in the Uintah Basin area of northeastern Utah. The study area covered approximately 110 sections or 65,500 acres. Inland proposed to expand its existing waterflood oil recovery operations by drilling up to 900 additional wells in the Castle Peak and Eightmile Flat areas of the greater Monument Butte-Myton Bench oil and gas production region. Important issues associated with this project included cumulative effects to raptor species in the Uintah Basin, air quality, and effects on sensitive species, such as the mountain plover and hookless cactus. A Biological Assessment for the U.S. Fish and Wildlife Service was prepared as part of the project permitting.

* *denotes projects completed with other firms*

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

BLM, Equilon/Shell Pipeline Company, New Mexico Products Pipeline Environmental Impact Statement*, New Mexico and Texas

Project manager, pipeline risk assessor. Shell proposed to convert and reverse the flow of an existing 406-mile crude oil pipeline to transport refined petroleum products (i.e., gasoline, diesel, jet fuel). System conversion also entailed the construction of two new pipeline extensions (about 100 miles total), pump stations, pressure reducing stations, miscellaneous facilities, and associated electrical transmission lines. The project would affect portions of New Mexico and Texas, involving many local, state, federal, and tribal jurisdictions. Due to public concern, a probabilistic risk assessment evaluated risk to humans and the environment that could result from an accidental release from the pipeline and its facilities. As a third-party contractor for the BLM, the Draft EIS in May 2003 and the Final EIS was completed in September 2003. Prior to the release of the Final EIS, Shell decided to put the project on hold.

FERC, Raton Basin 2005 Expansion*, Colorado, Kansas, New Mexico, Oklahoma

Technical support on pipeline risk issues and field surveys. For this 100-mile, six-loop project built in 2005, Ms. Tillquist supported Colorado Interstate Gas with the Federal Energy Regulatory Commission (FERC) NEPA Pre-filing Process (including agency and public scoping), preparation of the FERC certification application, state and federal environmental permitting, Environmental Assessment (EA) preparation, Biological Assessment/ Biological Evaluation preparation, and construction management. Ms. Tillquist also assisted with U.S. Fish and Wildlife Service Section 7 consultation, a Forest Service EA for crossing the Comanche National Grasslands, environmental compliance training, avian and mammal pre-construction clearing and biological monitoring during construction, and construction environmental inspection support.

FERC, Application for Line 2000 Converting a Crude Oil Pipeline to Natural Gas Pipeline, Texas, New Mexico, Arizona

Technical evaluation of pipeline reliability and public safety. Ms. Tillquist assisted with the preparation of El Paso Energy's Line 2000 application to the Federal Energy Regulatory Commission (FERC) for the conversion of an existing 800-mile crude oil pipeline to natural gas service. This conversion project affected lands within Texas, New Mexico, and Arizona. Ms. Tillquist's duties included the preparation of FERC resource reports, an applicant-prepared biological assessment, applicant-prepared environmental assessment, and Clean Water Act 404 permit. Ms. Tillquist's project management activities included project budgeting, coordinating office staff and field survey crews, and creation and maintenance of a database detailing over 300 construction sites and activities.

FERC and CSLC, Southern Trails Natural Gas Pipeline*, California, Arizona, Utah, and New Mexico

Project Manager. Responsible for personnel management and project budgeting in addition to technical writing responsibilities. Questar Natural Gas proposed to convert a 600-mile crude oil pipeline to a natural gas pipeline, referred to as the Southern Trails Pipeline. Construction resulting from the proposed extensions, reroutes, realignments, and replacements affected portions of California, Arizona, Utah, and New Mexico and involved many local, state, federal, and tribal jurisdictions. As Project Manager, Ms. Tillquist supervised staff in the preparation of this third-party Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Federal Energy Regulatory Commission. As project coordinator, wrote several technical sections, and provided technical review of the EIS document. For the California Environmental Quality Act, a separate Environmental Impact and Mitigation Measures Summary was developed for the California State Lands Commission.

* *denotes projects completed with other firms*

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

El Paso - Western Interstate Company, Kanda Natural Gas Lateral Pipeline Project*, Utah

Environmental Toxicologist and Lead Pipeline Risk Assessor. One of the most significant services that Ms. Tillquist provides is effective communication between oil and gas companies and federal regulating agencies. Ms. Tillquist has repeatedly demonstrated the ability to successfully work through difficult problems. On the Kanda Project, the U.S. Fish and Wildlife Service (USFWS) insisted that El Paso install emergency shutoff valves at the Green River to protect threatened and endangered fish species. The USFWS concerns revolved around the perceived toxicological threats from natural gas and the potential future conversion to hazardous liquids transportation. Ms. Tillquist prepared a white paper that detailed why the USFWS concerns were unjustified. The argument was successful: the USFWS withdrew its request for a valve at the site, thereby saving El Paso an estimated $250,000.

BLM, Natural Gas Liquid Pipeline Environmental Assessment*, Wyoming

Lead Pipeline Risk Assessor. Inland Resources plans to develop an area for natural gas liquids extraction. As part of the development, a new pipeline would be constructed which would cross a tributary to the Green River in Utah, which contains several endangered fish species. At the request of the BLM and potential hazard posed by the pipeline by evaluating the likelihood of a spill, attenuation rates, and dilution potential.

Additionally, cumulative risk from other natural gas liquid pipelines within the same drainage was also estimated. Based on the pipelines' location, volume of natural gas liquids, probability of failure, and likelihood of downstream transport, the assessment showed that no impacts to endangered fish species would be anticipated.

Spill & Resource Damage Evaluations

Emergency Spill Response, Confidential O&G Client, North Dakota

Deputy Incident Command/Lead Environmental Risk Assessor. Ms. Tillquist was on-site to within 6 hours of notification, responding to a well blowout near Watford City, North Dakota. Ms. Tillquist coordinated the environmental sampling and documentation. Crude oil and produced water was dispersed over a 5-square mile area during a winter blizzard. Stantec's emergency response team established and Incident Command Center and coordinated containment and cleanup with the US Environmental Protection Agency and North Dakota Department of Health. The site is stabilized, with closure anticipated after spring runoff. Due to the subzero temperatures, quantitative sampling of snow samples was conducted to determine the area where total petroleum hydrocarbons might exceed North Dakota soils standards after spring runoff. Salinity was also examined as a contaminant of concern since the blowout may have contained produced water. Stantec continues to work with North Dakota Department of Health and US Environmental Protection Agency to monitor the site during spring runoff and obtain site closure.

American Petroleum Institute (API), Fate and Effects of Oil Spills in Freshwater Environments*

Environmental Toxicologist, Technical Writing and Review. Ms. Tillquist assisted in the preparation of an API report describing the fate and effects of oil spills in freshwater environments. This report summarizes and documents potential environmental effects from inland oil spills into fresh surface waters. It identifies, describes, and compares the behavior, fate, and ecological implications of crude oil and petroleum products in inland waters. The document provides basic information necessary for the formulation of spill response strategies that are tailored to the specific chemical, physical, and ecological constraints of a given spill situation. The report describes the relevant features of various inland spill habitat types, discusses the chemical characteristics of oils and the fate processes that are dependent thereon, summarizes reported ecological and toxicological effects results both generally and with specific reference to distinct organism groupings, and, finally, in the context of case histories from past spills, highlights some of the considerations, difficulties, and elements of success of presently available spill response techniques.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Toxicity Profile for Crude Oil*, Nationwide
Ms. Tillquist authored a report that reviewed the toxicity of crude oil to terrestrial and aquatic ecosystems. The intended audience of this report was BP field personnel that might be involved with accidental releases of crude oil into the environment. The document provided a general characterization of crude oil, its environmental fate, and potential effects to various environments.

Exxon Valdez Oil Spill*, Prince William Sound, Alaska
Ms. Tillquist provided technical support for Natural Resource Damage Claims filed against Exxon following the Exxon Valdez spill. Data were compiled from thousands of environmental samples, ranging from water and sediment to oiled wildlife. Ms. Tillquist provided technical support for expert witness testimony in support of Exxon. Specifically, Ms. Tillquist was responsible for assembling, synthesizing, and summarizing relevant literature on oils spills and their impacts to aquatic ecosystems.

Burlington Northern Santa Fe Railroad, Train Derailment Emergency Response Team, Crow Creek*, Cheyenne, Wyoming
Ms. Tillquist was a team member in an emergency response program to evaluate potential human health and environmental contamination. She participated in an emergency response call to evaluate potential aquatic effects on a train derailment at Crow Creek, Wyoming. Ms. Tillquist was responsible for coordinating activities with state and federal wildlife agencies regarding potential impacts on federally endangered Preble's meadow jumping mouse as well as to the local plain stream fishery. In the field, she was responsible for the sampling design and field sampling. After the event, she summarized the incident events and presented findings in a report to Burlington Northern Santa Fe Railway.

Evaluation of the Transredes Petroleum Product Spill*, Bolivia (Technical Advisor)
Ms. Tillquist provided technical support following a pipeline rupture on the Rio Desaguardero. The spatial extent and environmental effects of hydrocarbon contamination were evaluated by chemical analysis of environmental media and laboratory toxicity tests. These data were then used in a risk assessment to evaluate the potential risk to aquatic biota, terrestrial herbivores (cattle, sheep, and endangered vicunas), and human receptors.

Exxon Valdez Oil Spill*, Prince William Sound, Alaska
Technical Support. Ms. Tillquist provided technical support for Natural Resource Damage Claims filed against Exxon following the Exxon Valdez spill. Thousands of environmental samples were collected, analyzed, and catalogued, ranging from water and sediment to oiled wildlife. Ms. Tillquist was responsible for assembling synthesizing, and summarizing relevant literature on oils spills and their impacts to aquatic ecosystems in support of expert witness testimony in support of Exxon.

Oil and Gas Projects

Washington Ranch Natural Gas Field Storage Project*, New Mexico
Technical support evaluating public safety issues, including preparation of Resource Reports for the Federal Energy Regulatory Commission (FREC) application. El Paso proposed to construct a small natural gas storage field in southeastern New Mexico. The project consisted of several horizontal wells, tie-in pipelines, and access roads. Ms. Tillquist prepared several environmental Resource Reports in support of El Paso's successful Federal Energy Regulatory Commission (FERC) application.

Boehm Natural Gas Storage Field Project*, Colorado
Ms. Tillquist provided technical support evaluating public safety issues, including preparation of Resource Reports for the Federal Energy Regulatory Commission (FERC) application. El Paso proposed to construct a small natural gas storage field in southeastern Colorado. The project consisted of horizontal wells, tie-in pipelines, and access roads. The project was successfully permitted.

Raton Basin Expansion Project and Washington Ranch Natural Gas Field Storage Project*, Colorado, Kansas, Oklahoma, and New Mexico
Technical Review of Public Safety. Ms. Tillquist evaluated public safety issues associated with several El Paso projects, including Raton Basin and Washington Ranch. El Paso proposed to loop its existing Raton Basin natural gas pipeline system in Colorado, Kansas, and Oklahoma. The project would consist of several pipeline loops, laterals, metering stations, and access roads. In New Mexico, El Paso proposed to construct a small natural gas storage field in southeastern New Mexico. The project consisted of several horizontal wells, tie-in pipelines, and access roads. Ms. Tillquist prepared environmental Resource Reports in support of El Paso's successful FERC application.

* *denotes projects completed with other firms*

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Pipeline and Facility Decommissioning Evaluation*, New Jersey, Pennsylvania

Project Manager. Ms. Tillquist was responsible for evaluating the condition of the pipeline and facilities and providing cost estimates for decommissioning the facilities, including regulatory compliance. Reliant owns a 10-mile pipeline that has been used to transport fuel oil #6 (historically) and fuel oil #2 (currently). The company also owns a related facility with breakout tanks and aboveground piping. Reliant was considering temporarily (1 to 3 years) suspending the transport of oil through the pipeline and facility and, perhaps, totally abandoning these assets. Alternatively, Reliant wanted the evaluation to include the potential for reactivating the pipeline after a temporary suspension. Ms. Tillquist and other staff evaluated the federal, state, and local regulatory that govern the temporary suspension, reactivation, and abandonment processes. Additionally, Ms. Tillquist and staff identified technical issues that would be associated with each process. Finally, Ms. Tillquist and staff provided Reliant with a range of anticipated costs associated with each of these activities.

Ecological Risk Assessment

Ecological Risk Assessment of Depleted Uranium*, Sonoran Desert and Chesapeake Bay, Arizona, Maryland

Co-investigator, assessing the environmental fate and distribution of depleted uranium in the Sonoran Desert, Yuma, Arizona, and the Chesapeake Bay, Aberdeen, Maryland. Ms. Tillquist collected biota, vegetation, water, soils, and sediments in the field from contaminated and uncontaminated sites. She also conducted toxicity tests to evaluate the toxicity of depleted uranium on kangaroo rats and freshwater and marine aquatic organisms. Ms. Tillquist compared concentrations of depleted uranium collected in the field to concentrations that caused toxicity in laboratory organisms.

Effects of Two-Stroke Outboard Motor Exhaust on Aquatic Biota*, California, Nevada

Ms. Tillquist conducted a systematic survey of the published literature and prepared a monograph summarizing and documenting the ecological effects from two-stroke outboard engine exhaust into the aquatic environment was produced. The document identified the major constituents of outboard exhaust, described the environmental fate of these constituents, and the detailed the toxicological implications. The ecological significance of two-stroke outboard engines was found to be primarily dependent on the water quality characteristics of the waterbody, the intensity of boat use, and the amount of pollution from other anthropogenic sources.

U.S. Army Corps of Engineers, Alaska District, Fort Richardson Post-wide Human Health and Ecological Risk Assessment*, Alaska

Ms. Tillquist provided technical support for the ecological risk assessment and toxicological evaluations for the project. Four ecological risk assessments have been conducted for various areas within the Fort Richardson post. This particular post-wide ecological risk assessment reviewed all previous assessments, identified data and assessment gaps, and re-assessed risk on a post-wide scale. During this process, Ms. Tillquist developed chemical profiles for more than 80 compounds that had been detected at Fort Richardson. Ms. Tillquist calculated exposure of various ecological receptors and compared with toxicity reference values established in the chemical profiles to evaluate the likelihood of risk. The evaluation suggested that potential risk exists to wildlife receptors from bioaccumulating contaminants in aquatic ecosystems. Subsequent field surveys were conducted to confirm or refute this possibility. Data from these surveys indicated that the level of contamination was not significantly impacting aquatic ecosystems. To further reduce potential ecological risk at the site, cooling water was rerouted around sensitive areas, providing a simple and inexpensive mitigation to eliminate further exposure.

Ecological Risk Assessment of US Navy Facilities, South Weymouth, Department of Defense*, Boston, Massachusetts

Ms. Tillquist conducted ecological risk assessments for the Navy's South Weymouth facility. Ms. Tillquist and other staff evaluated the potential risk to aquatic, wetland, and terrestrial receptors using a weight-of-evidence approach that included screening against benchmarks values, critical body residues, toxicity tests, quantitative field surveys, and food web exposure models.

Ecological Risk Evaluation of Dioxin's Effects on Wildlife*, Guam

Ms. Tillquist evaluated the toxicity of dioxin to terrestrial and aquatic receptors. In support of an ecological risk assessment, provided technical assessment of dioxin hazards and potentially toxic threshold values.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Upper Clark Fork River Ecological Assessment*, Upper Clark Fork River, Montana

Ms. Tillquist provided technical support for the ecological risk assessment and toxicological evaluations. Terrestrial and aquatic screening-level ecological risk assessments were conducted by Ms. Tillquist to evaluate the potential effects of heavy metals on the Clark Fork River ecosystem. In cooperation with the U.S. Environmental Protection Agency (USEPA) Region VIII, developed food web exposure models and provided extensive chemical profile documentation to justify the selection of aquatic and terrestrial toxicity reference values for arsenic, cadmium, copper, lead, and zinc. Estimated exposure and risk using computer models. Ms. Tillquist submitted multiple documents to the USEPA in support of the advancement of science in the risk assessment process as rebuttals to the State of Montana's legal position.

Evaluation of 210 Chemicals: Physical Chemistry, Acute Toxicity, and Human Health Protection*, Nationwide

Ms. Tillquist co-authored a book and accompanying CD-ROM that describes the toxicity, physical chemistry, emergency response procedures, material handling procedures, and regulatory compliance information of 210 chemicals. Information was compiled from various computerized databases.

Evaluation of Chronic Effects to Aquatic Biota from Organochlorine Exposure, Rocky Mountain Arsenal*, Colorado

Ms. Tillquist was awarded grant as co-principal investigator to evaluate the sublethal effects of organochlorine pesticide exposure on fish via food web exposure at the Rocky Mountain Arsenal. Specifically, the project evaluated toxic effects using bioenergetic models and used field data to validate the model.

Environmental Assessments

Bureau of Land Management, Over the River™ Art Project Environmental Impact Statement and Event Management Plan*, Colorado

Lead Public Safety Risk Assessor. Ms. Tillquist evaluated public safety risks associated with the project, including boating accidents, emergency access, and sufficiency of emergency personnel and equipment. The artists, Christo and the late Jeanne-Claude, propose to drape curtains across the Arkansas River as a temporary form of art. Since the project would occur on federal lands, Ms. Tillquist helped prepare a draft EIS as a third-party consultant to the BLM's Royal Gorge Field Office. The project will take three years to construct, display, and disassemble, affecting more than 3,500 acres of land. Public concerns ranged from impacts to bighorn sheep, aesthetics, socio-economic impacts, and public safety and emergency access along the narrow road that parallels the river through the Arkansas River canyon. Ms. Tillquist prepared a semi-quantitative risk assessment on how the project could potentially impact public safety. The four-volume draft EIS evaluated several alternatives that reduced the size or duration of the exhibit. The Draft EIS was published in July 2010, with the Final EIS and Record of Decision issued in February 2011.

Environmental Assessment of Chatfield Reservoir Drawdown*, Denver, Colorado

Ms. Tillquist provided technical direction and analyzed impacts associated with potential drawdown. Denver Water proposed to construct and operate a pump station to convey raw water from Chatfield Reservoir to the municipal water supply system during drought conditions. Construction of the pump station and drawdown of the reservoir required the approval of the U.S. Army Corps of Engineers. The Environmental Assessment evaluated the potential impacts from several drawdown and refill scenarios. While the drawdown would affect recreational opportunities, water quality, and fish and wildlife habitat at the reservoir, the No Action alternative (no pump station, but high evaporative losses) also would substantially impact these same resources.

* *denotes projects completed with other firms*

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Pima County Wastewater District, Applicability of U.S. EPA Water Quality Criteria in the Arid West*, Arizona and Other Western States

Project Manager. Ms. Tillquist evaluated the applicability of national water quality criteria (AWQC) for the arid West, particularly for effluent-dominated systems. The evaluation process included the evaluation of four AWQC, looking at duration and frequency of exceedances, sensitivity of local biota, and speed of aquatic system recovery. Various AWQC-modifying procedures, such as the Recalculation Procedure and the Biotic Ligand Model, were reviewed to determine their appropriateness and usefulness for site-specific modification of the AWQC. Results of this project were published in a special publication, "Relevance of Ambient Water Quality Criteria for Ephemeral and Effluent-Dependent Watercourses of the Arid Western U.S.," by the Society of Environmental Toxicology and Analytical Chemistry.

State of Wyoming, Evaluation of the Effects of Water Depletion on Endangered Species, Litigation Support, North Platte River*, Wyoming and Nebraska

Ms. Tillquist was responsible for evaluating correlations between water levels, fish populations, and whooping crane and plover populations. The effects of North Platte water depletions on endangered whooping crane and plovers were contested in Federal Court. Both these species use the North Platte drainage during their seasonal migrations as a foraging and resting area. Ms. Tillquist provided a technical evaluation of whooping crane population trends and its relationship to discharge at Grand Island, Nebraska. Results indicated that while discharge rates can directly affect habitat suitability for cranes and forage fish for plovers, these factors have not had any measurable effect of whooping crane populations.

Programmatic Environmental Impact Statement for Herbicide Application throughout the Western U.S.*

Lead Technical Advisor for toxicological evaluations of herbicides and their environmental fate and persistence in the environment. Ms. Tillquist assisted in the preparation of a Programmatic EIS for the BLM that evaluated the application of nine herbicides on BLM-administered lands throughout the West. Ms. Tillquist developed an ecological risk assessment to evaluate exposure pathways and potential effects to multiple receptors, ranging from non-target plant species to aquatic biota and terrestrial wildlife species. The nine herbicides included bromacil, chlorsulfuron, diflufenzopyr, diquat, diuron, fluridone, imazapic, sulfmeturon methyl, and tebuthiuron. To evaluate the toxicity of these nine herbicides, Ms. Tillquist review, synthesized, and summarized information from the Environmental Protection Agency registration data and the peer-reviewed literature to develop toxicity benchmarks (toxicity reference values). These benchmark values were subsequently used in the ecological risk assessment and programmatic EIS.

Mining

Bureau of Land Management, Cameco Resources In-Situ Uranium Mine Environmental Impact Statement*, Gas Hills, Wyoming (Lead Public Safety Risk Assessor)

Cameco proposes to develop the Gas Hills In-situ Recovery Uranium Mine Project. The project area covers approximately 8,500 surface acres (approximately 13 square miles) of federal, state and private lands. The Bureau of Land Management's Lander Field Office is the lead agency for the environmental analysis. The Project is permitted by the Wyoming Department of Environmental Quality and is licensed by the U.S. Nuclear Regulatory Commission. Unlike conventional mining practices, in-situ removal mining methods utilize a solution consisting of oxygen and carbon dioxide or bicarbonate injected via conventional water wells into uranium ore-bearing rock formations in the subsurface. The solution dissolves the uranium ore from the rock formations into the circulating groundwater. The resultant uranium-bearing groundwater is recovered by pumping wells located adjacent to the injection wells. The groundwater containing uranium is then processed through an ion-exchange facility where the uranium is precipitated onto a resin bead media. The resin beads containing uranium would then be transported to the Cameco Smith Ranch-Highland facility for processing into uranium yellowcake. After the uranium has been removed, the resin bead media would be returned to the Project site for re-use. The distance one-way from the Gas Hills to Smith Ranch-Highland is approximately 140 road miles.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Beartrack Mine, NPDES Issues and Biological Opinion*, Napias Creek, Idaho

Ms. Tillquist was the project manager for a study that evaluated the toxicity of heavy metals to trout. Because of extremely low water hardness (less than 10 mg/L of $CaCO_3$), the permitted discharge of metals, particularly copper, were extremely low for this mine. Ms. Tillquist developed a site-specific sampling plan to collect the necessary data for the development of a site-specific translator value for the mine's National Pollutant Discharge Elimination System permit. Samples were collected using ultra-clean sampling techniques and were analyzed to detect metal concentrations at very low concentrations. Results from these analyses were used to develop a translator value, allowing the mine to continue to discharge effluent.

Water Quality Evaluation*, Nevada

Ms. Tillquist was the environmental toxicologist and risk assessor evaluating the impacts of selenium and mercury from a mine. The U.S. Fish and Wildlife Service (USFWS) expressed concerns that elevated concentrations of contaminants derived from the Big Springs Mine, particularly mercury and selenium, have affected or have the potential to affect aquatic biota in the North Fork of the Humboldt River. The USFWS concern was enhanced by the presence of endangered Lahontan cutthroat trout and other species of concern. Critically evaluated the USFWS-proposed field sampling plan and questioned whether the data that would be collected could credibly discern any adverse effects attributable to the Big Springs Mine from normal environmental variability. As a result of the critique, the USFWS revised its field sampling plan and entered into consultation with Independence Mining Co. regarding alternative approaches.

Atlanta Gold, National Pollutant Discharge Elimination System Permit*, Atlanta, Idaho

Project Manager. Mining operations in Atlanta, Idaho, have occurred since the 1870s. As a result of these activities, mine drainage is currently being released at 25 different locations. The primary contaminant of concern is arsenic. Atlanta Gold needs to obtain a National Pollutant Discharge Elimination System (NPDES) permit for these existing discharges. To expedite the NPDES process, the Environmental Protection Agency (EPA) Region 10 agreed to third-party preparation of the NPDES application, EPA Fact Sheet, and the EPA permit.

Mining Company, Evaluation of Dietary Metals Toxicity to Rainbow Trout*, Western U.S.

Ms. Tillquist conducted literature research to compile and synthesize data related to dietary metal exposure to trout. In some mining areas, metals concentrations in benthic macroinvertebrates are elevated compared to reference sites. Some scientists have expressed concern that trout may be exposed to potentially toxic levels of metals via dietary exposure. Ms. Tillquist analyzed the published literature and established concentrations of metals in the diets that are considered to have no observable adverse effects as well as the lowest concentration demonstrated to have an adverse effect on survival or growth. This information was presented at the 1999 Society of Environmental Toxicology and Analytical Chemistry.

Identification of Potential Habitat for the Endangered Lahontan Cutthroat Trout*, Walker River and Carson River, Nevada, California

Ms. Tillquist identified drainages within the Walker and Carson River basins that contain potential habitat for future restoration work for off-site mitigation for Lahontan cutthroat trout habitat. As a result of the project, suitable habitat was identified for the mining client, who subsequently purchased the property with its associated water rights and successfully conducted off-site habitat mitigation.

Electrical Power Generation and Transmission

Bureau of Indian Affairs and Williams Company, Wanapa Energy Center Environmental Impact Statement*, Hermiston and Umatilla, Oregon

Ms. Tillquist evaluated water rights and researched water laws applicable to the project, particularly those related to threatened anadromous salmon species. As a third-party contractor for the Bureau of Indian Affairs, Ms. Tillquist evaluated the potential impacts associated with the construction and operation of the Wanapa Energy Center, a power generating plant. Ms. Tillquist evaluated issues associated with water rights and laws pertaining to water withdrawal, given the presumption by Diamond Generating (developer) that the water rights to be used were "reserved" municipal water rights and that these city water rights predated the in-stream flow requirements for the Columbia River. Also, the amount of water withdrawn and the method used to withdraw water were evaluated to determine if they could have potential impacts on federally listed Pacific salmon. Finally, water quality issues were evaluated to assess potential impacts of the effluent water used to cool the power generating equipment and to predict effects to the environment from the discharged water into the environment.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Tri-State Generation and Transmission Association, Environmental Assessment and Alternative Evaluation*, New Mexico

Provided technical support, evaluated data, and prepared the majority of the environmental assessment and alternatives evaluation. Tri-State applied for financial assistance from the Rural Utilities Services (RUS) in order to construct a simple-cycle combustion turbine generating facility near Lordsburg, New Mexico. As part of the RUS application process, Ms. Tillquist developed an Alternatives Evaluation which evaluated alternative sites for the power plant. A Site Selection Study also was produced; RUS used this Site Selection Study as its Environmental Assessment (with public scoping).

Power Plant Application for Certificate*, San Bernardino County, California

Wildlife Toxicologist evaluating risk to endangered biota from nitrogen deposition. The U.S. Fish and Wildlife Service expressed concerns about the potential negative effects of supplemental atmospheric nitrogen deposition on native plant communities originating from the new Mountainview Power Plant. Ms. Tillquist evaluated the likelihood of changes in the vegetative communities based on their location, growth periods, and estimated amount of nitrogen deposition. Sensitivity to nitrogen enrichment was assessed. The analysis indicated that the amount of additional atmospheric nitrogen deposition was not appreciable, particularly when compared to the sizeable background concentrations in the Los Angeles Air Basin.

Solar Energy

Stirling Energy Systems (SES), LLC, SES Solar Two Project*, Imperial County, California (Lead Biologist)

SES submitted an application to the Bureau of Land Management (BLM) for development of the proposed SES Solar Two Project, a concentrated solar electrical generating facility capable of generating 750 megawatts (MW) of renewable power. The proposed SES Solar Two Project site is located on approximately 6,140 acres of federal land managed by the BLM and approximately 300 acres of privately owned land, in Imperial County, California. The project would consist of approximately 30,000 SunCatchers, with a total generating capacity of 750 MW. The proposed SES Solar Two Project also includes an electrical transmission line, water supply pipeline, and a site access road. A new 230-kV substation would be constructed on-site, connected to the existing San Diego Gas & Electric Imperial Valley Substation via a 10.3-mile, double-circuit, 230-kV transmission line. Just over 7.5 miles of the new line would be constructed off-site. An off-site 6-inch diameter water supply pipeline would be constructed 3.4 miles from the Westside Main Canal to the project boundary. The BLM and CEC have executed a Memorandum of Understanding concerning their intent to conduct a joint environmental review of the project in a single NEPA/CEQA process. Ms. Tillquist provided review and technical input to the BLM's and CEC's environmental analysis. Ms. Tillquist revised CEC's document under an extremely tight timeline to make the document compliant with BLM minimum standards. Major concerns included biological impacts to desert bighorn sheep and desert tortoise.

* *denotes projects completed with other firms*

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Bureau of Land Management and California Energy Commission, Ivanpah Solar Energy Projects*, San Bernardino County, California

Biological Lead, handling wildlife and special status species issues. BrightSource Energy, Inc. proposed the development three separate solar thermal power plants within a 3,600-acre project site located in the desert in San Bernardino County, California. When constructed, the 392-megawatt project will be the world's largest solar energy project, nearly doubling the amount of solar thermal electricity currently produced in the U.S. It also will be the largest fully solar-powered steam turbine. Ms. Tillquist also helped prepare a Supplemental and Final EIS as a third-party contractor to the BLM. Ms. Tillquist also worked cooperatively with the California Energy Commission (CEC) to ensure the CEC siting committee issued a proposed decision consistent with the BLM's Record of Decision. BrightSource's proprietary Luz Power Tower (LPT) technology enables the company to employ a low-impact environmental design. Instead of the extensive land grading and concrete pads, BrightSource mounts mirrors (heliostats) on individual poles that are placed directly into the ground, allowing the solar field to be built around the natural contours of the land and avoid areas of sensitive vegetation. This design also allows for vegetation to co-exist within the solar field. The Final EIS was published in July 2010 with construction in fall 2010.

Inhalation Toxicology

National Institute of Health, Retention and Clearance of Radioactive Particles from Intermediate Airways in Beagle Dogs, Lovelace Inhalation Toxicology Research Institute*, New Mexico

Ms. Tillquist was a summer intern who received a grant to examine the movement and retention of small inhaled particles within the intermediate airways of lungs. In the lung, particulate matter tends to be trapped either in the upper airways or deep within the lung. Little was known about the ability of the intermediate airways to clear or retain particulate matter. Based on a grant from the National Institutes of Health, Ms. Tillquist developed a new technique for exposing intermediate airways (bronchioles). Clearance and retention rates of various-sized particulate within the lung were evaluated by using particles labeled with radioactive cesium and strontium. In addition to this basic research, was involved in the post-operative performance evaluation of lung transplants, a relatively new surgical procedure. Finally, Ms. Tillquist acted as a technician for measurement of radioactive materials in various tissues and other matrices for a variety of other projects.

National Toxicology Program, Acute $Ni^{63}SO_4$ Inhalation Exposures in Mice and Rats, Lovelace Inhalation Toxicology Research Institute*, New Mexico

Ms. Tillquist was the lead technician responsible to several National Toxicology Program studies. As part of the National Toxicology Program's evaluation of nickel compounds, conducted acute aerosol exposures of laboratory animals (over 100 animals) in order to evaluate the metabolism of nickel. Radioactive nickel was used to trace metabolic pathways. This work required Level B laboratory conditions (respirators, protective clothing, shower-in/shower-out procedures) as well as constant monitoring for radiological contamination.

National Toxicology Program, Chronic NiO, $NiSO_4$, and Ni_3S_2 Inhalation Exposures in Rats and Mice, Lovelace Inhalation Toxicology Research Institute*, New Mexico

Ms. Tillquist was the lead technician responsible to several National Toxicology Program studies. The National Toxicological Program (NTP) routinely evaluates the toxicity of compounds in the environment. Nickel compounds are used in a number of manufacturing processes. Ms. Tillquist was responsible for the supervision, monitoring, and laboratory measurements associated with three large inhalation toxicology studies (>3,500 animals) for the NTP. Ms. Tillquist ensured that staff followed Good Laboratory Practices (GLP procedures), maintained Quality Assurance of the associated data and other project-related paperwork. This work involved Level B laboratory conditions (respirators, protective clothing, shower-in/shower-out procedures).

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Water Quality Assessments

Climax Mine, Evaluation of the Effects of Aqueous Aluminum on Aquatic Biota of Tenmile Creek*, Climax, Colorado

Ms. Tillquist evaluated eight years of fish and macroinvertebrate community data to determine if any temporal or spatial trends related to water quality, specifically aluminum, were apparent. Whole-effluent toxicity (WET) test results for this same period were summarized and, again, were correlated to aluminum concentrations. Finally, a review on the toxicity of aluminum to aquatic biota was written to summarize the state-of-the-science knowledge of aluminum toxicity in aquatic systems, which has changed dramatically since the ambient water quality criteria were developed for aluminum. Results showed that although aluminum concentrations were above national ambient water quality criteria and local background levels, concentrations of aluminum were not having any demonstrable effect on aquatic biota. Rather, patterns of improvement were observed in the biological data since 1995, coinciding with the implementation of significant changes in the water treatment procedures at the Climax water treatment facility. Moreover, laboratory WET testing showed no acute or chronic toxicity when aluminum was above ambient water quality criteria.

Beartrack Mine, Review of Biological Opinion on Chinook and Steelhead: Critique and Re-evaluation, Tributary of the Snake River*, Idaho

Ms. Tillquist conducted a systematic evaluation of water quality in a Snake River tributary to determine if salmonids would be adversely affected by metal concentrations. The National Marine Fisheries Service (NMFS) originally concluded in a Biological Opinion that the continued operation of the mine jeopardized the successful reintroduction of Chinook salmon into this watershed. This conclusion was based on water quality data, which occasionally exceeded the national ambient water quality criteria. Ms. Tillquist re-evaluated the water quality data using a more extensive dataset and conducted a broad, weight-of-evidence evaluation that evaluated aquatic community health. Temporal and spatial trends in water quality and fish and benthic macroinvertebrate community structure were examined to determine if any adverse effects exist which are attributable to the operation of the mine. Specifically, this assessment evaluated the likelihood of adverse effects to federally listed salmonids. This assessment found there was no evidence of adverse impacts from the operation of the mine. Furthermore, there were statistically significant indications that the aquatic community health (measured as density and diversity) has recently improved, perhaps due to the mining company's restoration of historic placer mining areas in the watershed. As a result, the NMFS was forced to recant its original position and revised their Biological Opinion to indicate a no jeopardy finding.

Aquatic Toxicity Assessment of Leachate from the Cortez Landfill Superfund Site, Delaware Water Gap*, Pennsylvania/ Delaware

Ms. Tillquist investigated leachate from a Superfund site into a National Park area. In the 1970s, barrels containing unknown contamination were illegally dumped in a landfill in New Jersey. By the late 1980s, material from these barrels was leaching into surrounding properties and into the Delaware River and the landfill was designated as a Superfund site. Notably, there was an increased prevalence of illness in the surrounding areas. This portion of the Delaware River was part of the Delaware River Gap National Park, administrated by the National Park Service. Through a grant from the National Park Service, assessed the aquatic toxicity of leachate entering the Delaware River using Microtox® and several routine aquatic toxicity tests.

Water Quality Criteria Evaluation*, Nationwide (Technical Lead)

Ms. Tillquist is providing support on toxicological data and associated environmental impacts. National water quality criteria promulgated by the U.S. Environmental Protection Agency (USEPA) are applicable over a normal range of water hardness. However, the validity of extrapolating criteria to unusually hard or soft waters is unknown. Ms. Tillquist conducted a literature evaluation to determine whether application of the USEPA's criteria for metals is appropriate. Additionally, Ms. Tillquist conducted a series of aquatic toxicity tests with copper in both hard and soft waters. Neither the literature evaluation nor the toxicity tests supported the extrapolation of criteria beyond these hardness limits.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

Wildlife Biology

Biomonitoring of the Cache la Poudre River*, Colorado

Ms. Tillquist provided technical support for a long-term (i.e., over 10 years) biomonitoring project, fish community structure program. The study area encompassed the Poudre River in northern Colorado with the intent to evaluate if changes in water quality attributable to Eastman Kodak have negatively impacted the Cache la Poudre River ecosystem. Habitat was evaluated using U.S. Environmental Protection Agency's Rapid Bioassessment Protocol, while the fish community was assessed using the Index of Biotic Integrity. Large scale, long-term trends in the fish community appeared to be primarily affected by human disturbance activities such as channelization. Ms. Tillquist conducted fieldwork and analyzed data as part of an Index of Biotic Integrity assessment. Fish collected by electrofishing and seining were identified, weighed, measured, and examined for disease. Flow rates, habitat type, and habitat quality were quantitatively evaluated.

Survey of Fish Assemblage in the Headwaters of East Plum Creek*, Colorado

Ms. Tillquist conducted field surveys for fish in small streams on U.S. Air Force Academy lands. The Air Force Academy was evaluating the potential environmental impacts of increased training activities in undeveloped areas of the Academy's property. In conjunction with this assessment, conducted fish surveys in the intermittent portions of upper East Plum Creek. Electrofishing gear and seines were used to sample the creek and beaver ponds. No fish were found in these reaches.

Museum of Southwestern Biology, University of New Mexico, Field Surveys of Fish in Plain Streams of the Southwestern U.S.*, New Mexico, Texas, Colorado

Ms. Tillquist conducted field surveys for the collection and systematic identification of fish throughout New Mexico, Colorado, and Texas. Special emphasis was placed on the identification of new or existing endangered fish species. Through this work, the Rio Grande silvery minnow was identified and this species subsequently has been listed as an endangered species, largely due to the publication of this fieldwork. She helped curate specimens into the Museum of Southwestern Biology.

Carbon Dioxide Pipeline Project Environmental Assessment*, Wyoming (Project Wildlife Biologist)

Anadarko proposed to construct the 125-mile-long Salt Creek Carbon Dioxide Pipeline. Ms. Tillquist conducted sage-grouse, mountain plover, and raptor surveys. Data from these field reconnaissance surveys were used to assist with pipeline route selection and to identify areas with seasonal construction constraints. The pipeline has been successfully permitted and constructed.

Nesting Habitat Evaluation and Improvement for Threatened Dusky Canada Geese, Prince William Sound & Copper River Delta*, Cordova, Alaska

Ms. Tillquist evaluated areas on the Copper River Delta for their potential as nesting habitat for the endangered Dusky Canada goose. Once suitable sites were identified, artificial nesting structures and islands were constructed. Nesting success was documented through the breeding season to determine if artificial nesting structures were effective. Ms. Tillquist also participated in breeding waterfowl surveys and banded geese. She also evaluated and constructed in-stream habitat improvement structures for anadromous fish and collected water quality data.

* denotes projects completed with other firms

Heidi Tillquist

Environmental Toxicologist/Senior Program Manager

PUBLICATIONS

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CERTIFICATE OF SERVICE

I hereby certify that on the 2nd day of April, 2015, I sent by United States first-class mail, postage prepaid, or e-mail transmission, a true and correct copy of the foregoing Direct Testimony of Heidi Tillquist, to the following:

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

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HP 14-001

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT,

DIRECT TESTIMONY OF
COREY GOULET

o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o

Pursuant to the Commission's Order Granting Motion to Define Issues and Setting Procedural Schedule, Petitioner TransCanada Keystone Pipeline, LP, offers the following direct testimony of Corey Goulet.

1. Please state your name and address for the record.

Answer: My name is Corey Goulet. My business address is 450 1st Street S.W., Calgary, AB Canada T2P 5H1.

2. Please state your position with Keystone and provide a description of your areas of responsibility with respect to the Keystone XL Project.

Answer: I am President, Keystone Projects, with overall accountability for the implementation and development of the Keystone Pipeline system, including the Keystone XL Project (Project). In that capacity, I am responsible for overall leadership and direction of the Project.

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3. Please state your professional qualifications and experience with pipeline operations.

Answer: My professional background is stated in my resume, a copy of which is attached as Exhibit A. I have a degree in mechanical engineering.

4. Are you responsible for portions of the Tracking Table of Changes attached as Appendix C to Keystone's certification petition?

Answer: Yes. I am individually or jointly responsible for the information provided with respect to Finding Numbers 14, 15, 16, 17, 18, 19, 20, 22, 23, and 107 related to the Project. In general, I can testify to the Project purpose; overall description; construction schedule; operating parameters; overall design; cost; and tax revenues.

5. Please summarize the updated information regarding Finding Number 14.

Answer: The Bakken Marketlink project was developed after Keystone's permit application in HP 09-001. The update to this finding reflects that the Project's purpose include transporting domestic production from the Williston Basin and supporting the growth of crude oil production in the United States.

6. Please summarize the updated information regarding Finding No. 15.

Answer: The Gulf Coast Segment of the original Keystone XL Project and the Houston Lateral were constructed as a stand-alone project. The update to this finding reflects that change, meaning that the Project consists of the Steele City Segment, from Hardisty, Alberta, Canada, to Steele City Nebraska, where it will interconnect with the Keystone Cushing Extension segment of the Keystone Pipeline. The Project's current design is based on a maximum capacity to transport 830,000 barrels per day.

7. Please summarize the updated information regarding Finding No. 16.

Answer: Because the Project is limited to the Steele City Segment, the mileage decreased to approximately 1202 miles, with 876 miles through Montana, South Dakota, and Nebraska. The mileage has changed slightly in South Dakota due to minor route variations made at the request of landowners or for engineering reasons. The right of way passes through the same counties as indicated in the Permit Application.

8. Please summarize the updated information regarding Finding No. 17.

Answer: Keystone does not currently have a construction schedule for the Project, pending issuance of the Presidential Permit. The Project's inservice date is uncertain for the same reason.

9. Please summarize the updated information regarding Finding No. 18.

Answer: Due to minor route variations, the mileage in South Dakota and the mileposts have changed slightly. The pipeline will be constructed using API 5L X70M high-strength steel, which was one of the design options presented in the original Permit Application. Keystone's final design determinations were made after TransCanada withdrew its application to PHMSA for a special permit and adopted 59 special conditions developed by PHMSA as set forth in Appendix Z to the Department of State Final Supplemental Environmental Impact Statement (FSEIS).

10. Please summarize the updated information regarding Finding No. 19.

Answer: This update reflects final design determinations based on the decision to withdraw the special permit application and the requirements of 49 CFR 195.106.

11. Please summarize the updated information regarding Finding No. 20.

Answer: This update reflects a change in the number of mainline valves in South Dakota from 16 to 20 due to PHMSA requirements. All of the valves will be remotely controlled for purposes of emergency response.

12. Please summarize the updated information regarding Finding No. 22.

Answer: The 59 special conditions are set forth in Appendix Z to the FSEIS. Keystone has committed to meet these conditions.

13. Please summarize the updated information regarding Finding No. 23.

Answer: The estimated cost of the Project in South Dakota increased to $1.974 billion due to new technical requirements, inflation, and additional costs due to the delay in receipt of federal approval and commencing construction.

14. Please summarize the updated information regarding Finding No. 107.

Answer: Although I am not a tax expert, the increased cost of the Project reflected in Finding No. 23 is likely to result in increased tax revenues to the affected counties. To the extent that tax revenues are an issue at the hearing, Keystone may present rebuttal testimony addressing tax issues from Steve Klekar, Manager, Property Taxation for TransCanada – US Pipelines.

15. Are you aware of any reason that Keystone cannot continue to meet the conditions on which the Permit was granted by the Commission?

Answer: No. As stated in the Certification that I signed, Keystone is or will be able to satisfy all of the conditions imposed by the Commission as part of its Amended Final Decision and Order dated June 29, 2010.

16. Does this conclude your prepared direct testimony?

Answer: Yes.

Dated this 1 day of April, 2015.

Corey Goulet

Corey Goulet

President, Keystone Projects

As President, Keystone Projects, Corey Goulet has overall accountability for the development and implementation of all phases of the Keystone Pipeline including securing land and permits, engineering, procurement, construction, commissioning, start-up and testing.

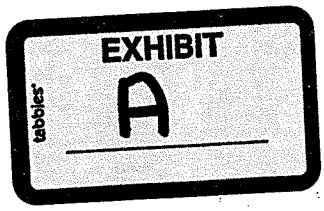
Prior to his current role, Mr. Goulet was Vice-President of the Facilities and Pipeline Projects department where he was responsible for leading the technical development and implementation of power plant, compression, metering and pipeline projects in Canada and the United States.

Mr. Goulet has 27 years of energy infrastructure experience. His experience is varied and has focused on the development, construction, operation and maintenance of natural gas, wind, hydro, nuclear and transmission power facilities; gas, oil and refined products pipelines; and oil and gas production facilities. He joined the company in 1998 as a manager in the international business unit where he was responsible for developing projects. Since that role, he has lead various departments including pipeline engineering, energy projects, and nuclear technical development.

Mr. Goulet is a former member of the Operations and System Integrity subcommittee for CSA Z662 Oil and Gas Pipeline Systems. In addition, he represented TransCanada for two years as a Board member, Executive Committee member, and Planning Committee member with the Pipeline Research Council International, Inc. (PRCI). Mr. Goulet has also been a Board member for two joint venture companies.

Born and raised near Edmonton, Alberta, he graduated with a Bachelor of Science in Mechanical Engineering (with Distinction) from the University of Alberta in 1985.

With more than 60 years' experience, TransCanada is a leader in the responsible development and reliable operation of North American energy infrastructure including natural gas and oil pipelines, power generation and gas storage facilities. TransCanada operates a network of natural gas pipelines that extends more than 68,500 kilometres (42,500 miles), tapping into virtually all major gas supply basins in North America. TransCanada is one of the continent's largest providers of gas storage and related services with more than 400 billion cubic feet of storage capacity. A growing independent power producer, TransCanada owns or has interests in over 11,800 megawatts of power generation in Canada and the United States. TransCanada is developing one of North America's largest oil delivery systems. TransCanada's common shares trade on the Toronto and New York stock exchanges under the symbol TRP. For more information visit: www.transcanada.com or check us out on Twitter @transcanada or http://blog.transcanada.com.



TransCanada
In business to deliver

CERTIFICATE OF SERVICE

I hereby certify that on the 2nd day of April, 2015, I sent by United States first-class mail, postage prepaid, or e-mail transmission, a true and correct copy of the foregoing Direct Testimony of Corey Goulet, to the following:

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

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HP 14-001

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT,

DIRECT TESTIMONY OF
JON SCHMIDT, PH.D.

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Pursuant to the Commission's Order Granting Motion to Define Issues and Setting Procedural Schedule, Petitioner TransCanada Keystone Pipeline, LP, offers the following direct testimony of Jon Schmidt.

1. Please state your name and address for the record.

Answer: My name is Jon Schmidt. My business address is exp Energy Services, 1300 Metropolitan Boulevard, Suite 200, Tallahassee, FL 32308.

2. Please state your position and provide a description of your areas of responsibility with respect to the Keystone XL Project.

Answer: I am Vice President, Environmental & Regulatory Services in the Tallahassee office of exp Energy Services, Inc. I am the regulatory and permitting manager for the Keystone XL Pipeline Project, including the coordination of the Department of State EIS, DEIS, SEIS, FEIS, and FSEIS, the Section 9 Biological Opinion, NHPA Section 106 Programmatic

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Agreement, United States Army Corps of Engineers permitting, the Montana Facility Siting Act licensing, South Dakota PUC environmental filing, and other state and federal permitting.

3. Please state your professional qualifications and experience with pipeline operations.

Answer: My professional background is stated in my resume, a copy of which is attached as Exhibit A. My education consists of a bachelor's degree in marine biology, a master's degree in biological sciences, and a Ph.D. in biological sciences. In general, I have extensive experience in environmental management with respect to the pipeline industry, and have permitted over 30,000 miles of pipeline projects in most states in the United States over the last 28 years. I managed the regulatory and permitting tasks associated with the Keystone Pipeline, including associated compliance inspection during construction. I have testified before the Commission in the permit proceedings concerning the Keystone XL Pipeline in Docket HP 09-001.

4. Are you responsible for portions of the Tracking Table of Changes attached as Appendix C to Keystone's certification petition?

Answer: Yes. I am individually or jointly responsible for the information provided with respect to Finding Numbers 32, 33, 41, 50, 54, 73, and 80. In general, I can testify to environmental issues other than risk and spill response information; the CMR Plan; the Con/Rec Units and the use of horizontal directional drilling.

5. Please summarize the updated information regarding Finding No. 32.

Answer: The environmental impacts discussed in Table 6 of Keystone's permit application still apply. The CMR Plan has been updated. The last version is Rev4, which is attached in redlined form as Attachment A to Appendix C to Keystone's certification petition.

Overall changes to the CMR Plan were made to clarify language, provide additional detail related to construction procedures, and incorporate lessons learned from previous construction, current right-of-way conditions, and project requirements.

6. Please summarize the updated information regarding Finding No. 33.

Answer: Keystone previously submitted Exhibit TC-14 in connection with the hearing on its permit application. Exhibit TC-14 includes soil type maps and aerial photograph maps of the route in South Dakota, showing topography, land uses, project mileposts and location descriptors. Exhibit TC-14 is still generally consistent in the description of the current Project route through South Dakota. Keystone has disclosed in discovery maps of minor route variations made at the request of landowners or for engineering reasons. These maps will be marked as an exhibit at the hearing on Keystone's certification petition. In addition, Keystone will submit updated maps prior to the initiation of construction as required by Condition No. 6 of the Amended Final Decision and Order.

7. Please summarize the updated information regarding Finding No. 41.

Answer: Since the permit application, Keystone has decided to use horizontal directional drilling ("HDD") to cross the Bad River and Bridger Creek, in addition to the Little Missouri, Cheyenne, and White Rivers. Exhibit C to Keystone's permit application contains a listing of all water body crossings and preliminary site-specific crossing plans for the HDD sites. To supplement Exhibit C in Docket HP09-001, Attachment B to Keystone's Tracking Table of Changes in Docket HP14-001 contains the preliminary site-specific crossing plans for the HDD crossings of the Bad River and Bridger Creek.

8. Please summarize the updated information regarding Finding No. 50.

Answer: The total length of the Project pipe with the potential to affect a High Consequence Are ("HCA") is 14.9 miles. The reference to 19.9 miles in the Tracking Table was a typographical error. Since the Tracking Table was prepared, the Cheyenne River crossing was adjusted because of HDD access issues and for construction and engineering reasons, resulting in a slight increase in total HCA mileage. The current HCA mileage figure is 15.8 miles. The 15.8 miles are ecologically sensitive areas and do not encompass populated areas or drinking water areas.

9. Please summarize the updated information regarding Finding No. 54.

Answer: Because of minor route variations, the mileages in South Dakota have changed slightly. The route is approximately 315 miles in South Dakota. All but 27.9 miles of the route are privately owned. 1.7 miles are owned by local governments, and 26.3 miles are state owned and managed. No tribal or federal lands are crossed by the route in South Dakota.

10. Please summarize the updated information regarding Finding No. 73.

Answer: Keystone has updated its CMR Plan since the Amended Final Decision and Order. The changes are shown in a redlined version of the CMR Plan, which is Rev4, filed with the Commission as Attachment A to Appendix C to Keystone's certification petition.

11. Please summarize the updated information regarding Finding No. 80.

Answer: Since the Amended Final Decision and Order, Keystone has completed the construction/reclamation unit ("Con/Rec Unit") mapping in consultation with the National Resource Conservation Service. The Con/Rec Unit mapping is included as Appendix R to the FSEIS.

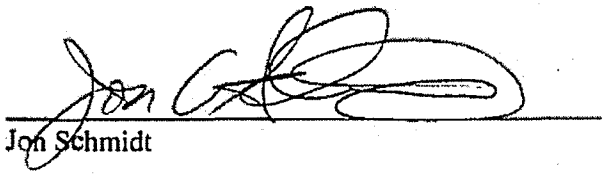
12. Are you aware of any reason that Keystone cannot continue to meet the conditions on which the Permit was granted by the Commission?

Answer: No. I have reviewed the conditions contained in the Amended Final Decision and Order dated June 29, 2010. The changes discussed in Finding Nos. 32, 33, 41, 50, 54, 73, and 80 do not affect Keystone's ability to meet the conditions on which the Permit was granted.

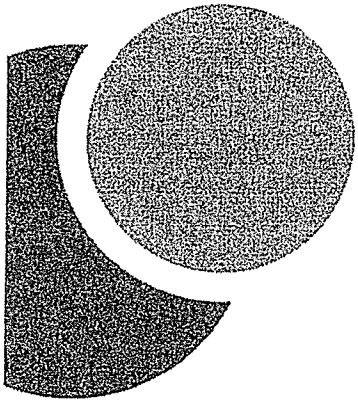
13. Does this conclude your prepared direct testimony?

Answer: Yes.

Dated this 30th day of March, 2015.



Jon Schmidt



Jon Schmidt, PhD

Vice President, Environmental & Regulatory

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Education & Training

- PhD, Biological Sciences, Florida State University
- M.S., Biological Sciences, University of Bridgeport
- B.S., Marine Biology, University of Massachusetts - Dartmouth

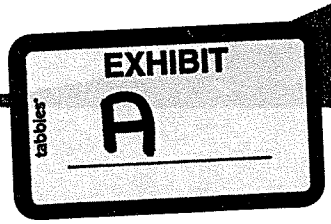
Overview

Jon A. Schmidt is currently the Vice President, Environmental & Regulatory Services in the Tallahassee office of **exp** Energy Services Inc. He joined **exp** in May of 2009.

Mr. Schmidt has extensive experience in environmental management, particularly with respect to the pipeline industry including: environmental regulatory strategy development and project planning, project management, environmental surveys, permitting, and environmental inspection. In over 25 years, he has permitted over 30,000 miles of pipeline projects in most states in the US for mid-stream pipeline companies, gas distributors, and producers. He has also permitted LNG facilities, refined products, natural gas, and crude oil pipelines and terminals throughout the US. This included the management of the regulatory and permitting tasks associated with the 7-state, 1,385 mile Keystone pipeline and associated compliance inspection during construction.

Currently, Jon is the regulatory and permitting manager for work for the 6-state, 1,300 mile Keystone XL Pipeline Project, including the coordination of the Department of State EIS, DEIS, SEIS, FEIS and now SFEIS, the Section 9 Biological Opinion, NHPA Section 106 Programmatic Agreement with over 60 parties, USACE permitting across 7 USACE Districts, Montana Facility Siting Act licensing, South Dakota Public Utilities Commission certification and other state and federal permitting. Jon is also working with the Alaska Pipeline Project in developing the FERC filing strategy and overall environmental program for the re-designed pipeline and LNG project.

Prior to joining **exp,** Mr. Schmidt had a wide variety of experience in the midstream energy industry, including work on international pipeline projects.



Jon Schmidt, PhD– *Continued*

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Project Experience

- **TransCanada/ExxonMobil Development Company as Alaska Pipeline Project (APP), 754 mile, Alaska Pipeline Project, Alaska.**
  Employment: 2010-2012

  Jon served as a member of the company Environment, Regulatory, and Land (ERL) management team for TransCanada and ExxonMobil to direct consulting firms conducting the environmental field surveys, agency consultations, and development of the FERC application for the proposed APP. His role focused on developing and implementing a regulatory strategy lined up with the commercial realities of the project. Jon directed consultants on the scope and efforts required for field surveys, the Resource Reports, and agency meetings and pre-filing activities. He wrote an overarching permitting roadmap and strategy, individual agency permitting plans, and helped implement through agency meetings and workshops to address and resolve timing and level of detail issues with the Alaskan agencies.

- **Keystone XL Pipeline, Montana, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.**
  Employment: 2010

  For the expansion of the Keystone pipeline, Jon served as the overall environmental manager reporting directly to TransCanada. Keystone XL is a 36-inch 1,375 mile crude oil pipeline to the Gulf Coast of the US. Jon's role was similar to that on the Keystone project, but with overall responsibility for environmental compliance. He managed several firms that carried out the field surveys, report writing, and permit application preparation.

- **Keystone Pipeline, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Missouri, and Illinois.**
  Employment: 2006-2012

  Was overall account manager and project director for AECOM as they served as environmental management contractor for Trow Engineering Consultants, owner's engineer for the TransCanada Keystone Project. Keystone is an approximate 1,300 mile crude oil pipeline. Jon was responsible for the overall environmental regulatory strategy for the Department of State Presidential Permit application and EIS process. This effort entailed the coordination with the USACE across multiple districts, multiple USFWS field offices, the NRCS, the South Dakota PUC, North Dakota PSC, and multiple state agencies in each state. Jon's role also included senior review on the multiple filings that were made to the agencies, consultation coordination and meetings, and negotiation of permit conditions, and a Conservation Agreement with the USFWS for Migratory Bird Treaty Act mitigation. Jon was also pivotal in negotiating the USACE permitting to be a NWP for all states crossed and mitigation projects to cover compensation in all states crossed.

- **ConocoPhillips Company, Environmental Services for Licensing of Proposed Beacon Port Liquid Natural Gas Facility, Gulf of Mexico.**
  Employment: 2004

  - Project Director, ConocoPhillips Company contracted ENSR to assist with the licensing of its proposed Beacon Port liquid natural gas facility in the northern Gulf of Mexico. ENSR's services included: 1) developing the environmental report for the deepwater port (DWP) license application to the Maritime Administration (MARAD) and the U.S. Coast Guard (USCG), and 2) managing the development of the entire DWP license application per the DWP Act of 1974, as amended.

Jon Schmidt, PhD– *Continued*

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- Related services included: 1) regulatory outreach, 2) biological impact assessment, 3) water discharge modeling, 4) air emissions modeling, 5) Environmental Protection Agency permitting (air and water discharges), U.S. Army Corps of Engineers permitting, 5) wetland surveys, 6) threatened and endangered species surveys, and 7) development and coordination of a biological sampling plan, among other services. ENSR continues to support ConocoPhillips Company in its efforts to develop Beacon Port.

- **AES Ocean Express Pipeline Third Party Environmental Impact Statement.**
  Employment: 2004

  Served as Project Director for the Environmental Impact Statement (EIS) prepared for the AES Ocean Express pipeline project from the Economic Exclusion Zone (EEZ) to Broward County, Florida. This project ties into a pipeline and LNG facility to be built in the Bahamas. ENSR's role is to serve as the Federal Energy Regulatory Commission's (FERC's) extended staff in preparing the EIS. To date, a PDEIS has been drafted for regulatory review by the MMS, NMFS, FERC, and the USACE.

- **Ingleside Energy Center and San Patricio Pipeline, Oxy Energy Ventures, Corpus Christi, Texas.**
  Employment: 2003-2005

  Jon served as the Project Manager overseeing the preparation of the FERC filing for a new LNG regas facility collocated with Occidental's chemical plant and power plant near Corpus Christi, Texas. Jon coordinated the field surveys required for the facility location, the marine studies to accommodate the dredging of a new berth and pier, as well as studies along the 80+ mile pipeline from the facility to the interstate pipeline grid. Jon worked with Oxy's energy services staff to utilize waste heat from the power plant for regasification, air modeling and coordination with the plant's existing air permits, and coordination of the NHPA 106 and Section 7 ESA consultation required for the FERC application.

- **Bayou Casotte Energy LLC, Casotte Landing Natural Gas Import Terminal, Pascagoula, Mississippi.**
  Employment: 2003-2005

  Jon acted as Project Director for the FERC licensing and permitting of a liquefied natural gas import terminal adjacent to Chevron's Pascagoula refinery at Moss Point, Mississippi. The FERC filing covered the regasification facilities, air modeling and permitting, USACE permitting and dredge disposal studies, and the water use permitting for hydrotesting the LNG storage tanks. Because the site location and required dredging impacted the Gulf Sturgeon, a Section 7 ESA consultation was required to complete the EIS.

- **Cypress Pipeline Project, 166 mile Natural Gas Pipeline, Coastal Georgia and Florida**
  Employment: 2002-2004

  Project Director for permitting the Cypress Project, which included route analysis, agency consultation, FERC Environmental Report preparation, wetland delineation report to USACE and FERC, Environmental Resource Permit application to the state of Florida, and specialized field surveys for Gopher Tortoises.

Jon Schmidt, PhD– *Continued*

Vice President, Environmental & Regulatory

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- **ConocoPhillips Company, Environmental Services for Licensing of Proposed Compass Port Natural Gas Facility, Gulf of Mexico.**
  Employment: 2002-2004

  Project Manager, ConocoPhillips Company contracted ENSR to assist with the licensing of its proposed Compass Port liquid natural gas facility in the northern Gulf of Mexico. ENSR's services included: 1) developing the environmental report for the deepwater port (DWP) license application to the Maritime Administration (MARAD) and the U.S. Coast Guard (USCG), 2) developing the environmental report for the Certificate of Public Convenience and Necessity with the Federal Energy Regulatory Commission (FERC), and 3) managing the development of the entire DWP license application in accordance with the DWP Act of 1974, as amended. Related services included: 1) management of the regulatory Team Permitting process, 2) biological impact assessment, 3) water discharge modeling, 4) air emissions modeling, 5) Environmental Protection Agency permitting (air and water discharges), U.S. Army Corps of Engineers permitting, 6) wetland surveys, 7) threatened and endangered species surveys, and 8) development and coordination of a biological sampling plan, among other services. ENSR continues to support ConocoPhillips Company in its efforts to develop Compass Port.

- **Elba Island LNG Import Terminal Reactivation, Southern LNG Inc.—An El Paso Company, Georgia.**
  Employment: 1999-2001

  Project Director for the successful 1999–2000 certification for reactivation of the Elba Island Import Terminal.

- **Gulfstream Natural Gas System, Environmental Management of Pipeline Construction Project, Gulf of Mexico, Mississippi, Alabama, Florida.**
  Employment: 1998-2001

  Project Director for siting, routing, field surveys, and permitting for 775-mile pipeline construction project. To-date, the project has involved the coordination of over 100 regulatory agencies, and over 15 public meetings with landowners, the general public and over 30 environmental groups. Led the Team Permitting (Florida) and FERC coordination aspects on behalf of the client. Included assessing project impacts to live bottom (reefs) in the Gulf of Mexico and impacts to threaten and endangered marine turtles and mammals.

- **Destin Pipeline Company, LLC (Southern Natural Gas Affiliate), Destin Pipeline Project - Construction of Natural Gas Pipeline, Gulf of Mexico to Clarke County, Mississippi.**
  Employment: 1996-1998

  Project Manager for environmental aspects of construction project which included the installation of 206 miles of 36-in outside-diameter (OD) and 30-in OD pipeline, installation of 2.4 miles of 16-in OD pipeline in Mississippi, installation of four meter stations,construction of a platform in the Gulf of Mexico, and construction of two new compressor stations in Mississippi. Tasks included Alternatives Analysis for selection of a preferred route, environmental surveys, permitting, and on-site environmental inspection.

Jon Schmidt, PhD– *Continued*

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- **Blue Atlantic Transmission System, Environmental Management of Pipeline Project, Nova Scotia Canada to New York.**
  Employment: 1996
  Project Director for the siting, routing, field surveys, regulatory permitting and meetings, and FERC filing for a 850+ mile large diameter pipeline from Nova Scotia into the New York marketplace. The project has involved meeting with all the New England state regulatory bodies, the FERC, NMFS, USACE, MMS, and NOAA to discuss routing and field survey requirements. Most of the offshore field surveys have been completed to date.

- **Etowah LNG Company, LLC, Etowah LNG Peakshaving Facility and Pipeline Construction Project, Polk County, Georgia.**
  Employment: 1995
  Project Director for all environmental aspects of project related to construction of a new 2.5-billion cubic ft. liquefied natural gas peakshaving facility and 12.49 miles of 12.75-in OD natural gas pipeline. Directed team responsible for: preparation ofFERC 7(c) filing and Biological Survey Report; conducting biological field surveys of the jurisdiction and non- jurisdictional facilities (including wetlands, species of concern, and surveys for construction constraints); assisting in the siting of the Etowah Pipeline; preparing Land Disturbing Activity; permitting for the construction of the jurisdictional facilities; preparing the application to the USACE for Section 404 permit; coordinating with surveyors to quickly complete field surveys; and performing agency consultations and negotiations.

- **TransCanada/ANR partnership, 800+ mile SunShine Pipeline Project, Florida, and Alabama.**
  Employment: 1994
  Technical Project Manager. Managed the technical team to put together the state of Florida Siting Application as well as directed the effort for the FERC ER. Managed the technical efforts and data analysis for the cultural resource and biological surveys using GPS/GIS. Participated in the 36 public meetings and coordinated with 80 regulatory agencies from local, regional, state and federal agencies to coordinate comments and simplify licensing/permitting conditions. Put together a regulatory and technical Mitigation Task Force to constructively deal with the impact to over 1,000 wetland crossings.

- **TransContinental Pipe Line Company, Southeast Mainline Looping Project, Alabama, Georgia, and North Carolina.**
  Employment: 1994
  Directed the biological field survey efforts, FERC ER preparation, and provided support to TransContinental for FERC interrogatories.

- **Viking Voyageur Pipeline Company, Viking Voyageur Pipeline Project, Minnesota, Wisconsin, and Illinois.**
  Employment: 1993
  Project Director for 800+-mile project which included providing siting, biological and cultural resource field surveys, FERC ER preparation, and permitting support and coordination for the joint TransCanada and NSP Power project.

Jon Schmidt, PhD– *Continued*

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- **ANR, LSP Power Project, Mississippi.**
  Employment: 1992
  Project includes the field surveys, permitting and FERC ER preparation for the 12-mile lateral.

- **Southern Natural Gas Company, Southern Natural Zone III Expansion Project, Alabama, and Georgia**
  Employment: 1991-1994
  Project director for the Southern Natural Zone III Expansion Project (27 miles looping in 3 states with compression), FERC Section 7(c) Environmental Report (ER), field Surveys, permitting, and environmental inspector's manual preparation.

- **Florida Power Corporation, Environmental Master Services Agreement, Florida.**
  Employment: 1991-1993
  Projects included jurisdictional wetland delineations at the Higgins Power Plant, waste water monitoring at the Montincello facility.

- **ANR Pipeline Company, Patterson Looping Project, Gulf of Mexico, and Louisiana.**
  Employment: 1991
  Project director for 37-mile project which included FERC ER preparation, federal and state permitting, and agency negotiation.

- **Southern Natural Gas Company, Approximately Fifteen 7(c) Projects Totaling 600 Linear Miles, LA, MI, AL, GA, TN, SC, NC, FL, and Gulf of Mexico.**
  Employment: 1990-1992
  Project Manager and Director providing air permitting, contamination assessment, audit and environmental inspection services for regulated facilities.

- **US Navy, Environmental Assessments, Puerto Rico, Florida, and Atlantic Seaboard.**
  Employment: 1990
  Project manager for several US Navy EAs which were completed for proposed facilities or Navy actions. Projects included the Camp Pendleton Warfare Training facilities, the Naval Warfare Training Facilities on Isla Pincros, Puerto Rico, and the ecological risk assessment at the Naval Air Training Center in Pensacola, Florida. Managed the efforts to conduct a siting alternatives analysis study along the Atlantic seaboard for the shock testing for the new class of submarine, the Sea Wolf. Project utilized satellite imagery to create databases and a GIS to manage the information. Required to assess impacts of underwater detonation of explosives to marine mammals and endangered species.

Jon Schmidt, PhD– *Continued*

Vice President, Environmental & Regulatory

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- **Chandeleur Pipeline Company, Chandeleur Destin Extension Project and Chandeleur Expansion Project, Mississippi, and Gulf of Mexico, and Louisiana.**
  Employment: 1990
  Project director for Chandeleur Destin Extension project (4 miles) and Chandeleur Expansion project (30 miles). ENSR provided field survey, FERC ER preparation and permitting support until the project was removed from consideration by Chandeleur.

- **Discovery Pipeline Company LLC, Discovery Pipeline Project, Gulf of Mexico, and Louisiana.**
  Employment: 1990
  Project manager for 80-mile project where ENSR was asked to provide a fast track ER for filing with the FERC and support to Discovery through the FERC review and certification process.

- **Southern Natural Gas Company, Southern Natural East Tennessee Expansion Project, Alabama, Georgia, and Tennessee.**
  Employment: 1989-1991
  Project Director for the project. On a fast track basis, ENSR conducted biological field surveys, completed the FERC ER and survey reports, agency consultation for filing with the FERC and sate and federal agencies in 45 days. Completed all permitting and construction implementation plans. Provided EIS and managed environmental inspection.

- **Southern Natural Gas Company, North Alabama Pipeline Project, Alabama.**
  Employment: 1989
  Project Manager for Southern Natural's 122-mile North Alabama pipeline project in Tuscaloosa, Fayette, Walker, Cullman, Morgan, and Madison counties, Alabama. Project involves route alternatives analysis, FERC 7(c) ER, field surveys using GPS/GIS, and public meeting/FERC support through the EIS process, permitting, and agency negotiation. Currently providing EIS and inspection services.

- **Tenneco, Tenneco West-East Pipeline Project, Louisiana, and Mississippi.**
  Employment: 1989
  Project management involved preparation of the ER for a 225-mile project, management of the biological and cultural resource surveys in Tennessee's Vicksburg field office, and coordination with state and federal agencies and FERC.

Jon Schmidt, PhD– *Continued*

Vice President, Environmental & Regulatory

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International

- **TransCanada Pipelines, Colombia.**
  Employment: 1997
  For TransCanada's first pipeline project in Colombia, Jon served as the technical reviewer and in-country consultant coordinator between the local environmental consulting firms and TCPL's project staff. He helped the locals develop the scope of work for the EIA with the regulators, oversaw implementation, and assisted in impact assessment development to ensure permitting conditions could be implemented in the field by TCPL.

- **ENSR (now AECOM) – Senior Vice President**
  Employment: 1996 – 2009
  Responsibilities included: Part of senior management team at ENSR/AECOM that oversaw all of the company's consulting services related to pipelines and LNG facilities. This included ensuring that staff resources were available across the country and around the world to support key clients on all pipeline and LNG projects. Jon was also account manager for TransCanada, El Paso, and ConocoPhillips while overseeing the company's mid-stream services line.

- **PDVSA, eastern Venezuela.**
  Employment: 1996
  Working with Willbros Engineers, Jon served as the project manager for a routing and feasibility study for the Caripito-Guiria oil pipeline project in the Orinocho River basin. This project involved siting a new oil pipeline from interior E & P locations, across virgin tropical wetland forests, to the coast for PDVSA to build a new oil refinery and shipping facilities to export this new source of crude. Working with local environmental and engineering firms, Jon oversaw the route development, aerial reconnaissance, and report preparation. He participated with Willbros in presenting the study's results to the PDVSA management.

- **Endesa, Chile.**
  Employment: 1993
  For two separate projects on the Bio-Bio River, Jon served first as a task leader for an Environmental Impact Assessment (EIA) to the International Finance Corporation (IFC) for a hydro-electric dam, the first in a series of 5 to be built on this Clase VI river. This project was the first Category A EIA to be reviewed and approved by the IFC. On a subsequent project, Jon was the project manager for a downstream impact and flow study related to the EIA. Issues and concerns related to the operations of the dam resulted in this additional study where Jon had to coordinate and manage local University professors specializing in endemic fish species, hydrologists, modelers, and riverine ecologists coupled with E & E's ecological and modeling staff. He managed his work efforts from Santiago Chile and served as the principal negotiator between Endesa and the IFC on flow conditions for dam operations.

- **Ecology and Environment Inc. – Senior Environmental Scientist.**
  Employment: 1987 – 1996
  Responsibilities included: Served as project manager and project director on energy related projects throughout the US and overseas. Specialties included marine impact assessments and NEPA document preparation for energy projects.

CERTIFICATE OF SERVICE

I hereby certify that on the 2nd day of April, 2015, I sent by United States first-class mail, postage prepaid, or e-mail transmission, a true and correct copy of the foregoing Direct Testimony of Jon Schmidt, to the following:

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

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HP 14-001

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT,

DIRECT TESTIMONY OF MEERA KOTHARI, P.ENG.

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Pursuant to the Commission's Order Granting Motion to Define Issues and Setting Procedural Schedule, Petitioner TransCanada Keystone Pipeline, LP, offers the following direct testimony of Meera Kothari.

1. Please state your name and address for the record.

Answer: My name is Meera Kothari. My business address is 700 Louisiana Street, Houston, Texas 77002.

2. Please state your position with Keystone and provide a description of your areas of responsibility with respect to the Keystone XL Project.

Answer: I am currently Manager, U.S. Business Development, Liquids Pipelines, for TransCanada, as well as Manager, Technical Services Pipeline Engineering for Keystone Oil Projects. I have oversight responsibility for design and engineering for the Keystone XL Pipeline Project.

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3. Please state your professional qualifications and experience with pipeline operations.

Answer: My professional background is stated in my resume, a copy of which is attached as Exhibit A. In general, I am a Professional Engineer, with a degree in mechanical and manufacturing engineering. Beginning in October, 2005, I served as the Lead Project Engineer for the Keystone Pipeline Project. I was the Project Manager for the Cushing Extension Pipeline Project from April 2010 to January 2011. I was the Reclamation Project Manager for the Cushing Extension Pipeline from January 2011 to November 2011. I have testified before the Commission in the permit proceedings concerning the Keystone Pipeline in Docket HP07-001 and concerning the Keystone XL Pipeline in Docket HP 09-001.

4. Are you responsible for portions of the Tracking Table of Changes attached as Appendix C to Keystone's certification petition?

Answer: Yes. I am individually or jointly responsible for the information provided with respect to Finding Numbers 60, 61, 62, 63, 68, 83, 90, and 107. In general, I can testify to design and construction of the Keystone XL Pipeline and PHMSA compliance.

5. Please summarize the updated information regarding Finding No. 60.

Answer: Since the Amended Final Order dated June 29, 2010, Keystone withdrew its request to PHMSA for a special permit ("Special Permit") on August 5, 2010. The decision was explained in a media advisory issued on August 5, 2010, a copy of which is attached as Exhibit B. As a result of the withdrawal, Keystone will implement 59 additional safety measures as set forth in Appendix Z to the Department of State Final Supplemental Environmental Impact

Statement. These measures provide an enhanced level of safety equivalent to or greater than those that would have applied under the previously requested Special Permit.

6. Please summarize the updated information regarding Finding No. 61.

Answer: This finding is no longer relevant as Keystone has withdrawn its request for a Special Permit.

7. Please summarize the updated information regarding Finding No. 62.

Answer: This finding is no longer relevant as Keystone has withdrawn its request for a Special Permit.

8. Please summarize the updated information regarding Finding No. 63.

Answer: As a result of withdrawing the Special Permit application, Keystone will build the Keystone XL Pipeline using the as-proposed high strength steel, API 5L grade X70M steel with a nominal wall thickness of 0.465 inches, but will operate the pipeline at a lower pressure of 1,307 psig to comply with internal pressure design requirements in accordance with federal code of regulation title 49 CFR 195.106. For location specific low elevation segments close to the discharge of pump stations, the maximum operating pressure will be 1,600 psig. Pipe associated with these segments of 1,600 psig MOP will have a design factor of 0.72 and a nominal pipe wall thickness of 0.572 inches (X-70M).

9. Please summarize the updated information regarding Finding No. 68.

Answer: This Finding was updated because TransCanada has four more years of experience in the use of FBE coated pipe. On one occasion when TransCanada excavated pipe to validate FBE coating performance, there was one instance in which an adjacent foreign utility interfered with the cathodic protection system in a shared utility corridor. The situation was

remedied, and no similar situation could exist in South Dakota because there are no shared utility corridors.

10. Please summarize the updated information regarding Finding No. 83.

Answer: Keystone will use Horizontal Directional Drilling ("HDD") for the Bridger Creek and Bad River crossings, in addition to the Little Missouri, Cheyenne, and White River crossings. Attachment B to Keystone's Tracking Table of Changes contains the preliminary site-specific crossing plans for the HDD crossings of the Bad River and Bridger Creek.

11. Please summarize the updated information regarding Finding No. 90.

Answer: The updated information for this finding is based on the withdrawal of the Special Permit application. Keystone will comply with the 59 additional conditions as set forth in the FSEIS, Appendix Z, which provide an enhanced level of safety equivalent to or greater than those that would have applied under the Special Permit.

12. Please summarize the updated information regarding Finding No. 107.

Answer: To the extent that Finding No. 107 included reference to the Special Permit, Keystone has withdrawn its application, but will comply with the 59 additional conditions as set forth in the FSEIS, Appendix Z.

13. Are you aware of any reason that Keystone cannot continue to meet the conditions on which the Permit was granted by the Commission?

Answer: No. I have reviewed the conditions contained in the Amended Final Decision and Order dated June 29, 2010. The changes discussed in Finding Nos. 60, 61, 62, 63, 68, 83, 90, and 107 do not affect Keystone's ability to meet the conditions on which the Permit was granted.

14. Does this conclude your prepared direct testimony.

Answer: Yes.

Dated this 1 day of April, 2015.

Meera Kothari

Meera Kothari P.Eng.

Meera Kothari P.Eng.

Professional Experience

TransCanada Corp. Houston, TX — October, 2014 – Present

Manager, U.S. Business Development, Liquids Pipelines

- Manage TransCanada's existing customer relationships, and develop new customers for future business opportunities.
- Market of capacity on TransCanada's existing oil pipeline system, and extending the reach of TransCanada's oil pipeline network through the development of transportation and terminalling opportunities.
- Perform market research and provide analysis supporting strategy development.
- Prepare business strategies and plans.
- Provide analytical and due diligence support.
- Prepare marketing material and proposals.
- Assist with development of key valuation assumptions and related analysis.
- Interact with key internal clients: Engineering, Supply Chain, Construction, Operations, Legal, Finance, Accounting, Tax, and Risk.
- Transition successful development projects to execution.

TransCanada Corp. Houston, TX — October, 2012 – Present

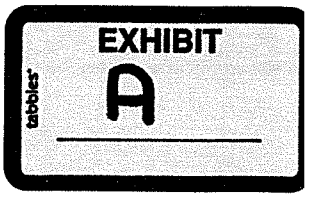
Manager, Technical Services Pipeline Engineering for Keystone Oil Projects

- Guide, review and sign off on pipeline designs and facility interface designs for oil project portfolios worth up to $12B.
- Oversight of 8 engineering firms dealing with all facets of pipeline engineering (inclusive of specialty items such as routing, civil design, E&I, welding, ECA, coating, welding, NDE technology, stress analysis, cathodic protection design, AC mitigation design, risk and spill analysis, thermal modeling, etc.)
- Oversight of construction technical execution for a 860 km 36" pipeline project inclusive of mechanize and flux core welding, automated girth weld coating application, high risk HDDs applications (7500 ft+ in length), AUT/RTR nondestructive examination, automated inspection record capturing
- Performance management for team of 15 direct reports/10 contract staff (engineers, technologists, resident inspectors).
- Technical representative interfacing with construction contractors and major pipe/material suppliers
- Preparation of permit applications, data responses and meetings with Canadian/US Federal and State agencies (NEB, PHMSA, Department of State, Bureau of Reclamation/Land Management ,etc.),

TransCanada Corp. Houston, TX — November 2011 - October 2012

Technical Advisor, Keystone XL Pipeline Project

- Technical advisor during pipeline detail design phase, construction contractor bid process, material procurement, and preconstruction planning activities for 36" 2,798 km cross border pipeline project.



TransCanada Corp. Houston, TX — January 2011 - November 2011

Reclamation Project Manager, Cushing Extension Pipeline

- Management of ROW reclamation activities for 482 km pipeline.

TransCanada Corp. Houston, TX — April 2010 - January 2011

Project Manager, Cushing Extension Pipeline Project

- Construction execution of $110M, 36" 171 km pipeline project in Kansas.
- Delivery of safety performance results and ensured management visibility on the construction site.
- Ensured the project was constructed with the approved design, plans, and standards; and in accordance with environmental regulations and all project permit conditions.
- Delivered within budget and on-time performance meeting project safety, environmental, and quality requirements.
- Ensured positive and professional relationships are enhanced and maintained with contractors, unions, landowners, communities, aboriginal , governmental and regulatory bodies.
- Facilitation of Board of Directors and External Stakeholder visits to the ROW.

TransCanada Corp. Calgary, AB — October 2005 - April 2010

Lead Project Engineer, Keystone Pipeline Project

- Development and review of DBM, FEED, detail design, specifications, standards, procedures for new construction, pipeline change of service conversion and above ground facilities in accordance with applicable industry codes and standards (Canada & USA).
- Pipeline route planning, HCA development, integrity management plans, spill analysis.
- Construction technical support for design, coating, NDE (AUT/RTR), ECA, mechanized/manual welding, hydrostatic testing, In-Line Inspection (ILI), and materials.
- Commissioning support.
- Engineering and Integrity assessment for conversion of 864 km circa 1950, 34" gas pipeline to crude oil service in Canada. Converted without hydrotesting through the use of ultrasonic in-line inspection
- Engineering assessment for the design, construction and operation of 30"/36" 2,215 km crude pipeline at 80% SMYS in the USA. First liquid line to be granted a waiver in the US.
- Plan, review and ensure timely completion of regulatory baseline data collection, permit application preparation and submittal in Canada (NEB Section 74, Section 52, Section 58) and the US (NEPA and State).
- Preparation and analysis of project budgets & expansion cases.
- Generation of terms, conditions, scope, analysis and award and completion of project RFP for major materials and services.
- Expert witness testifying at multiple Department of State (DOS) hearings, State hearings, technical spokesperson at public consultation project open houses.
- Preparation of permit applications, data responses and meetings with Canadian/US Federal and State agencies (NEB, PHMSA, Department of State etc),

TransCanada Energy. Trois Rivières, Québec — May 2005 - October 2005

Project Engineer, Becancour 500 MW Cogeneration Power Plant

- Development & implementation of inside battery limit/outside battery limit construction quality plan for $550M project.
- Witness point inspections and audit of equipment fabrication & equipment installation.
- Conducted plant hazard assessment recommendation close out.
- Validation of work package estimates for outside battery limit pipeline project bid award.
- Development hazardous material philosophy.

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- RFP preparation for gas and chemical supply.
- Development of community investment risk matrix.
- French guided plant tours for various stakeholders.
- Preparation of monthly project status report, management presentations and HS&E statistics
- Analysis and validation of cost and schedule for various work packages
- Development of management operating system compliance tracking report

TransCanada Corp. Calgary, AB July 2001 - April 2005

Pipeline Integrity Engineer for Asset Reliability, Technical Support and Technology Management

- Technical specification support for new capital pipeline projects (coating, welding, materials, NDE).
- Engineering critical assessment for pipeline defect assessment, maintenance repair, pipeline pressure de-rating, unsupported pipe lengths, blasting/explosives, coating systems for 40,000 miles of operating pipeline.
- Urban development encroachments, foreign utility, road and vehicle crossing application review focused in the areas of integrity verification, stress analysis, population growth tracking for the purpose of code compliance and conflicts with facilities that may impact the ability to maintain integrity, access for maintenance purposes, emergency response accessibility and compatible land uses for 40,000 miles of operating pipeline.
- Failure analysis of in service pipe body leaks, pipeline ruptures and hydrostatic test failures
- Research & Development of SCC & MFL In-Line Inspection, NDT techniques, pipeline repair techniques, mainline and joint coating systems, welding of new materials.
- Risk analysis for new pipeline construction projects.
- Development of engineering & integrity budget and programs for due diligence and acquisitions.
- Development of commercial agreements & contracts with Provincial Governments, private developers and construction contracts for pipeline upgrade/rehabilitation project.
- Coordination of Facilities Integrity R&D Program reviews and budgeting cycles.
- Liaison with Regulators (National Energy Board, Transportation Safety Board and Alberta Energy and Utilities Board) with respect to integrity management issues and incidents.
- Providing direction during emergency maintenance activities to various groups within the organization.
- Developed annual integrity maintenance program using quantitative risk modeling software.
- Coordination of research & development projects for risk management, corrosion and SCC.
- Coordination of peer review team for evaluation of projects feasibility and cost management.
- Performed value/benefit analysis for integrity projects.
- Directing contractors & field technicians to perform technical tasks.

Education

Bachelor of Science (BSc) – Mechanical & Manufacturing Engineering, University of Calgary, AB May 2001

- Four (4) Summer Student Program Terms with Petro-Canada Oil & Gas Ltd performing data and technology architecture development for various projects: McKay River Bitumen Recovery Scheme, De-sulferization upgrade facility, transportation developments and Natural Gas Liquids (NGL) facilities June 1998 - May 2001

Special Skills

- **Team and Individual Leadership** – Can fully utilize the capabilities of direct reports to ensure effectiveness of own department. Empowers and motivates the team to set and achieve goals despite significant obstacles.
- **Project Management** – Utilize time management skills to meet deadlines for numerous major projects and demonstrated ability to engage and collaborate with team members effectively.
- **Communication & Collaboration** – Possess strong oral and written communication skills; able to research and present ideas effectively as shown through publications, speeches, and presentations.
- **Languages** – Write and speak fluent English and French

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Publications & Industry

M. Kothari, S. Tappert, U. Strohmeier, J. Larios and D. Ronsky, "**Validation of EMAT In-Line Inspection Technology for SCC Management**," Proceedings of the International Pipeline Conference, Calgary, 2004.

R. Worthingham, M. Cetiner, M. Kothari, "**Field Trial of Coating Systems for Arctic Pipelines**," Proceedings of the International Pipeline Conference, Calgary, 2004.

Chair Person: **In-Line Inspection Session**, Banff Pipeline Integrity Workshop, Banff, 2005

Professional Member of APEGGA

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TransCanada
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Media Advisory

Special Permit Application Withdrawn for Keystone Gulf Coast Expansion Pipeline

Calgary, Alberta – August 5, 2010 – TransCanada has withdrawn its request to the Pipeline and Hazardous Materials Safety Administration (PHMSA) for a special permit. The permit would have allowed TransCanada to operate the proposed Keystone XL pipeline at a slightly higher pressure than current federal regulations for oil pipelines in the United States, subject to building the pipeline using stronger steel and operating under additional safety conditions.

After listening to concerns from the public and various political leaders, TransCanada made the decision to withdraw the permit application. The company will build Keystone XL using the as-proposed stronger steel but will operate it at a lower level of pressure, consistent with current U.S. regulations.

The company recognizes it needs to take more steps to assure the public and stakeholders that the parameters of the special permit would result in a safer pipeline. The company will continue to establish an operating record which will demonstrate the strength and integrity of the Keystone Pipeline System, which has been granted a special permit.

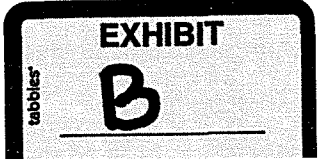
Keystone XL will implement the additional safety measures that would have been required under the special permit. These measures offer an enhanced level of safety and would allow TransCanada to request a special permit in the future. These safety measures also will be consistent with those that have been implemented on the existing Keystone Pipeline. In issuing the special permit for Keystone, PHMSA concluded the permit would provide a level of safety equal to or greater than that provided if the pipeline were operated under the current standard.

Without the special permit, Keystone XL will meet all of its initial commercial commitments to serve Gulf Coast refineries. Keystone also will continue to work with U.S. producers in the Bakken and broader Williston Basin area to provide needed transport for growing production in Montana and the Dakotas.

The Keystone XL project received approval in March 2010 from both the South Dakota Public Utility Commission and the National Energy Board in Canada. Pending receipt of additional permits, construction is planned to begin in 2011.

When completed, the Keystone XL project will increase the commercial capacity of the overall Keystone Pipeline System from 590,000 barrels per day to approximately 1.1 million barrels per day. The $12 billion system is 83 percent subscribed with long-term, binding contracts that include commitments of 910,000 barrels per day for an average term of approximately 18 years.

Commercial operations of the first phase of the Keystone system began June 30. Construction of the extension from Steele City Nebraska to Cushing Oklahoma is one-third complete and the pipeline is expected to be operational in 2011.



Keystone XL is a planned 1,959-mile (3,134-kilometre), 36-inch crude oil pipeline stretching from Hardisty, Alberta and moving southeast through Saskatchewan, Montana, South Dakota and Nebraska. It will connect with a portion of the Keystone Pipeline that will be built through Kansas to Cushing, Oklahoma and facilitate take away capacity from U.S. hubs located on the pipeline. The pipeline will then continue on through Oklahoma to a delivery point near existing terminals in Nederland, Texas to serve the Port Arthur, Texas marketplace.

To view a map of the proposed pipeline route, please visit the project web page at www.transcanada.com/keystone

With more than 50 years' experience, TransCanada is a leader in the responsible development and reliable operation of North American energy infrastructure including natural gas and oil pipelines, power generation and gas storage facilities. TransCanada's network of wholly owned natural gas pipelines extends more than 60,000 kilometres (37,000 miles), tapping into virtually all major gas supply basins in North America. TransCanada is one of the continent's largest providers of gas storage and related services with approximately 380 billion cubic feet of storage capacity. A growing independent power producer, TransCanada owns, or has interests in, over 11,700 megawatts of power generation in Canada and the United States. TransCanada is developing one of North America's largest oil delivery systems. TransCanada's common shares trade on the Toronto and New York stock exchanges under the symbol TRP. For more information visit: www.transcanada.com

TransCanada Forward-Looking Information

This news release may contain certain information that is forward looking and is subject to important risks and uncertainties. The words "anticipate", "expect", "believe", "may", "should", "estimate", "project", "outlook", "forecast" or other similar words are used to identify such forward-looking information. Forward-looking statements in this document are intended to provide TransCanada securityholders and potential investors with information regarding TransCanada and its subsidiaries, including management's assessment of TransCanada's and its subsidiaries' future financial and operations plans and outlook. Forward-looking statements in this document may include, among others, statements regarding the anticipated business prospects, projects and financial performance of TransCanada and its subsidiaries, expectations or projections about the future, and strategies and goals for growth and expansion. All forward-looking statements reflect TransCanada's beliefs and assumptions based on information available at the time the statements were made. Actual results or events may differ from those predicted in these forward-looking statements. Factors that could cause actual results or events to differ materially from current expectations include, among others, the ability of TransCanada to successfully implement its strategic initiatives and whether such strategic initiatives will yield the expected benefits, the operating performance of TransCanada's pipeline and energy assets, the availability and price of energy commodities, capacity payments, regulatory processes and decisions, changes in environmental and other laws and regulations, competitive factors in the pipeline and energy sectors, construction and completion of capital projects, labour, equipment and material costs, access to capital markets, interest and currency exchange rates, technological developments and economic conditions in North America. By its nature, forward looking information is subject to various risks and uncertainties, which could cause TransCanada's actual results and experience to differ materially from the anticipated results or expectations expressed. Additional information on these and other factors is available in the reports filed by TransCanada with Canadian securities regulators and with the U.S. Securities and Exchange Commission (SEC). Readers are cautioned to not place undue reliance on this forward looking information, which is given as of the date it is expressed in this news release or otherwise, and to not use future-oriented information or financial outlooks for anything other than their intended purpose. TransCanada undertakes no obligation to update publicly or revise any forward looking information, whether as a result of new information, future events or otherwise, except as required by law.

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CERTIFICATE OF SERVICE

I hereby certify that on the 2nd day of April, 2015, I sent by United States first-class mail, postage prepaid, or e-mail transmission, a true and correct copy of the foregoing Direct Testimony of Meera Kothari, P.Eng., to the following:

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o

HP 14-001

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT,

DIRECT TESTIMONY OF DAVID DIAKOW

o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o

Pursuant to the Commission's Order Granting Motion to Define Issues and Setting Procedural Schedule, Petitioner TransCanada Keystone Pipeline, LP, offers the following direct testimony of David Diakow.

1. Please state your name and address for the record.

Answer: My name is David Diakow. My business address is 450 1st Street S.W., Calgary, AB Canada T2P 5H1.

2. Please state your position with Keystone and provide a description of your areas of responsibility with respect to the Keystone XL Project.

Answer: I am Vice President, Commercial, Liquids Pipelines, for TransCanada Pipelines. I am responsible for commercial activities for TransCanada's liquids pipeline business, including the Keystone XL Project.

3. Please state your professional qualifications and experience with pipeline operations.

010768

Answer: My professional background is stated in my resume, a copy of which is attached as Exhibit A. I have a bachelor's and master's degree in mechanical engineering, and a Master of Business Administration degree.

4. Are you responsible for portions of the Tracking Table of Changes attached as Appendix C to Keystone's certification petition?

Answer: Yes. I am individually or jointly responsible for the information provided with respect to Finding Numbers 24, 25, 26, 27, 28, and 29 related to the Project. In general, I can testify to demand for the Project.

5. Please summarize the updated information regarding Finding Number 24.

The crude oil market is dynamic. While the crude oil market has changed since 2010, demand for the Project remains strong. Keystone has binding shipper commitments for the Project. The need for the Project is driven by factors that include the need to transport safely and efficiently growing U.S. and Canadian crude oil production, insufficient pipeline capacity, and the opportunity to reduce U.S. dependence on foreign offshore crude oil through increased access to North American supplies. The continued demand for the Project is documented in the Department of State Final Supplemental Environmental Impact Statement (FSEIS), Section 1.4, Market Analysis.

6. Please summarize the updated information regarding Finding Number 25.

Answer: Since Keystone's petition for a permit was filed with the Commission in 2009, United States production of crude oil has increased significantly, from approximately 6.5 million barrels per day (bpd) in 2012, and is expected to peak at 9.6 million bpd by 2019. Even with this growth in domestic production, the United States is expected to remain a net importer of crude

oil. Keystone reviews and relies on forecasts from the U.S. Energy Information Administration (EIA). According to the EIA, U.S. demand for crude oil has held steady at approximately 15 million bpd and is expected to remain relatively stable into the future. More information from the EIA forecasts is included in the FSEIS in Section 1.4. Keystone also relies on industry information available from the CAPP Crude Oil Forecast, Markets and Transportation June 2014, which Keystone produced in discovery in this proceeding.

7. Please summarize the updated information regarding Finding Number 26.

Answer: While domestic production of light crude oil has increased since 2009 and has replaced most foreign imports of light crude, demand persists for imported heavy crude oil by U.S. refineries that are optimally configured to process heavy crude slates. The U.S. Gulf Coast continues to import approximately 3.5 million bpd of heavy and medium sour crude oil. This demand is supported by Keystone's binding shipper commitments for the Keystone XL Project.

8. Please summarize the information regarding Finding Number 27.

Answer: Continued demand for imported heavy crude oil is also demonstrated by the fact that the vast majority of Canadian heavy crude oil production is currently exported to the United States to be processed by U.S. refineries. North American crude oil production growth and logistics constraints have contributed to significant discounts on the price of landlocked crude and led to growing volumes of crude shipped by rail in the United States. As the FSEIS makes clear, in the absence of new pipelines, crude oil will continue to be transported via rail at an increasing rate. The North Dakota Pipeline Authority estimates that rail export volumes from the U.S. Williston Basin have increased from approximately 40,000 bpd in 2010 to over 700,000 bpd in early 2014. Over 60% of crude oil transported from the Williston Basin is delivered by

rail. The industry has also been making significant investments in increasing rail transport capacity for crude oil out of the Western Canadian Sedimentary Basin. In recent years, rail transport of crude oil in Canada has grown from approximately 10,000 bpd in 2010 to approximately 270,000 bpd by the end of 2013. Chapter 5 of the FSEIS (sections 5.0, 5.1, 5.2, and 5.3) indicates that transportation of crude oil by pipeline is safer and less greenhouse gas intensive than crude oil transportation by rail. Thus, the statement in Finding No. 27 remains true--that the project will provide an opportunity for U.S. refiners in Petroleum Administration for Defense District III, the Gulf Coast region, to further diversify supply away from traditional offshore foreign crude supply and to obtain direct access to secure and growing domestic crude supplies.

9. Please summarize the updated information regarding Finding No. 28.

Answer: The numbers vary slightly, but the overall fact remains the same. Reliable and safe transportation of crude oil will help ensure that U.S. energy needs are not subject to unstable political events. Canada has 173 billion barrels of oil reserves, 97% of which are located in the oil sands. Canada's reserves are third only to Venezuela and Saudi Arabia. Canada is the largest foreign supplier of crude oil to the United States and is likely to remain as such for the foreseeable future.

10. Please summarize the updated information regarding Finding No. 29.

Answer: Keystone's shippers have committed to long-term binding contracts, which demonstrate a material endorsement of support for the Project, its economics, proposed route, and target market, as well as the need for additional pipeline capacity to access domestic and

Canadian crude supplies. The FSEIS independently confirms strong market demand for the Project.

11. Are you aware of any reason that Keystone cannot continue to meet the conditions on which the Permit was granted by the Commission?

Answer: No. I have reviewed the conditions contained in the Amended Final Decision and Order dated June 29, 2010. The changes discussed in Finding Nos. 24-29 related to demand do not affect Keystone's ability to meet the conditions on which the Permit was granted.

12. Does this conclude your prepared direct testimony?

Answer: Yes.

Dated this 24 day of March, 2015.

David Diakow

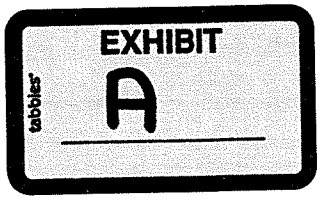
David Diakow

Vice President, Commercial, Liquids Pipelines
TransCanada Pipelines

David is currently responsible for commercial activities for TransCanada's liquids pipeline business, including strategy development, commercial regulatory management and commercial management of its operating assets, such as the Keystone Pipeline system, and including those in advanced stages of commercial development such as the Keystone XL project.

David has over 27 years of experience in the oil and gas industry, with 24 years at TransCanada. David has held management positions in engineering, major projects and business development with respect to natural gas and crude oil pipelines development in Canada and the U.S.

David graduated from the University of Saskatchewan in 1987 with a Bachelor of Science degree in Mechanical Engineering and also holds both a Master of Science degree in Mechanical Engineering (1994) and a Master of Business Administration degree (2002) from the University of Calgary.



CERTIFICATE OF SERVICE

I hereby certify that on the 2nd day of April, 2015, I sent by United States first-class mail, postage prepaid, or e-mail transmission, a true and correct copy of the foregoing Direct Testimony of David Diakow, to the following:

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April 2, 2015

Patricia Van Gerpen, Executive Director
South Dakota Public Utilities Commission
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Pierre, SD 57501

RE: HP14-001, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification of Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline

Ms. Van Gerpen,

Attached for filing please find the following:

1) Prefiled testimony and Exhibit of Brian Walsh
2) Prefiled Testimony and Exhibit of Paige Olson
3) Prefiled Testimony and Exhibit of Tom Kirschenmann
4) Prefiled Testimony and Exhibit of Derric Iles
5) Prefiled Testimony and Exhibit of Kim McIntosh
6) Prefiled Testimony and Exhibit of Darren Kearney
7) Prefiled Testimony and Exhibit of Dan Flo
8) Prefiled Testimony of Jenny Hudson
9) Prefiled Testimony and Exhibit of David Schramm
10) Prefiled Testimony of Christopher Hughes

By copy of this correspondence, on today's date, the foregoing was served upon all persons identified on the Commission's service list in the above-captioned docket. Thank you for your time and attention to this matter. Should you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Kristen N. Edwards
Staff Attorney

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF BRIAN WALSH
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. State your name.

A. Brian Walsh.

Q. By who are you employed?

A. State of South Dakota.

Q. For what department do you work?

A. Department of Environment and Natural Resources – Ground Water Quality Program

Q. Please explain your role and duties within your department.

A. I am an Environmental Scientist III with the Ground Water Quality Program. My role is to provide technical expertise and departmental oversight while enforcing the applicable state laws and rules on projects impacting or having the potential to impact groundwater resources in South Dakota.

My duties include serving as the department's coordinator for hazardous material pipeline projects and staffing the South Dakota Underground Pipeline Task Force, administering the department's Underground Injection Control Class II program, preparing source water assessment reports, and overseeing the cleanup of regulated substance releases cases.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission.

Q. Were you involved in the Keystone XL permitting docket, HP09-001?

A. Yes.

Q. Did you file prefiled testimony in HP09-001?

A. Yes. (Exhibit___BW-1)

Q. Did you also provide testimony at the evidentiary hearing in HP09-001?

A. Yes.

Q. Have you reviewed the information filed in HP14-001?

A. Yes. I have reviewed the information in the docket relevant to my previous testimony.

Q. Have you reviewed the Final Supplemental Environmental Impact Statement (FSEIS) for the Keystone XL project?

A. Yes.

Q. On March 12, 2009 the DENR submitted comments on the scope of the Draft EIS to the U.S. Department of State. In addition, on May 20, 2011 the DENR submitted comments on the Supplemental Draft Environmental Impact Statement. Do you believe the DENR's comments were adequately addressed by the Department of State now that the FSEIS is available for review?

A. Yes. DENR's comments were adequately addressed in the FSEIS.

Q. In your opinion, do the FSEIS and conditions set forth in the PUC's Amended Final Decision and Order adequately address the protection of South Dakota's natural resources?

A. Yes. If the pipeline is constructed and operated as designed and in compliance with all applicable laws and regulations, permit conditions, and the recommendations of the FSEIS, risks to South Dakota's natural resources is minimized.

Q. Did any of TransCanada's amended conditions set forth in Exhibit C of this docket result in a change to your professional opinion on the project?

A. No.

Q. Has any information provided to the DENR or acquired by the DENR since the PUC's Amended Final Decision and Order issued on June 29, 2010 changed your opinion on the Keystone XL project?

A. No.

Q. Are there any conditions in the Amended Final Decision and Order, dated June 29, 2010, that you believe, at this time, that Keystone XL cannot continue to meet?

A. No.

Q. In your pre-filed testimony filed in docket HP09-001 you attested that the pipeline crosses geological and/or hydrological sensitive areas. Has the pipeline route changed to avoid those sensitive areas since the Amended Final Decision and Order was issued on June 29, 2010?

A. Yes. TransCanada has developed the Colome reroute which moved the proposed route so it no longer will intersect Colome's zone A source water protection area. With this change, the proposed pipeline route does not cross any zone A source water protection areas in South Dakota. However, the proposed pipeline route does cross other unconfined aquifers in South Dakota.

Q. If not, in your opinion, can the Applicant still mitigate the risks associated with crossing those sensitive areas?

A. Yes.

Q. If so, please explain.

A. If the pipeline is constructed and operated as designed and in compliance with all applicable laws and regulations, permit conditions, and the recommendations of the FSEIS the risk to these sensitive areas is minimized.

Q. Any other information of use to the commission or public with regards to the certification of the Applicant's permit?

A. No

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF BRIAN WALSH ON BEHALF OF THE COMMISSION STAFF SEPTEMBER 2009

BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA

PREFILED TESTIMONY OF BRIAN WALSH

Q. State your name.

A. Brian Walsh

Q. State your employer.

A. State of South Dakota

Q. Specify the department for which you work.

A. Department of Environment and Natural Resources – Ground Water Quality Program.

Q. Explain your role and duties within your department.

A. I am a Hydrology Specialist with the Ground Water Quality Program. My role is to provide technical leadership, departmental oversight, and enforce laws and rules on projects impacting or potentially impacting groundwater resources of the state.

Primary duties include serving as the lead, department-wide coordinator for hazardous material pipeline projects in South Dakota, serve as the lead staff for the South Dakota Underground Pipeline Task Force, serve as the Governor's appointee on the Interstate Oil and Gas Compact Commission / Federal Energy Regulatory Commission Pipeline Task Force, responsible for developing source water assessments and preparing source water assessment reports for the statewide Source Water Assessment and Protection Program, direct and oversee the Pierre VOC assessment and remediation project, and serve as the lead project officer for multiple regulated substance release cases.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. What is your involvement with TransCanada Keystone XL?

A. I am the department's project coordinator for the TransCanada Keystone XL project. I am responsible for maintaining a thorough knowledge of the project, representing the department at project meetings, serving as the primary department contact for the project, responding to data requests from TransCanada and their contractors, responding to public inquires about the project, and coordinating department wide review and response to project documents (i.e., the Environmental Impact Statement).

Q. Did you provide comments during the EIS preparation process?

A. Yes, however, the EIS process is still ongoing. To date, the department has provided comments on the scope of the Draft EIS to the U.S. Department of State. When the Draft EIS is available, I will review the document, coordinate the department's response, and provide comment as needed.

Q. Tell about those comments.

A. On March 12, 2009 I submitted the department's comments on the scope of the Draft EIS to the U.S. Department of State (Attachment A). These comments are general in nature and cover items the department thinks should be addressed as part of the EIS.

Q. Do you believe those comments were adequately addressed in the EIS process?

A. I will not be able to determine if the comments were adequately addressed until the Draft EIS is available and the department reviews it.

Q. Did TransCanada or their consultants contact you for information?

A. Yes.

Q. If yes, what kind of information?

A. Information I provided to TransCanada's consultants included:

- GIS shapefiles showing Zone A source water protection areas located within 5-miles of the proposed centerline.
- Electronic copies of source water assessment reports for specific public water supply systems requested by TransCanada's consultants.
- Electronic copies of South Dakota Geological Survey Special Report 48 "Ground-Water Investigation for the City of Colome, South Dakota" and South Dakota Geological Survey Open-File Report 69-UR "Investigation of Ground-Water Resources for the Tripp County Water User District".
- GIS shapefiles showing Zone B source water protection areas located within 5-miles of the proposed centerline.
- Written descriptions of the nearest Zone B source water protection areas located downstream of major river crossings along the proposed route.
- GIS shapefiles showing the locations and availability of driller's logs for groundwater wells within 5-miles of the proposed centerline.
- Copies of driller's logs for specific wells, requested by TransCanada's consultant, located along the proposed route.
- GIS shapefiles showing the location of availability of driller's logs for groundwater wells less than 50 feet deep within 5-miles of the proposed centerline.
- GIS shapefiles showing the location of groundwater wells with water rights permits completed in unconfined aquifers located within 5-miles of the proposed centerline.
- The contact information for the South Dakota State Geologist, Derric Iles.
- The contact information for the department staff who work on TMDL issues.

Q. How many meetings have you had with TransCanada and/or their consultants?

A. Ten. In addition, I have had significant email communication and several conversations via telephone with TransCanada's consultants.

Q. What was the nature of each of those meetings?

A.

- May 21, 2008 – TransCanada's representatives came to Pierre to introduce the project to interested state agencies.
- June 23 – 30, 2008 – Attended a series of five public meetings hosted by TransCanada to provide project information to the public. Meetings were located in towns along the proposed pipeline route.
- January 14, 2009 – Attended an informational meeting for South Dakota Legislators in Pierre hosted by TransCanada's representatives.
- April 27 – 28, 2009 – Attended three public meetings hosted by the South Dakota Public Utilities Commission. Meeting locations are Winner, Philip, and Buffalo. At each meeting, TransCanada representatives presented information about the project and answered questions from the public.
- The email and telephone communications predominately concerned the information requests described in section 10 of my testimony.

Q. When would your agency have jurisdiction over Keystone XL?

A. The department would have regulatory authority over the proposed pipeline under the following circumstances.

- **Temporary Water Right Permit** – required for all water uses except reasonable domestic use. TransCanada would need a temporary water right permit to acquire water to hydrostatically test the proposed pipeline.

- **Surface Water Discharge Permits**

    1. Temporary Discharge Permit – required for any point source discharge to waters of the state. TransCanada would need a temporary discharge permit if hydrostatic test waters or construction dewatering waters are discharged to surface waters of the state.
    2. Storm Water Construction Permit – Oil pipelines are typically exempt from these permitting requirements. However, the state's surface water quality standards for suspended solids still apply. If the construction of the pipeline causes or contributes to violations of the surface water quality standards, the department could require TransCanada to obtain a permit.

- **Title V Air Quality Operating Permit** – These regulations would only apply if TransCanada installs backup generators at their pump stations that are required to meet 40 CFR Part 60, Subpart IIII.
- **Underground and Aboveground Storage Tanks** – any tank used to store petroleum or other hazardous regulated substance must comply with the state tank requirements. These requirements may apply if TransCanada uses tanks to store petroleum products during construction or if they have petroleum storage tanks at their pump stations.
- **Oil Spill Response Plan** – each crude oil pipeline operator issued a permit from the South Dakota Public Utilities Commission under the Energy Conversion and Transmission Facilities Act shall prepare an oil spill response plan. The pipeline operator must submit the plan to the

department prior to putting the pipeline in operation and is not effective without departmental approval.

- **Regulated Substance Release** – In the event of a regulated substance release during construction or operation of the pipeline, the department would have regulatory authority over the cleanup of the release. This authority includes the ability to take enforcement action against the responsible party and the ability to enforce the department's soil, groundwater, and surface water standards.

Q. Does this pipeline place any additional burden on your program?

A. No.

Q. Are there any geological and/or hydrological sensitive areas crossed by the Keystone XL pipeline?

A. Yes.

Q. Please briefly summarize each.

A. As of July 2008, the proposed pipeline route intersected the city of Colome's zone A, source water protection area in Tripp County. The city currently purchases its permanent water supply from the Tripp County Water Users District. The source water area intersected by the proposed pipeline is for the city's emergency back-up wells. These wells are approximately 55 feet deep and are completed in the unconfined, High Plains aquifer.

The proposed pipeline does cross other, unconfined aquifers in South Dakota. For additional information on these aquifers, I defer to the testimony of the State Geologist, Derric Iles.

Q. Can the Applicant mitigate the risks associated with crossing those sensitive areas?

A. Yes.

Q. If so, please explain.

A. TransCanada can mitigate the risk associated with crossing the city of Colome's source water protection area by rerouting the pipeline to avoid the source water protection area.

Based on my review of TransCanada's application to the PUC, they have developed an alternative pipeline route (the Colome reroute) routing the pipeline around the city's source water area. To reduce the risk to the city's emergency back-up drinking water wells I recommend TransCanada incorporate the Colome reroute into the final pipeline route.

Concerning mitigation efforts for the other, unconfined aquifers crossed by the proposed pipeline, I defer to the testimony of the State Geologist, Derric Iles.

Q. Any other information of use to the commission or the public.

A. In March 2009, through a landowner email to the Governor's office, I became aware of a landowner concern about a proposed pump station in Jones County located approximately 600 feet from their house. Their primary concern was noise pollution from the electric pumps at the pump station. In this case, the landowner built the house after TransCanada selected the pump station location. To help address the landowner's concern I contacted TransCanada representatives to make sure they were aware of the situation and to see what could be done to alleviate the landowners concern. TransCanada informed me they were aware of the situation and would design the pump station to minimize operational noise. In addition, TransCanada was evaluating alternative sites for the proposed pump station that would be further away from the house. During a June 5, 2009 phone conversation, Brett Koenecke (TransCanada representative) informed me the pump station had been relocated and the issue has been resolved.

DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES
PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

March 12, 2009

Elizabeth Orlando
OES/ENV Room 2657
U.S. Department of State
Washington, DC 20520

Subject: South Dakota DENR Comments on the U.S. Department of State's Notice of Intent to Prepare an Environmental Impact Statement for the Keystone XL Project

Dear Ms. Orlando,

Enclosed for your review are the department's comments on the U.S. Department of State's Notice of Intent to Prepare an Environmental Impact Statement for TransCanada's proposed Keystone XL project. If you have any questions concerning these comments feel free to contact me at 605.773.3296 or brian.walsh@state.sd.us.

Sincerely,

Brian J. Walsh
Hydrology Specialist
Ground Water Quality Program

Enclosure (1)

cc: Kara Semmler, SD PUC, Pierre
Nathan Solem, SD PUC, Pierre

010793
Attachment A

South Dakota Department of Environment and Natural Resources Comments on the U.S. Department of State's Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Scoping Meetings

General

1. Please continue to include the department on the Department of State mailing list for the Keystone XL project. The department contact for this project is:

   Brian Walsh
   Hydrology Specialist
   SD DENR
   523 E. Capitol Ave.
   Pierre SD 57501
   605.773.3296
   605.773.6035 (fax)
   brian.walsh@state.sd.us

2. Please provide the department with one hard copy of the DRAFT Environmental Impact Statement (EIS) and one hard copy of the Final EIS for the Keystone XL project.

Water Resources

3. The Draft EIS needs to evaluate the potential impacts of the project on public and private drinking water sources near the proposed pipeline. The evaluation needs to address the potential impacts to private wells and the potential impacts to public water supply system's source water protection areas.

4. The Draft EIS needs to evaluate the potential impacts to groundwater quality and quantity near the proposed pipeline. Specifically, the evaluation needs to address this issue where the project crosses surficial aquifers such as the Hell Creek, Fox Hills, and Ogallala aquifers.

5. The Draft EIS, as part of its evaluation of potential impacts to perennial and intermittent water bodies, needs to consider the impacts of the proposed project on South Dakota's rivers, streams, impoundments, stream classifications and surface water quality standards.

Oil and Gas Industry

6. The Draft EIS, as part of its evaluation of the potential impacts to existing land uses, needs to evaluate the potential impacts to South Dakota's existing crude oil and natural gas pipeline infrastructure.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF DERRIC ILES
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. State your name.

A. Derric Iles.

Q. By who are you employed?

A. State of South Dakota.

Q. For what department do you work?

A. Department of Environment and Natural Resources.

Q. State the program for which you work?

A. Geological Survey Program.

Q. Please explain your role and duties within your department.

A. I plan and direct the activities of the Geological Survey Program to locate, describe, map, and evaluate the natural resources of South Dakota. I also provide scientific advice and expertise to the South Dakota Department of Environment and Natural Resources, other governmental agencies, consultants, and the public.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission.

Q. Were you involved in the Keystone XL permitting docket, HP09-001?

A. Yes.

Q. Did you file prefiled testimony in HP09-001?

A. Yes. (Exhibit____DI-1)

Q. Did you also provide testimony at the evidentiary hearing in HP09-001?

A. Yes.

Q. Have you thoroughly reviewed all of the information filed in HP14-001, including the route changes provided by TransCanada in response to question 10 of Staff's first interrogatory request?

A. I have reviewed all of the relevant information.

Q. Have you reviewed the Final Supplemental Environmental Impact Statement (FSEIS) for the Keystone XL project?

A. I have reviewed the relevant portions of the FSEIS.

Q. Do the route changes or information provided in the FSEIS result in a need to modify your original testimony filed in PUC Docket HP09-001?

A. No.

Q. Based on your review of the route changes, FSEIS, and amended conditions in Exhibit C of this docket, is it your opinion that the Applicant can still mitigate the risks associated with crossing the geologically and hydrologically sensitive areas?

A. Yes

Q. Based on your review of the FSEIS, amended permit conditions provided in this docket, and route changes, has your opinion on the Keystone XL project changed since your original testimony filed in PUC docket HP09-001?

A. No

Q. Are there any conditions in the Amended Final Decision and Order, dated June 29, 2010, that you believe, at this time, that Keystone XL cannot continue to meet?

A. No

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF DERRIC ILES
ON BEHALF OF THE COMMISSION STAFF
SEPTEMBER 2009

BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA

PREFILED TESTIMONY OF DERRIC ILES

Q. State your name.

A. Derric Iles.

Q. State your employer.

A. State of South Dakota, Department of Environment and Natural Resources.

Q. State the program for which you work.

A. Geological Survey Program.

Q. State the program roles and your specific job with the department.

A. The mission statement of the Geological Survey Program concisely describes the role of the Geological Survey Program. That mission statement is provided below.

To conduct geologic studies, hydrologic studies, and research; and to collect, correlate, preserve, interpret, and disseminate information, leading to a better understanding of the geology and hydrology of South Dakota. Special emphasis is placed on ground-water quantity and quality and other natural resources of economic value. The Survey has no regulatory authority; instead, it provides information and interpretations on natural resources and related issues, and assists agencies and individuals in making well-informed decisions.

I am the State Geologist and Administrator of the Geological Survey Program. In that capacity, I plan, organize, and direct the activities of the Geological Survey Program. I administer the activities conducted by Program employees who use their technical and scientific expertise to locate, describe, map, and evaluate the natural resources of South Dakota. I also provide advice and expertise to the South Dakota Department of Environment and Natural Resources, other governmental agencies, consultants, and the public.

Q. Explain the range of duties you perform.

A. My duties include the following.

- Collection and analysis of data.
- Preparation and review of technical reports and maps.
- Coordination and implementation of projects and contracts related to the Geological Survey Program.
- Providing technical advice to DENR's regulatory Programs, upon request, related to permit applications or appeals.
- Providing advice and guidance to Geological Survey personnel and to entities and individuals external to the Geological Survey.
- Providing work direction to Geological Survey personnel.
- Planning of long-range Geological Survey Program activities.
- Securing the cooperation and coordination of external individuals and entities for the betterment of activities performed by Geological Survey personnel.
- Tracking agency performance and maintaining acceptable progress and productivity.
- Maintaining an adequate inventory of supplies and parts needed for the day-to-day operations of the Geological Survey Program.
- Assessment of the need for purchase of capital assets necessary to maintain productivity and to meet expected project demands.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. Are there any geological and/or hydrological sensitive areas crossed by the Keystone XL pipeline?

A. Yes.

Q. Please briefly summarize each.

A. Geologically Sensitive Area – Paleontological Resources

Page 37 of the permit application refers to the fossil (paleontological resource) potential of two geologic units: the Ludlow Formation of the Fort Union Group and the Hell Creek Formation. I concur with statements in the application indicating that there is high potential for encountering fossil resources in these two geologic units, however; only a small length of the proposed pipeline route in South Dakota is directly underlain by the Ludlow Formation. The permit application also refers to the Fox Hills Sandstone and the Pierre Shale as having potential for containing fossils. I concur with this as well. Additionally, there is the possibility that fossils could be encountered in other geologic units along the proposed pipeline route. For example, the Valentine Formation of the Ogallala Group is known to have vertebrate fossils. There is no way to know the locations of all fossil resources in advance of construction activities.

Hydrologically Sensitive Area – Surface Water

Drainages containing a surface flow of water are hydrologically sensitive. The permit application states on page 44 that "A total of 12 perennial streams and rivers, 109 intermittent streams, and 182 ephemeral streams will be crossed in South Dakota during the construction of the Project." Flowing surface water would have the potential to carry sediment disturbed during construction in a downstream direction.

Hydrologically Sensitive Area – Ground Water

The area comprised by sediments of the High Plains aquifer is hydrologically sensitive. This aquifer is mentioned on page 46 of the permit application and, along the proposed pipeline route, occurs only in Tripp County. I examined the records of 21 wells that have locations near and along the proposed pipeline route in the area of Tripp County that contains the High Plains aquifer. These well records were obtained from a database maintained by the Water Rights Program, Department of Environment and Natural

Resources. These records indicate sand or sandy sediments beginning at depths from land surface ranging from 0 to 11 feet and extending to depths ranging from 16 to 55 feet. The static water levels listed in those records ranged from 4 to 25 feet below land surface. These thicknesses of sand or sandy sediment and static water levels along the proposed pipeline route are consistent with a 2004 South Dakota Geological Survey publication titled "Hydrogeologic Assessment of the High Plains Aquifer in Tripp and Gregory Counties, South Dakota" that shows the saturated thickness of the aquifer along the proposed pipeline route to be less than 50 feet. The High Plains aquifer sediments along the proposed pipeline route occur at or very near land surface, have a shallow depth to water (the water table in this case), and are generally permeable. The quality of water in the High Plains aquifer, such as the water distributed by the Tripp County Water User District, is often very good.

A comparison of the proposed pipeline route with the surface geology shown on the Geologic Map of South Dakota (published in 2004 by the South Dakota Geological Survey) shows that the proposed pipeline route crosses the following ten geologic units (listed in alphabetical order):

- Alluvium
- Eolian deposits (part of the High Plains aquifer where in contact with Ogallala Group)
- Fox Hills Sandstone
- Hell Creek Formation
- Ludlow Formation of the Fort Union Group
- Ogallala Group (part of the High Plains aquifer)
- Pierre Shale
- Terrace deposits (part of the High Plains aquifer where in contact with Ogallala Group)

- Tongue River Formation of the Fort Union Group
- White River Group (part of the High Plains aquifer)

The four geologic units crossed by the most miles of the proposed pipeline route, in order from most to fewest miles, are the Pierre Shale, the Hell Creek Formation, Terrace deposits, and the Fox Hills Sandstone. Approximately 65 percent of the proposed pipeline route in South Dakota is directly underlain by the Pierre Shale or the Hell Creek Formation.

The descriptions provided on the Geologic Map of South Dakota for the ten geologic units listed above indicate that all of the units contain portions which would be considered permeable. Examples of the descriptive words or phrases to which I refer in the unit descriptions are silty sandstone, clay- to boulder-sized clasts, sandstone and pebble conglomerate, cross-bedded sandstone, silt to medium-grained sand, sandstone, conglomerate, and gravel. Detailed geologic maps are not available to determine whether these particular portions of the geologic units, and to what extent these portions, may be present along the proposed pipeline route. These more permeable portions may be a minor component of a given geologic unit or may be totally absent in a particular area. For example, the Pierre Shale which underlies more of the proposed pipeline route than any of the other geologic units is not generally considered an aquifer but its description on the Geologic Map of South Dakota states that it contains "minor sandstone." Thus, there is a possibility that some portions of geologic units crossed by the pipeline, combined with the presence of a shallow water table, could be interpreted as a hydrologically sensitive area; especially if a user of the shallow ground water is located in a down-gradient direction where it could be reasonably expected that an impact might be observed from activities related to the pipeline.

Q. Can the Applicant mitigate the risks associated with crossing those sensitive areas?

A. Yes.

If so, please explain

Geologically Sensitive Area – Paleontological Resources

If paleontological resources are encountered on lands under the jurisdiction of the Office of School and Public Lands, South Dakota Codified Law 5-1-20 requires that "Any person who discovers any scientifically significant paleontological resources on lands under the jurisdiction of the commissioner of school and public lands shall promptly report the discovery to the commissioner." Such paleontological resources are the property of the state and their disposition is controlled by the state.

If paleontological resources are encountered on private land, it is my understanding that the land owner is the owner of the paleontological resource. In this situation, it is my recommendation that landowners consult with staff at the Museum of Geology at the South Dakota School of Mines and Technology regarding the documentation, handling, and disposition of the paleontological resource.

Hydrologically Sensitive Area – Surface Water

The water-crossing-construction methods to be used in pipeline construction are outlined on pages 44 through 46 of the permit application. The permit application indicates forethought of how to mitigate impacts to the environment during construction, a willingness to comply with permit requirements that may be imposed during construction, and a willingness to utilize best management practices aimed at minimizing soil erosion and sedimentation. If the applicant properly constructs, operates, inspects, and maintains the pipeline, it is my opinion that the risks can be adequately mitigated.

Hydrologically Sensitive Area – Ground Water

If the applicant properly constructs, operates, inspects, and maintains the pipeline, it is my opinion that the risks can be adequately mitigated.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF KIMBERLY MCINTOSH
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. State your name.

A. Kimberly McIntosh.

Q. By who are you employed?

A. State of South Dakota.

Q. For what department do you work?

A. Department of Environment and Natural Resources.

Q. State the program for which you work?

A. Ground Water Quality Program

Q. Please explain your role and duties within your department.

A. Senior Scientist Manager and team leader for the Spills Section of the Ground Water Quality Program. Oversee the enforcement of South Dakota's laws and rules related to spill and release reporting, assessment, and cleanup of regulated substance releases throughout the state. I manage the Regulated Substance Response Fund and oversee the state's response contractors that are under contract to respond to regulated substance releases. I manage the State's Brownfields Program which provides financial assistance for the assessment of abandoned contaminated sites. I act as the team leader overseeing the state's Emergency Planning and Community Right to Know Act (EPCRA) Program which collects chemical storage data from certain facilities in the state and provides information that information to local responders and planning committees. I am the department designated representative to the State's Homeland Security Task Force, and act as the department's emergency planning contact to work with the Office of Emergency Management and other state agencies in the event of a disaster. I am the Governor designated Regional Response Team Representative for

Region VIII with responsibilities to coordinate with Federal agencies in the event of a hazardous material incident or disaster that threatens human health or the environment.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission.

Q. Were you involved in the Keystone XL permitting docket, HP09-001?

A. Yes.

Q. Did you file prefiled testimony in HP09-001?

A. Yes. (Exhibit____KM-1)

Q. Did you also provide testimony at the evidentiary hearing in HP09-001?

A. Yes.

Q. Have you reviewed the information filed in HP14-001?

A. Yes.

Q. Have you reviewed the Final Supplemental Environmental Impact Statement (FSEIS) for the Keystone XL project?

A. Yes.

Q. Have you reviewed TransCanada's Spill Prevention Control and Countermeasure (SPCC) Plan and Emergency Response Plan (ERP), identified as Appendix I of the FSEIS?

A. Yes.

Q. In your opinion, do the SPCC Plan and ERP adequately identify that TransCanada has the appropriate resources available to respond to a spill should one occur?

A. Yes.

Q. Has your opinion on the Keystone XL project changed since the Amended Decision and Order was issued on June 29, 2010?

A. No.

Q. Are there any conditions in the Amended Final Decision and Order, dated June 29, 2010, that you believe, at this time, that Keystone XL cannot continue to meet?

A. No.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF KIMBERLY LORRENE MCINTOSH
ON BEHALF OF THE COMMISSION STAFF
SEPTEMBER 2009

BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA

PREFILED TESTIMONY OF KIMBERLY LORRENE MCINTOSH

Q. State your full name.

A. Kimberly Lorrene McIntosh.

Q. State your employer.

A. South Dakota Department of Environment and Natural Resources.

Q. Explain the specific program for which you work.

A. Ground Water Quality Program – Spill Assessment and Cleanup Section. The spill section is responsible for documenting all reported regulated substance releases: petroleum, chemical, pesticide, fertilizer, metals, etc. The spill section maintains the program files and the environmental events database which contains information on each reported release. This section investigates complaints and releases, obtains environmental samples, provides direction to responsible parties, environmental consultants and local officials on state laws and rules, and issues letters directing the assessment and cleanup of contamination. This section is responsible for the SARA (Superfund Amendment and Reauthorization Act) Title III Program which requires that chemicals stored in certain quantities be reported to the state. The spill section also is responsible for other projects such as emergency planning and response, methaphedimine issues, low level radiation issues, and homeland security issues.

Q. State what you do for this program.

A. I direct and oversee the staff in the spill section. I evaluate information and data to identify and name responsible parties. I direct environmental contractors and responsible parties on emergency response activities, assessment and cleanup activities associated with spills, releases and un-permitted discharges. I manage the State Regulated Substance Response Fund and the Environmental Livestock

Fund. I am responsible for the selection and hiring of contractors to be used in the event that a responsible party is unable to perform a cleanup or refuses to perform a cleanup and the Regulated Substance Response Funds are necessary to remedy a situation. I am responsible for evaluation of spills and releases to insure that the cleanup meets state requirements.

Q. Explain the range of activities and duties your program covers and what you specifically do for the program.

A. I review consultant reports detailing sampling of soil and ground water contamination associated with all types of spills and releases of regulated substances. I review and approve cleanup plans and act as the team leader, directing day to day work activity of the spill section. Activities included in the spill section include the Superfund Amendment and Reauthorization Action (SARA) Title III activities, department emergency response activities, homeland security activities, and state emergency and disaster planning activities. I also represent the state on the Regional Response Team acting as a state liaison with EPA, and other federal agencies in the event of a multi-state disaster.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. What federal and state standards exist for petroleum spills?

A. SDCL 34A-2, SDCL 34A-12, SDCL 34A-18 and ARSD Chapter 74:34:01, ARSD Chapter 74:54:01, ARSD Chapter 74:56:03, ARSD Chapter 74:56:05 and ARSD Chapter 74:10:05.

Q. Which of those standards do you personally work with?

A. All of the above.

Q. What level of cleanup is required in the case of a petroleum spill?

A. All petroleum spills are evaluated to determine what damage has occurred and what risk to human health and the environment exists based on the specifics of each release: substance released, amount released, location of release, depth to ground water, threat to surface water, threat to basements, water wells, or utilities, etc. The department has established cleanup criteria and standards in which each release is evaluated against to protect human health and the environment, so not all petroleum releases are cleaned up to the same level of contamination.

Q. Can there by hydrocarbon left in the soil after a cleanup?

A. Yes, petroleum contamination may be left in the soil after a cleanup if the department determined that the remaining contamination does not pose a risk to human health or further risk to the environment.

Q. What kind of remediation activities are conducted in response to a hydrocarbon spill in soil?

A. Excavation and off site disposal/treatment of impacted soil, excavation and onsite treatment of impacted soil and in-situ soil vapor extraction.

Q. What kind of remediation activities are conducted in response to a hydrocarbon spill in groundwater?

A. Excavation of impacted soil and soil venting may be conducted in conjunction with ground water sparging. Ground water monitoring is conducted to document ground water conditions.

Q. Explain other activities you use for remediation.

A. Soil can be excavated and incinerated to destroy hydrocarbons.

Q. What are the leak size requirements for a reportable spill?

A. SDCL 34A-12: A release or spill of a regulated substance (petroleum) must be reported to DENR immediately if any one of the following conditions exists:

1. The discharge threatens or is in a position to threaten the waters of the state (surface water or ground water);
2. The discharge causes an immediate danger to human health or safety;
3. The discharge exceeds 25 gallons; (For crude oil see bullet #8)
4. The discharge causes a sheen on surface water;
5. The discharge of any substance that exceeds the ground water quality standards of ARSD chapter 74:54:01;
6. The discharge of any substance that exceeds the surface water quality standards of ARSD chapter 74:54:01;
7. The discharge of any substance that harms or threatens to harm wildlife or aquatic life;
8. The discharge of crude oil in field activities under SDCL chapter 45-9 is greater than 1 barrel (42 gallons).

Q. Has there been any permanent natural resource damage in South Dakota as the result of a hydrocarbon pipeline leak?

A. I am not aware of any permanent natural resource damage from a petroleum pipeline release.

Q. Are there spills that cannot be remediated?

A. I do not believe there are any petroleum spills that can not be remediated given sufficient time and resources.

Q. Who is obligated to remediate a spill?

A. SDCL 34A-12 identifies that the person or persons who caused the release are responsible to assess and cleanup the contamination. SDCL 34A-18-8 identifies that each crude oil pipeline operator must implement their response plan regardless of the cause of the party responsible for the release.

Q. How do you remediate hydrocarbon contaminated wells?

A. It depends on the level of contamination present in the well and in the ground water. The water from a contaminated well can be treated with a carbon filter system that removes (strips) the hydrocarbons.

Q. What if you can't achieve remediation of a well?

A. The responsible party is required to supply the well owner/user with an alternate source of drinking water. This may require drilling a new well in a different location, drilling a deeper well in a deeper formation or hooking the well user up to rural or city water supply.

Q. What is the extent of landowner involvement in remediation?

A. It depends on the situation. Some landowners want to be involved in the cleanup but most allow the department to work with the responsible party to get the cleanup work performed to state standards. The department copies the land owner on all written correspondence with the responsible party and consultant. If the land owner wishes to be involved with the cleanup, meetings may be held to address the concerns of the landowner and other interested parties. Copies of all documents can be provided if the land owner wishes to receive them.

Q. Does DENR have the resources to deal with a spill from a hydrocarbon pipeline such as Keystone XL?

A. The DENR has the resources necessary to oversee the assessment and cleanup of a crude oil release from existing crude oil pipelines and has the resources to oversee a release from the Keystone XL pipeline, if one should occur. The DENR manages a fund with sufficient resources to contain and initiate cleanup actions, if a release should occur, and the pipeline company is unable or refuses to perform the required response activities. Federal financial resources may also

be available if the responsible party refuses or is unable to perform the cleanup work.

Q. Does this pipeline place any additional burden on your program?

A. The Keystone XL pipeline does not place additional burden on the Ground Water Quality Program.

Q. Please explain the Regulated Substance Release Fund, the Superfund and/or any other program available to help fund a remediation project.

A. Please see Attachment 1. Attachment 1 is a copy of Appendix I from the "Findings Report" dated December 1, 2008 from the *South Dakota Underground Pipeline Task Force* report. This attachment is information on the South Dakota Regulated Substance Response Fund. This information was previously compiled and provided to the South Dakota Underground Pipeline Task Force.

Q. Is all of the information contained in Attachment 1 current?

A. No. The Department of Environment and Natural Resources currently has seven environmental contractors under contract. Tetra Tech, Rapid City, South Dakota, is also now under contract. Also, the balance of the Regulated Substance Response Fund as of 06/30/09 was $2,782,073.

Please also see Attachment 2. Attachment 2 is a copy of Appendix N from the "Findings Report" dated December 1, 2008 from the *South Dakota Underground Pipeline Task Force* report. This attachment is information on the federal Oil Spill Liability Trust Fund. This information was previously compiled and provided to the South Dakota Underground Pipeline Task Force.

Q. Any other information you believe the commission and the public will find useful.

A. The Ground Water Quality program has extensive staff experienced in overseeing the assessment and cleanup of all types of petroleum releases both in soils and ground water.

Appendix I

South Dakota Regulated Substance Response Fund

REGULATED SUBSTANCE RESPONSE FUND

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

CONTACTS:
Steve Pirner, Secretary
Tim Tollefsrud, Director

INTENT / USE / PURPOSE:

The money in the Regulated Substance Response Fund is continuously appropriated to provide funding for the clean up of regulated substance discharges. The Secretary of the Department of Environment and Natural Resources may expend funds from the response fund to provide for the costs of investigations, **emergency remedial efforts**, corrective actions, and managerial or administrative activities associated with such activities.

SUMMARY:

In 1988 SDCL: 34A-12-3 created the Regulated Substance Response Fund. The fund was created through an appropriation from general fund, a one-time contribution from the petroleum release compensation fund, and a temporary pesticide registration fee.

On going deposits into the fund come from; money from civil action or administrative proceedings for violation of environmental statutes or upon damage to the environment, including actions for administrative expense recoveries, civil penalties, compensatory damages, and money paid pursuant to any agreement, stipulation, or settlement in such actions or proceedings; and interest attributable to investment of the money in the response fund. Before the fund can be used, there must be a discharge of a regulated substance, but then the money is continuously appropriated to provide funds for the clean up of regulated substance discharges. The department may file civil actions or liens on property owned by the responsible person to cost recover.

REQUIREMENTS:

The Secretary of the Department of Environment and Natural Resources may expend funds from the response fund to provide for the costs of investigations, **emergency remedial efforts**, corrective actions, and managerial or administrative activities associated with discharges of regulated substances. For a substance to be classified as a regulated substance, it must be defined in either statute or rule. SDCL 34A-12-1 exempts sewage and sewage sludge from being classified as a regulated substance.

The secretary's use of the response fund shall be based upon the following:

(1) In the case of an investigation, when the secretary determines that a discharge requiring an emergency remedial effort may have occurred and that the general operating budget of the department for such purposes is not adequate to cover the costs of the necessary investigatory activities;

(2) In the case of an emergency remedial effort, when the secretary determines that a discharge has occurred and that corrective actions shall be immediately undertaken to protect an imminent threat to the public health or safety or to contain a discharge which, if not immediately contained, shall in time pose a significantly greater threat to public health or safety or to the environment of this state than if such action is not immediately taken;

(3) In the case of a discharge not of an emergency nature when the secretary determines that a discharge has occurred, that a responsible party or liability fund capable of performing the corrective actions either cannot be identified or refuses to undertake corrective actions, and that corrective actions shall be undertaken to protect the public health, safety, welfare, or environment of the state.

SDCL 34A-12-12 makes the responsible person strictly liable for any corrective action costs expended from the Regulated Substance Response Fund, and the department may file either civil actions or liens on property owned by responsible persons to cost recover.

STATUTES:

34A-12-3. Regulated substance response fund established - Purpose - Source of funds - Continuous appropriation - Informational budget - Annual legislative review -- There is hereby established in the state treasury an operating fund to be known as the regulated substance response fund for the purpose of providing funds for the clean up of regulated substance discharges. In addition to the money from the petroleum release cleanup fund as provided in § 34A-12-2 and the temporary pesticide registration fee increase provided by § 38-20A-9, funds from the following sources shall be deposited into the response fund:
(1) Direct appropriations to the response fund from the general fund;
(2) Money, other than criminal fines assessed in criminal actions, recovered by the state in any action or administrative proceeding based upon violation of the state's environmental statutes or upon damage to the environment, including actions for administrative expense recoveries, civil penalties, compensatory damages, and money paid pursuant to any agreement, stipulation, or settlement in such actions or proceedings;
(3) Interest attributable to investment of the money in the response fund;
(4) Money received by the department in the form of gifts, grants, reimbursements, or appropriations from any source intended to be used for the purposes of the response fund.
All money in the response fund is continuously appropriated for the purposes specified in § 34A-12-4. All money received by the department for the response fund shall be set forth in an informational budget pursuant to § 4-7-7.2 and be annually reviewed by the Legislature.
Source: SL 1988, ch 291, § 4.

34A-12-2. One-time contribution from petroleum release compensation fund to response fund - Annual contribution to groundwater protection fund -- The petroleum release compensation fund established pursuant to § 34A-13-18, shall make a one time contribution of three hundred fifty thousand dollars, to the response fund within one year after March 1, 1988, and shall contribute one hundred thousand dollars annually for five years to the groundwater protection fund to fund the groundwater research and education program established pursuant to § 46A-1-85. Source: SL 1988, ch 291, § 3; 1989, ch 306, § 55.

34A-12-4. Expenditure of funds by secretary - Grounds for expenditures -- When necessary in the performance of the secretary's duties under §§ 23A-27-25, 34A-1-39, 34A-2-75, 34A-6-1.4, 34A-6-1.31, 34A-11-9, 34A-11-10, 34A-11-12, 34A-11-14, 34A-12-1 to 34A-12-15, inclusive, 45-6B-70, 45-6C-45, 45-6D-60, and 45-9-68 and Title 34A relative to discharges, the secretary may expend funds from the response fund to provide for the costs of investigations, emergency remedial efforts, corrective actions , and managerial or administrative activities associated with such activities. The secretary's use of the response fund shall be based upon the following:

(1) In the case of an investigation, when the secretary determines that a discharge requiring an emergency remedial effort may have occurred and that the general operating budget of the department for such purposes is not adequate to cover the costs of the necessary investigatory activities;

(2) In the case of an emergency remedial effort, when the secretary determines that a discharge has occurred and that corrective actions shall be immediately undertaken to protect an imminent threat to the public health or safety or to contain a discharge which, if not immediately contained, shall in time pose a significantly greater threat to public health or safety or to the environment of this state than if such action is not immediately taken;

(3) In the case of a discharge not of an emergency nature when the secretary determines that a discharge has occurred, that a responsible party or liability fund capable of performing the corrective actions either cannot be identified or refuses to undertake corrective actions, and that corrective actions shall be undertaken to protect the public health, safety, welfare, or environment of the state. Source: SL 1988, ch 291, § 5; 1992, ch 158, § 55A; 1999, ch 182, § 3.

34A-12-12. Strict liability for costs of corrective action. Any person who has caused a discharge of a regulated substance in violation of § 34A-12-8 is strictly liable for the corrective action costs expended by the department pursuant to §§ 23A-27-25, 34A-1-39, 34A-12-1 to 34A-12-15, inclusive, 38-20A-9, 45-6B-70, 45-6C-45, 45-6D-60, and 45-9-68. Source: SL 1988, ch 291, § 13.

CURRENT STATUS

The Department of Environment and Natural Resources currently has six (6) contracts in place with environmental consulting firms to provide response capabilities. These contracts are 4 year contracts with extension provisions. Currently the department has contracts with the following firms: Geotek Engineering & Testing Services (Sioux Falls); Leggette, Brashears & Graham (Sioux Falls); Terracon Consultants (Rapid City and Omaha); West Central Environmental (Morris, Minnesota); BayWest (St. Paul, Minnesota); and American Engineering Testing Services (Pierre and Rapid City).

The balance of the Regulated Substance Response Fund as of 06/30/2008 was $ 2,575,500.00.

Appendix N

Federal Oil Spill Liability Trust Fund

The Oil Spill Liability Trust Fund

Introduction

The Oil Spill Liability Trust Fund (fund) was created by Congress in 1986 and its use was authorized by the signing of the Oil Pollution Act in 1990. The fund, managed by the U.S. Coast Guard, is established as a funding source to pay for cleanup costs and damages resulting from oil spills or threats of oil spills to navigable waters of the United States. For the purposes of this fund "navigable waters" is defined in § 300.5 of the National Contingency Plan.

The fund has two major components. First, the emergency fund. The emergency fund is available for Federal On-Scene Coordinators to respond to oil discharges and for Federal natural resource trustees to initiate natural resource damage assessments. This portion of the fund receives an annual $50 million apportionment. The Coast Guard has the authority to advance an additional $100 million into the emergency fund each year to supplement shortfalls. Second, the remaining Principal Fund balance is used to pay claims and to fund appropriations by Congress to Federal agencies to administer the provisions of the Oil Pollution Act and support research and development.

Who Can Access the Fund?

- All Federal On-Scene Coordinators
- Other Federal, State, Local, and Indian tribal government agencies that assist the Federal On-Scene Coordinator can be reimbursed for their costs.
- Natural Resource Trustees
- Claimants – individuals, corporations, and governments can submit claims for uncompensated removal costs and damages if the responsible party does not satisfy their claim.

Limitations to Accessing the Fund

- The release or threat of release must be into or on the navigable waters of the United States or adjoining shorelines or the Exclusive Economic Zone
- The discharge must be oil
- In general, the maximum amount expendable from the fund per incident is $1 billion.

Responsibility of the Responsible Party to a Spill

- When an oil spill occurs, the responsible party is responsible for complete cleanup of the spill.
- If the responsible party does not fully remove the spill and the Federal On-Scene Coordinator responds to the spill the responsible party will be later billed for all Federal response costs.

Funding

- The fund balance on April 27, 2006 was $662 million.
- As of March 18, 2008, the following is the projected end of year fund balance based on the barrel tax and historical expenditures:

  2008 - $1,030,009,455
  2009 - $1,107,363,831
  2010 - $1,227,242,256
  2011 - $1,345,434,782
  2012 - $1,468,866,674
  2013 - $1,601,770,189
  2014 - $1,744,565,195

EPA's Use of the Fund in South Dakota

In the early 1990's EPA used monies from the fund to cleanup a coal tar spill in the Big Sioux River at Fawick Park in Sioux Falls.

DRAFT
Revised 11 July 2005

USING THE OIL SPILL LIABILITY TRUST FUND

A Primer of Key Funding Eligibility Concepts and Procedures

These concepts are intended solely for the guidance of agency personnel. These concepts do not constitute a regulation and may not be relied upon to create a right or benefit, substantive or procedural, enforceable at law or in equity by any person. This document may change at any time, without prior notice.

July 11, 2005

DRAFT
Revised 11 July 2005

ACCESSING THE OIL SPILL LIABILITY TRUST FUND

DRAFT
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I. INTRODUCTION

The Coast Guard (CG) and the Environmental Protection Agency (EPA) are authorized under Section 311(c) of the Federal Water Pollution Control Act ("FWPCA") (as amended by the Oil Pollution Act of 1990), 33 U.S.C. § 1321(c), to remove a discharge, and to mitigate or prevent a substantial threat of a discharge, of oil to navigable waters or adjoining shorelines.[1/] A principal purpose of the Oil Pollution Act of 1990, P.L. 101-380 ("OPA") is to ensure that federal responders have the financial resources readily available to support an immediate and effective response. Those resources are provided by a $50 million annual appropriation from the Oil Spill Liability Trust Fund ("OSLTF") as outlined under OPA section 6002.[2/]

The three questions that must be answered to determine whether an oil response is authorized under Section 311(c) of the FWPCA are:

(1) Is the substance involved an oil?

(2) Is there a discharge or substantial threat of a discharge of oil?

(3) Is the discharge or substantial threat of discharge into navigable waters or adjoining shorelines?

If each of these elements is present, the Federal On-Scene Coordinator ("FOSC") is authorized to take oil response action under Section 311(c) of the FWPCA. Also, if each of these three elements is present, the OSLTF is available for use by the FOSC. Thus, it is important that each of these elements be documented by FOSCs when they access the OSLTF (or as soon thereafter as practical) so that the National Pollution Funds Center ("NPFC") can ensure that funds are being accessed appropriately.

This document provides funding eligibility guidance to FOSCs on these three threshold elements. In addition, guidance is provided on how to document these elements. Guidance is also provided on FOSC responsibilities with respect to documentation regarding the identification of responsible parties[3/]

[1/] Pursuant to Executive Order 12777, 56 Fed. Reg. 54757 (October 22, 1991), the President's authority under Section 311(c) of the FWPCA has been delegated to EPA for the inland zone and the Secretary of the Department in which the Coast Guard is operating for the coastal zone. The authority to remove a discharge, and to mitigate or prevent a substantial threat of a discharge, of oil extends not only to navigable waters and adjoining shorelines, but also to the waters of the exclusive economic zone and to discharges or substantial threats of discharges of oil "that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States." 33 U.S.C. §1321(c). Simply for ease of reference, the remainder of the guidance refers solely to "navigable waters or adjoining shorelines," but is not to be construed as any limitation on the full scope of authority available under Section 311(c) of the FWPCA.

[2/] Section 7 of Executive Order 12777 delegates authority for management of the Oil Spill Liability Trust Fund to the Secretary of the Department in which the Coast Guard is operating, and this authority is exercised within the Coast Guard by the National Pollution Funds Center.

[3/] FOSCs also have responsibilities with respect to the documentation of removal costs. Guidance this topic may be found in the NPFC User Reference Guide.

II. THE FOSC HAS BROAD REMOVAL AUTHORITY

A fundamental public policy underlying the FWPCA is that there shall be no discharge of oil to navigable water or adjoining shorelines. 33 USC 1321(b)(1). Consistent with that policy the President may, in accordance with the National Contingency Plan (NCP), ensure effective and immediate removal of a discharge, and mitigation or prevention of a substantial threat of discharge, of oil to navigable waters and adjoining shorelines. 33 USC 1321(c)(1). As noted above, the President's removal authority has been delegated to the Coast Guard for the coastal zone and to the Environmental Protection Agency for the inland zone. These authorities are also established in the NCP. See, e.g., 40 C.F.R. §§300.120(a) and 300.130. The OSLTF is available to pay the costs of federal oil removal. 33 USC 1321(s); 33 USC 2712(a)(1); 33 USC 2752(b).

"Remove or Removal" is defined as "containment and removal of the oil...from the water and shorelines or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, and public and private property, shorelines, and beaches." 33 USC 1321(a)(8).

"Removal costs" are the "costs of removal that are incurred after a discharge of oil has occurred or, in any case in which there is a substantial threat of a discharge of oil, the costs to prevent, minimize or mitigate oil pollution from such an incident." 33 U.S.C. 2701(31).

When there is a discharge or substantial threat of discharge of oil to navigable waters or adjoining shorelines, the FOSC determines the response actions appropriate under the NCP. The FOSC has broad authority to remove or arrange for the removal of a discharge and to mitigate or prevent a substantial threat of a discharge, and to direct or monitor all federal, state and private actions to remove a discharge or to mitigate or prevent a substantial threat of a discharge. 33 U.S.C. §1321(c); 40 C.F.R §§ 300.130 and 300.305(d). Containment, countermeasures and cleanup of the oil include a wide range of activities including controlling the source of a spill. 40 C.F.R. 300.310(a).

Removal authority should be construed broadly to achieve the policy enunciated by Congress – that there shall be no discharge of oil to navigable waters. The NCP recognizes that removal authority necessarily includes authority to address a discharge at its source, consistent with the no discharge policy. 40 C.F.R. 300.310(a). However, once the discharge to the water is stopped, the oil is removed from the navigable waters and shorelines, and all steps have been completed to prevent, minimize or mitigate any substantial threat of discharge to the water, NPFC removal funding typically ends.

The NPFC is responsible for making funds available for removal, but does not exercise oil removal authority under the FWPCA. Amounts appropriated annually from the OSLTF are made available by the NPFC to CG or EPA FOSCs for oil removal projects that are authorized under FWPCA 311(c) and consistent with the NCP. The NPFC has a fiduciary responsibility to ensure proper use of the OSLTF. Therefore, availability of funding is subject to NPFC policies and guidelines. In cases where it is unclear that the three FWPCA threshold elements have been met, the NPFC will work with the FOSC to ensure that the OSLTF will be used appropriately.

III. THRESHOLD ELEMENTS AND DOCUMENTATION REQUIREMENTS

A. Is it Oil?

1. FWPCA and OPA definitions of "oil"

Section 311(a) of the FWPCA defines "oil" as "oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil." 33 U.S.C. § 1321(a)(1). OPA Title I, 33 U.S.C. §§2701-2720 creates a liability and compensation regime for oil discharges that is complementary to the provisions of Section 311 of the FWPCA. OPA Title I adopts the FWPCA definition of oil but adds an express exclusion for "any substance which is specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601) and which is subject to the provisions of that Act." 33 U.S.C. §2701(23). Thus, FWPCA oils are also OPA Title I oils except for any FWPCA oil that is specifically listed or designated as a CERCLA hazardous substance. See CERCLA Table of Hazardous Substances at 40 C.F.R. 302.4.

2. NPFC Policy on OSLTF Funding with Respect to Certain Substances

As a matter of policy, the NPFC and EPA have agreed that the NPFC will not generally provide funding from the OSLTF for responses with respect to the substances identified below, for which funding is generally available from the Hazardous Substance Superfund established under CERCLA.

a. Hexane. Hexane is specifically listed as a CERCLA hazardous substance. As a matter of policy, the NPFC will not generally provide funding from the OSLTF for response to the discharge or substantial threat of a discharge of hexane. FOSCs that are contemplating accessing the OSLTF to fund removal activities in response to the discharge or substantial threat of discharge of hexane should consult with their NPFC Regional Manager prior to accessing the OSLTF.

b. Creosote. Creosote is not widely used today, but historically was widely used as a wood preservative by wood treatment facilities. Creosote is specifically listed as a CERCLA hazardous substance. As a matter of policy, the NPFC will not generally provide funding from the OSLTF for responses to the discharge or substantial threat of a discharge of creosote. FOSCs that are contemplating accessing the OSLTF to fund removal activities in response to the discharge or a substantial threat of discharge of creosote-related contaminants should consult with their NPFC Regional Manager prior to accessing the OSLTF.

c. "Coal Tar" Wastes From Former Manufactured Gas Plants (MGPs). The term "coal tar" is often loosely used to refer to several types of substances derived from the distillation of coal, some of which are products, or by-products, and others which are wastes. With respect to funding, responses to discharges of "coal tar" wastes from former Manufactured Gas Plants ("MGPs") that contain constituents that are hazardous substances under CERCLA have typically been funded from the Hazardous Substance Superfund. As a matter of policy, the NPFC will not generally provide funding from the OSLTF for responses to the discharge or substantial threat of a discharge of "coal tar" wastes from MGPs. FOSCs that are contemplating accessing the OSLTF to fund removal activities in response to the discharge or substantial threat of discharge of "coal tar" wastes from a MGP should consult with their NPFC Regional Manager prior to accessing the OSLTF.

3. Natural Gas

Natural gas is not an oil. Response to a discharge or substantial threat of discharge of natural gas is not an oil response under FWPCA and is not funded from the OSLTF. However, oil may be present in some amounts when there is a natural gas incident, such as a leak, fire, or explosion from certain natural gas wells. Such oil may discharge to navigable waters or adjoining shorelines or there may be a substantial threat of such a discharge. Therefore, while a response to a natural gas incident will in general not be a response under the FWPCA for which OSLTF funding is available, FOSC response to the discharge of oil to navigable waters or adjoining shorelines, or the substantial threat of such a discharge, may be funded from the OSLTF. When confronted with a natural gas incident, FOSCs should explain and document how the response for which OSLTF funding will be used is for the primary purpose of removing a discharge of oil to navigable waters, or adjoining shorelines or mitigating or preventing the substantial threat of such a discharge.

4. Tire Fires

Oil may be produced in some amounts when there is a tire fire. Such oil may discharge to navigable waters or adjoining shorelines or there may be a substantial threat of such a discharge. Therefore, while a response to a tire fire in general will not be a response under the FWPCA for which OSLTF funding is available, FOSC response to the discharge of oil to navigable waters or adjoining shorelines, or the substantial threat of such a discharge, may be funded from the OSLTF. When confronted with a tire fire incident, FOSCs should explain and document how the response for which OSLTF funding will be used is for the primary purpose of removing a discharge of oil to navigable waters, or adjoining shorelines or mitigating or preventing the substantial threat of such a discharge.

5. Responses Potentially Involving Both FWPCA Oil and a CERCLA Hazardous Substance

a. The CERCLA "Petroleum Exclusion". The CERCLA definition of "hazardous substances" does not include, "petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of [section 101(14)] and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas)." 42 U.S.C. §9601(14).

EPA has interpreted the petroleum exclusion to only apply to: crude oil that naturally contains hazardous substances; and refined product containing hazardous substances or constituents that normally are added during the refining process. See Memorandum from Francis S. Blake, General Counsel, "Scope of the CERCLA Petroleum Exclusion Under Sections 101(14) and 104(a)(2)," July 31, 1987. Hazardous substances that are added to petroleum during use, or increased in concentration as a result of use, are not subject to the petroleum exclusion and are subject to regulation under CERCLA. Courts generally have accepted this interpretation.

If the facts and circumstances indicate that the CERCLA petroleum exclusion is not applicable to substances subject to the response action, the FOSC should closely coordinate with the NPFC and EPA Headquarters regarding funding.

b. Mixes of Oil and Hazardous Substances. When a discharge to navigable waters or adjoining shorelines is discovered or reported, the FOSC must be able to make a swift, field decision about whether the discharging material is oil, a hazardous substance, or a mix or combination of both in order to determine response authority and funding. These field determinations will take into account any readily available information from the RP or other informed source (e.g., state or local agencies). If the circumstances indicate that the substance is likely to be a mix or combination of oil and a specifically listed or designated CERCLA hazardous substance, the FOSC should closely coordinate with the NPFC and EPA Headquarters before funding is provided.

Even after deciding to conduct an oil response under the FWPCA and accessing the OSLTF, the FOSC should test the substance as soon as practical in order to confirm the nature of the substance. If the source of the discharge is not known, testing of the substance may also be useful in identifying the source and the responsible party for the source.

If, during a removal funded from the OSLTF, it is determined that the substance discharging or substantially threatening to discharge to protected waters or shorelines is a specifically listed or designated CERCLA hazardous substance, NPFC policy is that generally OSLTF funding should end. At that point, as appropriate, the FOSC may decide to seek funding from the CERCLA Superfund. In such circumstances, the NPFC and EPA should work together to facilitate a smooth transition of funding sources.

If an incident includes a distinct discharge or substantial threat of discharge of an oil and a distinct release or substantial threat of release of a CERCLA hazardous substance, and there are distinct response actions directed to each, those distinct response actions directed to the discharge or substantial threat of discharge of oil generally should be funded from the OSLTF, and those distinct activities directed to the CERCLA hazardous substances generally should be funded from CERCLA's Superfund.

B. Is there a Discharge or Substantial Threat of a Discharge?

If there is oil in or on the navigable water or adjoining shorelines, there has been an actual discharge that clearly satisfies this threshold element. This element is also satisfied if there is a substantial threat of a discharge of oil to navigable waters or adjoining shorelines.

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1. FOSC and NPFC roles

The FOSC, in exercise of his/her FWPCA oil response authority, determines the existence of a discharge or a substantial threat of a discharge of oil to navigable waters or adjoining shorelines. The FOSC also determines what action is needed to ensure the substantial threat of a discharge to protected waters and shorelines is mitigated or prevented. The NPFC does not exercise oil removal authority under FWPCA, but is responsible for making funds available for response actions authorized under 33 USC §1321 and consistent with the NCP to ensure the substantial threat of a discharge of oil to navigable waters or adjoining shorelines is mitigated or prevented. NPFC has a fiduciary responsibility to ensure proper use of the OSLTF and therefore will work with the FOSC to ensure that the OSLTF will be used appropriately.

To that end, the FOSC and the NPFC Case Officer should initiate a dialogue at the beginning of a response to a substantial threat of a discharge. These discussions help provide the NPFC with a full understanding of the FOSC's determination that a substantial threat of a discharge exists and help facilitate funding.

2. Substantial Threat

The OSLTF may be used when the FOSC responds under authority of FWPCA section 311(c) to prevent or mitigate a substantial threat of a discharge of oil to the navigable waters or adjoining shorelines. In making the determination that circumstances present a substantial threat of a discharge of oil to navigable waters or adjoining shorelines the FOSC should consider relevant factors in the context of the overall situation, including the following:

a. The source of the oil, the condition of the source including any environmental factors or weather which may change the condition of the source, and if the source is functioning in some way to contain the oil in whole or in part, facts relevant to an evaluation of the integrity of that containment mechanism and predicted or potential failures of that containment mechanism;

b. The proximity of the oil source to navigable waters or adjoining shorelines, the quantity of oil, any relevant available information regarding the nature of the oil, and the flow path from the oil source to the navigable waters, including slope, terrain, natural or manufactured conduits or drains, the absence of effective natural or manmade barriers between the source and the navigable waters, any environmental factors or weather conditions that may affect movement of the oil, and any other available information relevant to the potential movement of the oil from the source to the navigable waters;

c. Whether under all the facts and circumstances response action should be undertaken in order to prevent a discharge of oil to navigable waters or adjoining shorelines.

3. Documentation for Substantial Threat Incidents

FOSCs are to document the facts and circumstances relied upon in making the "substantial threat" determinations to the NPFC in order to memorialize the basis for the exercise of removal authority. Summary documentation should be provided in the initial POLREP, and detailed documentation should be provided as soon as practical. All documentation should reflect consideration of the relevant factors, as discussed above, and the basis for the determination that the circumstances present a substantial threat of a discharge of oil to the navigable waters or adjoining shorelines

Documentation of the "substantial threat" determination is important since the OSLTF is not available for response when an oil source has merely a remote potential to discharge oil "someday". Thus, provision of adequate documentation is a predicate to OSLTF funding. Even after OSLTF funding is made available, if additional relevant information becomes available, it is the FOSC's responsibility to provide that additional information and documentation to the NPFC, and to respond to NPFC's requests for additional information. In addition to its funding responsibilities, this documentation is also used by NPFC in support of other responsibilities that the NPFC fulfills, including the payment of claims under OPA, determination of liable responsible party debts, and to support enforcement actions necessary to recover removal costs from responsible parties

There are numerous ways an FOSC can document the factors considered and the basis for the decision that a specific situation presents a substantial threat of discharge, in support of their request for funding. Whatever methods are used, the FOSC should describe all of the relevant facts and circumstances, as discussed above, and include any available photographs. The following list provides several examples of the types of documentation that may be used for this purpose:

a. For Coast Guard-managed incidents: Operational logs or ICS forms such as the Incident Information Form, the Incident Briefing form (ICS 201), the Response Objectives form (ICS 202), the Unit Log (ICS 214) or the Executive Summary form (ICS Exec. Sum.);

b. For EPA managed incidents: the OPA90 Removal Project Plan (ORPP);

c. POLREPS;

d. E-mail to operational superiors and the NPFC;

e. A memorandum regarding the substantial threat determination; or

f. Administrative orders issued under FWPCA 311(c) to responsible parties.

Any of these or other similar methods of documentation may be used as long as the purpose is fulfilled, which is to document the FOSC's consideration of relevant factors and the basis for the determination that the circumstances present a substantial threat of a discharge of oil to the navigable waters or adjoining shorelines.

C. Is the Discharge or Substantial Threat of a Discharge into Navigable Waters?

Under the FWPCA, the term "navigable waters" is broadly defined as "the waters of the United States, including the territorial seas." 33 U.S.C. §1362(7).[4/] Regulatory definitions of the term include, among other things, waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters that are subject to the ebb and flow of the tide (sometimes referred to as traditional navigable waters); interstate waters, including interstate wetlands; tributaries to traditional navigable waters; and wetlands that are adjacent to traditional navigable waters or their tributaries. See, e.g., 40 C.F.R. §300.5.

In January 2001, the Supreme Court held that use of isolated, non-navigable, intrastate waters by migratory birds was not a sufficient basis for the exercise of federal regulatory jurisdiction under Section 404(a) of the FWPCA. Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, 531 U.S. 159 (2001) ("SWANCC"). Since that decision was rendered, case law with respect to the meaning of the term "navigable waters" has been evolving.

Particularly given these legal developments, the FOSC should provide relevant information on the affected water or shoreline to the NPFC case officer, including the name and nature of the water, tributary connections between the water and downstream traditional navigable waters, and information regarding any other adjacent waters. If a question should arise with respect to the jurisdictional status of a particular water, agency counsel should be consulted.

D. Responsible Party Identification - Facility/Vessel Source

1. RP Definitions

OPA imposes liability for removal costs and damages "on each responsible party for a vessel or a facility from which oil is discharged, or which poses the substantial threat of a discharge of oil, into or upon the navigable waters or adjoining shorelines or the exclusive economic zone...." 33 U.S.C. §2702(a). Identification of the responsible parties under OPA depends on the source of the discharge or substantial threat of a discharge. See 33 U.S.C. §2701(32). In general, responsible parties for each type of pollution source are as follows:

a. Vessel. In the case of a vessel, responsible party or parties means the owner(s), operator(s), and demise charterer(s).

b. Onshore Facility. In the case of an onshore facility, responsible party or parties means the owner(s) and operator(s) of the facility. An onshore facility is any facility located in, on, or under any land within the United States other than submerged land.[5/] There are

[4/] Under OPA, the term "navigable waters" is also defined as the "waters of the United States, including the territorial seas," 33 U.S.C. §2701(21), and the term has been construed by courts to have the same meaning under OPA as under the FWPCA.

[5/] "Facility" is further defined as

some exceptions for states and other government owners that have transferred possession and right to use the property to other persons by lease, assignment or permit at the time of the discharge or substantial threat of discharge. In the case of an actual discharge, the relevant time for determining ownership and operation is the time during which the discharge occurred. In the case of a substantial threat of a discharge, the relevant time for determining ownership and operation is the time during which a substantial threat was posed.

c. Offshore facility. In the case of an offshore facility, responsible party or parties means the lessee(s), permitee(s), and holder(s) of a right of use and easement of the area in which the facility is located. An offshore facility includes any facility located in, on, or under water. There are some exceptions for states and other government owners that have transferred possession and right to use the property to other persons by lease, assignment or permit at the time of the discharge or substantial threat of discharge.

d. Deepwater Port. In the case of a deepwater port licensed under the Deepwater Port Act of 1974, responsible party or parties means the licensee.

e. Pipeline. In the case of a pipeline, responsible party or parties means the owner(s) or operator(s) of the pipeline.

f. Abandonment. In the case of an abandoned vessel, onshore facility, deepwater port, pipeline, or offshore facility, responsible party or parties means the persons who would have been responsible parties immediately prior to the abandonment of the vessel or facility.

2. Documentation Required From FOSC

Under the NCP, the FOSC is responsible for identifying potentially responsible parties to the extent practicable. 40 CFR 300.305(b)(3). For a simple vessel case, this task is fairly straightforward. For a facility case involving numerous leases and other title documents, that process may be more lengthy and complicated. In the case of an onshore facility, FOSCs should generally retain a deed and title search company when the FPN is opened in order to identify all of the responsible parties as promptly as possible. Because this search facilitates the prompt identification of responsible parties, it should be conducted before the commencement of the removal where time permits and, in any event, as soon as possible during the response phase. The OSLTF is generally available to pay the costs of this search, and a draft model Scope of Work ("SOW") for this purpose is available from the NPFC. This procedure is also available with respect to offshore facilities. Documentation with respect to the identification of responsible parties for vessels and onshore and offshore facilities is discussed further below.

a. Vessel. In the case of a vessel, documentation of the responsible party should include the name of the vessel, dimensions, type of vessel, and some identifying number, such an official number if it is a U.S. flag vessel or a Lloyds number for foreign flag vessels.

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any structure, group of structures, equipment, or device (other than a vessel) which is used for one or more of the following purposes; exploring for, drilling for, producing, storing, handling, transferring, processing or transporting oil. This term includes any motor vehicle, rolling stock, or pipeline used for one or more of these purposes. 33 U.S.C. § 2701(9).

A copy of the vessel's Certificate of Documentation should be in the case file. For vessels with no Coast Guard documents, a copy of the vessel's state registration and drivers license of the owner and/or operator should be obtained, along with any other documents identifying the owners and operators.

b. Onshore Facility. As soon as the FPN is opened, in a case involving an onshore facility, the FOSC should generally retain a deed and title search company familiar with relevant property records. The attached model SOW for "Onshore Facilities" should be used in contracting with the deed and title search company and modified where appropriate. If the FOSC does not retain a deed and title search company, the FOSC should obtain the information and documentation set forth in the model SOW. In general, the title documents and leases will determine the owner(s) of the facility at the time of the discharge or substantial threat of a discharge of oil. The term operator is not limited to the operator of record. The term operator may include others who had control with respect to the facility's operations, even though these parties may not have been designated an operator of record by the state regulatory body. FOSCs should contact their Regional Counsel (for EPA) or District Legal Office (for Coast Guard) to resolve any enforcement issues and interpretation of various legal documents.

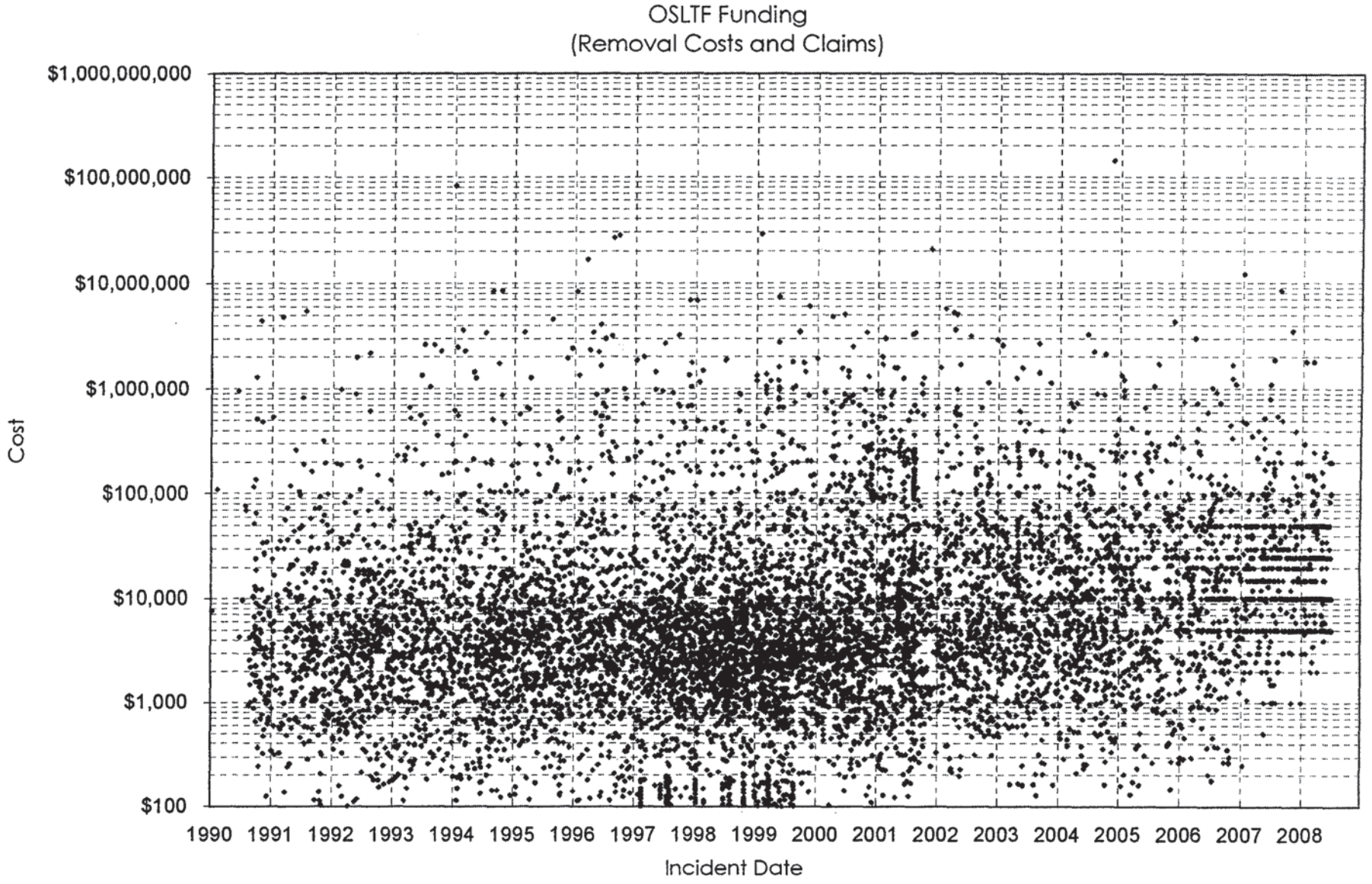
c. Offshore Facility. As soon as the FPN is opened, in the case of an offshore facility, the FOSC should generally obtain the documents and information set forth in the attached SOW for "Offshore Facilities." With respect to submerged lands owned by the state most of this information is usually kept by the state leasing authority or state oil gas regulatory body. As discussed above, the FOSC may contract these services out at the beginning of the removal project to a deed and title company familiar with records pertaining to oil and gas leasing.

FOSCs should contact their Regional Counsel (for EPA) or District Legal Office (for Coast Guard) to resolve any enforcement issues and interpretation of various legal documents. NPFC legal staff is available to provide advice to case managers on interpretation of these documents.

E. Funds Access Procedures

1. EPA FOSCs can initially obtain $50K from the OSLTF using CANAPS. EPA FOSCs should use CANAPS to request higher ceilings when necessary. Upon receipt of the request, the NPFC Case Officer will coordinate with the FOSC and raise the ceiling as appropriate. EPA FOSCs must prepare and submit Oil Removal Project Plans when requesting ceilings in excess of $250K.

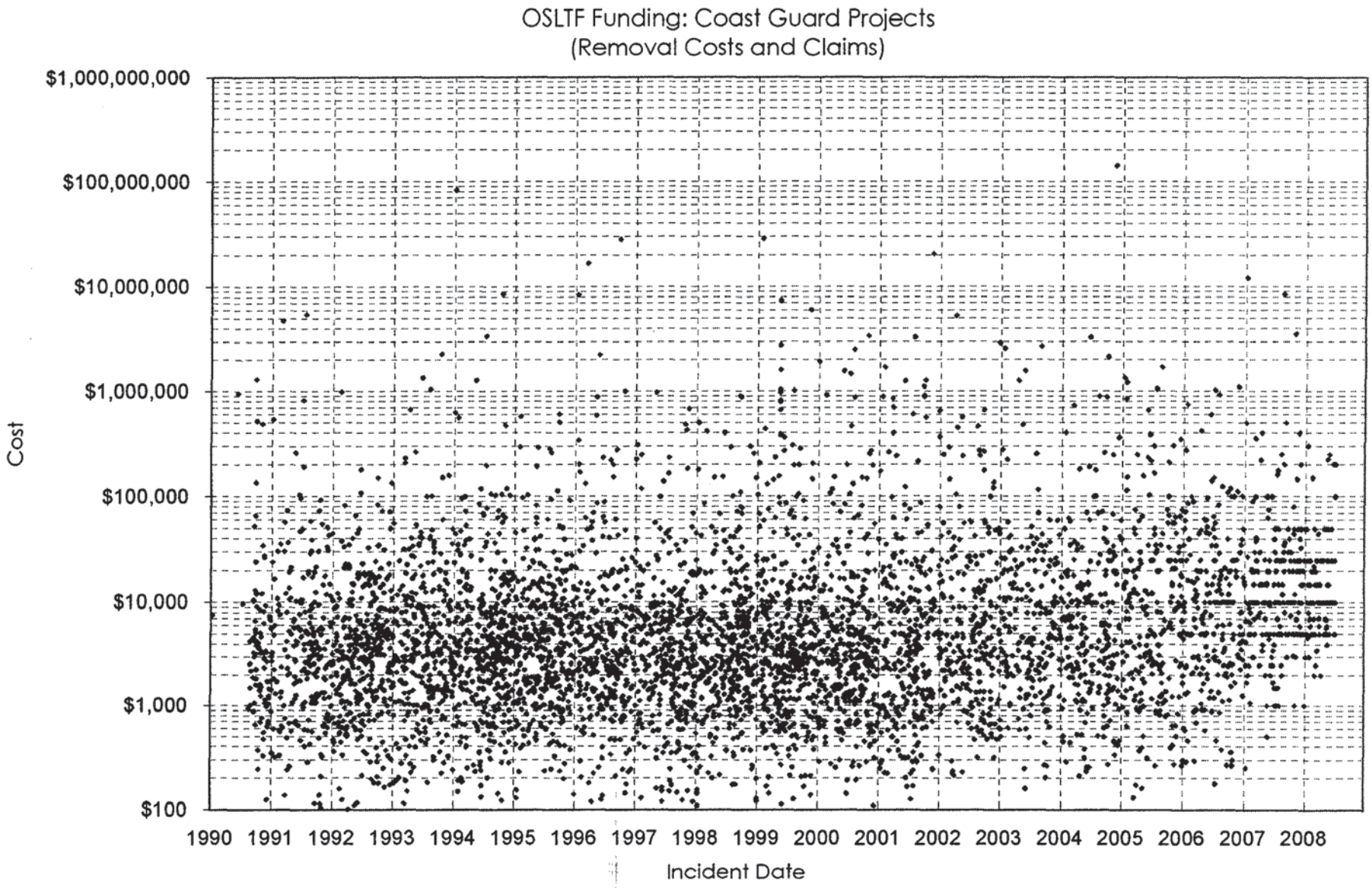
2. USCG FOSCs can initially obtain $500K from the OSLTF using CANAPS. USCG FOSCS should use CANAPS to request higher ceilings when necessary. Upon receipt of the request, the NPFC Case Officer will coordinate with the FOSC and raise the ceiling as appropriate.



Source: National Pollution Funds Center

Prepared by Greg Buie 07/11/2008

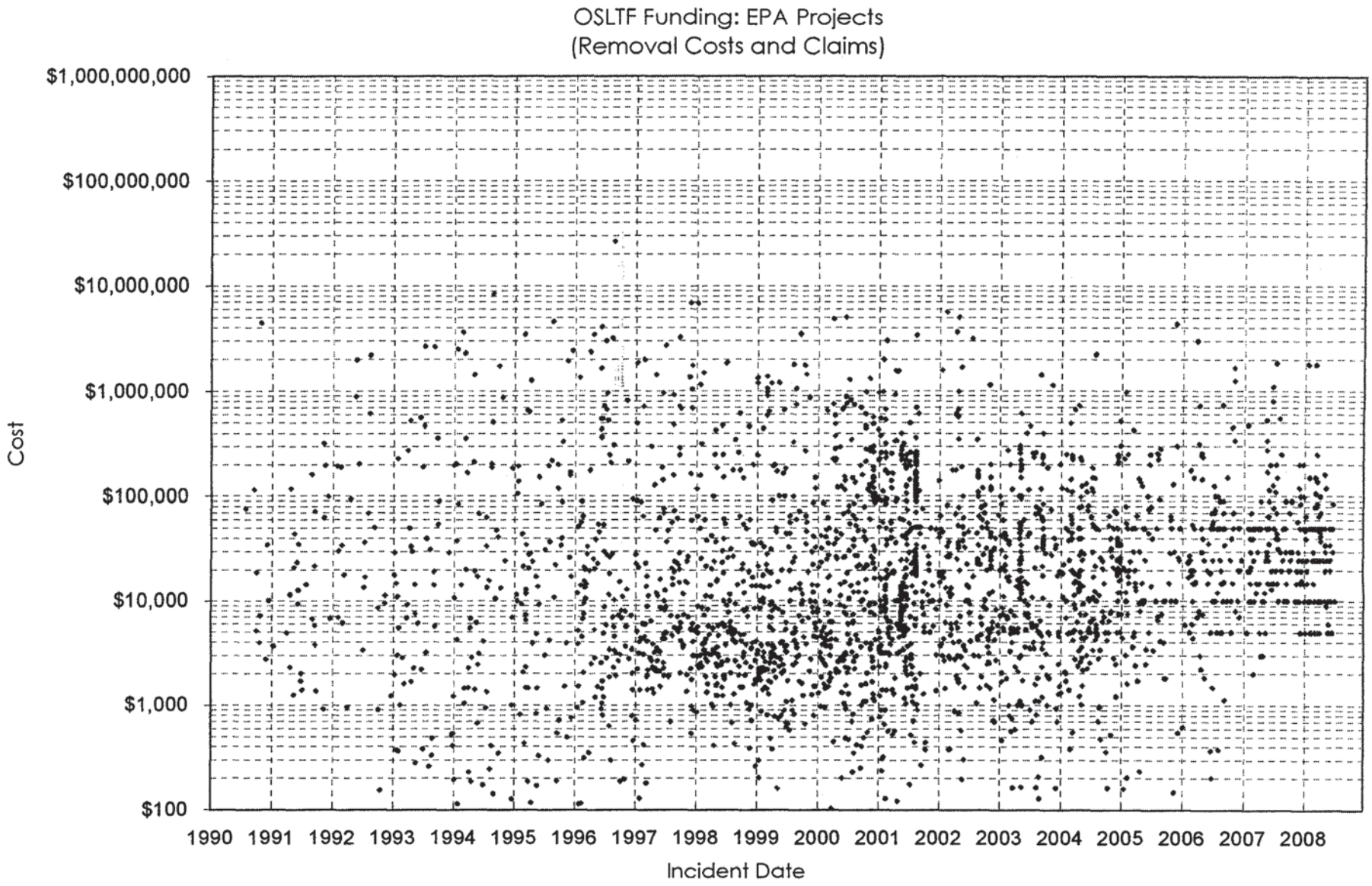
Exhibit KM-1
Page 27 of 31



Source: National Pollution Funds Center

Prepared by Greg Buie 07/13/2008

Exhibit KM-1
Page 28 of 31

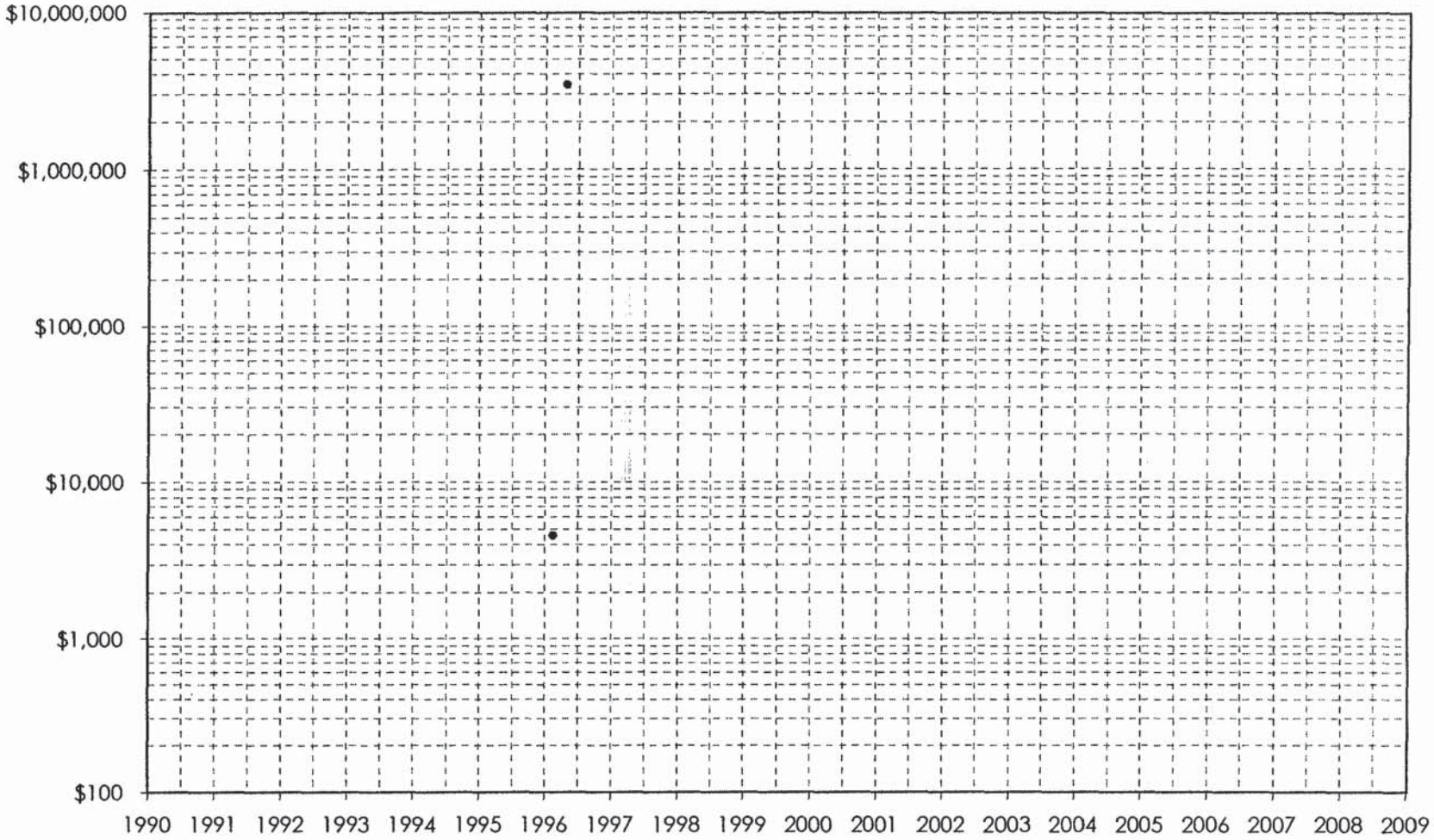


Source: National Pollution Funds Center

Prepared by Greg Buie 07/13/2008

Exhibit KM-1
Page 29 of 31

OSLTF Removal Costs and Claims
South Dakota



OSLTF Removal Costs and Claims
Pipelines

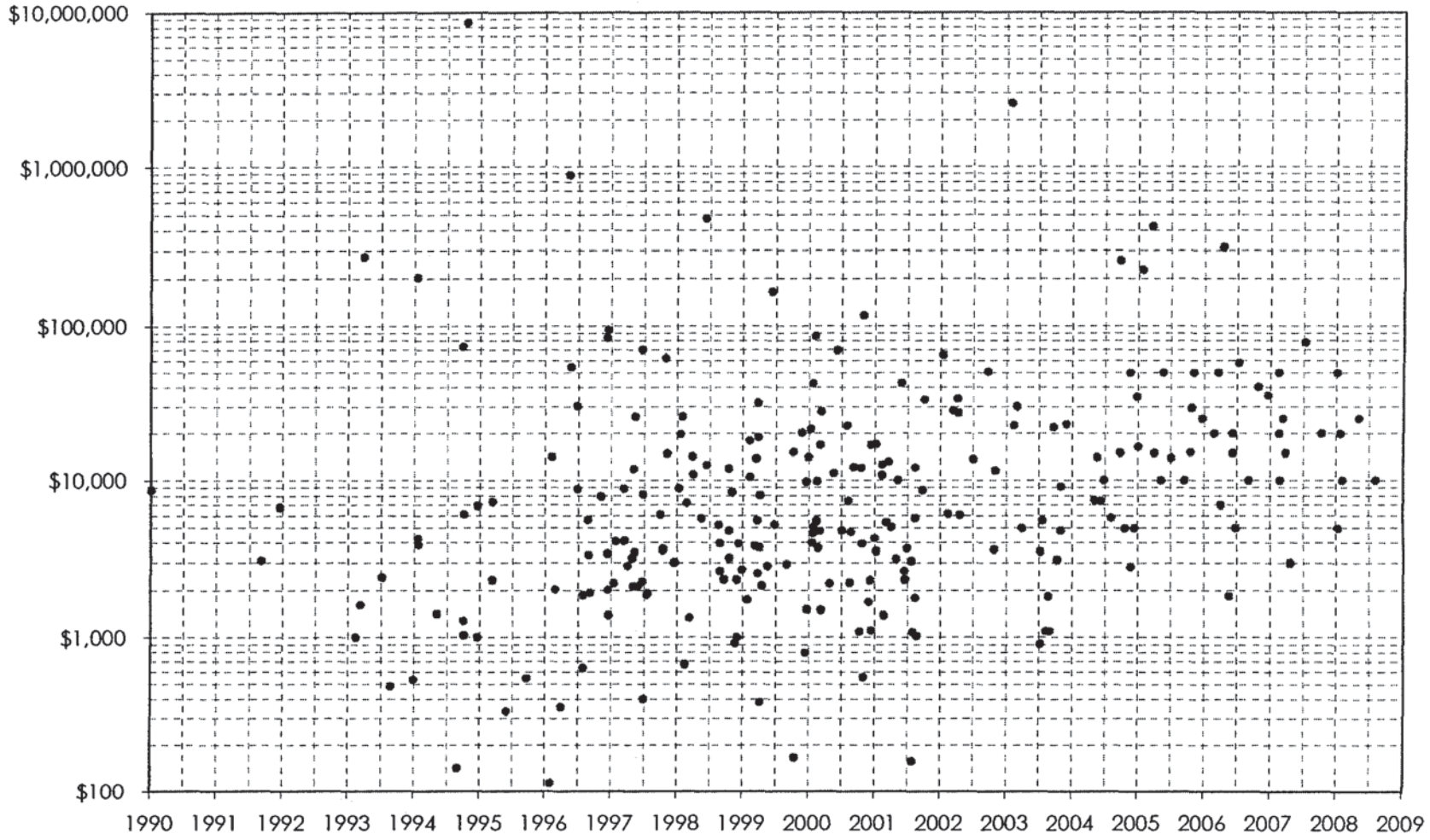


Exhibit ___ KM-1
Page 31 of 31

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF TOM KIRSCHENMANN
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. State your name.

A. Tom Kirschenmann.

Q. By who are you employed?

A. State of South Dakota.

Q. For what department do you work?

A. Department of Game, Fish, and Parks.

Q. State the program for which you work?

A. Division of Wildlife, Terrestrial Resources Chief.

Q. Please explain your role and duties within your department.

A. Coordinate the management and research of terrestrial wildlife (game and non-game) statewide; coordinate the administration of the Department's habitat programs, including private land's programs, various aspects of public land management, and hunting access programs; manage terrestrial environmental review assessments; and over-see programs related to the federal Farm Bill. These coordination and management efforts are accomplished through the oversight of a Habitat Program Administrator, Wildlife Program Administrator, and a Wildlife Damage Program Administrator, 21 biologists, and three staff assistants. Serve as the Department's liaison or representative for several state and federal agencies and associated committees and coordinate with non-government organizations, constituency groups, and agricultural entities on resource management programs, projects, and issues.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission.

Q. Were you involved in the Keystone XL permitting docket, HP09-001?

A. Yes.

Q. Did you file prefiled testimony in HP09-001?

A. Yes. (Exhibit___(TK-1))

Q. Did you also provide testimony at the evidentiary hearing in HP09-001?

A. Yes.

Q. Have you thoroughly reviewed all of the information filed in HP14-001?

A. I have reviewed the information related to wildlife and fisheries resources.

Q. Have you reviewed the Final Supplemental Environmental Impact Statement for the Keystone XL project?

A. Yes.

Q. Have there been any changes to the state threatened and endangered species list or Department of Game Fish and Parks' management plans since your original testimony filed in PUC Docket HP09-001?

A. There have been no changes to the threatened and endangered species list since my original testimony. The Department of Game, Fish and Parks finalized a revision of the state's Greater sage-grouse management plan in November 2014. The plan focuses on monitoring and habitat approaches/programs which are beneficial to wildlife and landowners alike. No regulatory mechanisms were included, however the plan discusses ways in which the Department can more closely work with other state agencies in reviewing energy development or other activities and projects to provide

management recommendations which may minimize or alleviate impacts to sage grouse and its associated habitats.

Q. If so, do any of those changes impact the Keystone XL project and can the project minimize its impact to any recently listed state threatened or endangered species?

A. No changes impact the project.

Q. Based on your review of the FSEIS and any other information provided to you in this docket, has your opinion on the Keystone XL project changed?

A. No.

Q. Are there any conditions in the Amended Final Decision and Order, dated June 29, 2010, that you believe, at this time, that Keystone XL cannot continue to meet?

A. No.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF TOM KIRSCHENMANN
ON BEHALF OF THE COMMISSION STAFF
SEPTEMBER 2009

BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA

PREFILED TESTIMONY OF TOM KIRSCHENMANN

Q. State your name.

A. Tom Kirschenmann.

Q. State your employer.

A. State of South Dakota, Department of Game, Fish, and Parks.

Q. State the program for which you work.

A. Division of Wildlife, Terrestrial Resources Chief.

Q. State the program roles and your specific job with the department.

A. The role of the Terrestrial Resources section is to study, evaluate, and manage all wildlife and associated habitats. Management includes game and non-game wildlife populations, habitat management on public lands and technical assistance and habitat development on private lands, population and habitat inventory, and environmental review of local and landscape projects. As Chief of the Terrestrial Resources Section, I oversee all wildlife management and research, as well as habitat management consisting of the department's public lands and private lands programs.

Q. Explain the range of duties you perform.

A. Duties include managing the Terrestrial Resources sections that includes two program administrators, 20 wildlife biologists, and two secretaries; oversee all wildlife research, management, and the establishment of hunting seasons for game species; oversee all private lands habitat programs; coordinate environmental review evaluations and responses related to terrestrial issues; serve as the Department's liaison for several state and federal agencies; and represent the Department on state and national committees.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. Are there any sensitive wildlife areas crossed by the pipeline?

A. There are a few areas that would fall under this category: sage brush habitat that includes sage grouse leks, crossing of several rivers, an area where American Burying Beetle are located within Tripp County, and native prairie.

Q. Please briefly summarize each.

A. The northwest corner of South Dakota is the easterly edge of the sagebrush range, including the easterly range of sage grouse. Sage grouse are dependent on sage brush habitat and traditional leks (courtship areas) are extremely important to this species. Disturbance of leks could have a negative impact on reproduction and ultimately recruitment to the population; applying additional strain to already small population. In addition, several species of concern depend on sage habitats in South Dakota, including the sagebrush vole, Brewer's sparrow and sage thrasher.

Although underground directional boring would be used to cross rivers such as the Cheyenne and White Rivers, these riparian areas provide critical habitat for multiple species, including nesting locations for species such as the least tern, bald eagles, and other raptors.

Tripp County and the southwest corner of Gregory County has an area approximately 800 square miles in size of occupied American Burying Beetle, with an estimated 600 acres affected by the pipeline route. This species is a federally listed endangered species.

The fragmentation of large contiguous tracts of native prairie resulting from infrastructure is a concern and the potential affect it would have on a number of grassland dependent bird species.

Q. Can the applicant mitigate the risks associated with crossing those sensitive areas?

A. <u>Sage brush habitat and sage grouse leks</u>

Locating and monitoring of active leks prior to construction would identify areas that would be recommended to avoid or restrict during March 1 through June 15. Sage brush habitat altered or destroyed during construction should be replanted to native species.

River crossings and riparian disturbance

Least Tern: If construction was to occur during the breeding season on the Cheyenne River, it would be recommended to conduct surveys to determine if any active nesting is occurring. If active nests are located, an adequate buffer (minimum of 0.25 mile) should be implemented with no disturbance within that buffer zone.

Bald Eagle: Monitoring of active nests should be conducted prior to and during construction. Active nests located should be provided a buffer of 1 mile during the nesting season (Feb. 1 – Aug. 15).

American Burying Beetle

Mitigation efforts should be deferred to the US Fish and Wildlife Service. Potential to set up a mitigation bank to off-set the acres lost to construction.

Grassland Fragmentation

It will be difficult to avoid total fragmentation due to roads and other infrastructure development, however disturbed ground should be replanted with native species and all necessary measures taken to avoid the infestation of noxious weeds and invasive plant species.

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. HP14-001

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUEDIN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

Direct Testimony of Daniel Flo on Behalf of the Staff of the South Dakota Public Utilities Commission

April 2, 2015

Q: Please state your name and business address.

A: Daniel Flo, Natural Resource Group, LLC (NRG), 1500 Southwest First Avenue, Suite 885, Portland, OR, 97201; 1000 IDS Center, 80 South 8th Street, Minneapolis, MN, 55402 (Corporate Office).

Q: Describe your educational background.

A: I received my Bachelor of Science Degree in 1996 from Minnesota State University, Mankato with a Major in Geography. I then received my Juris Doctor degree from Northwestern School of Law of Lew & Clark College in 2002. My educational and professional specialties are in environmental law and land use.

Q: By whom are you now employed?

A: I have been employed by Natural Resource Group, LLC from 2005 to 2010, and from 2013 to present. I currently hold the position of Senior Consultant.

Q: What work experience have you had that is relevant to your involvement on this project?

A: From 2005 to present, my responsibilities have been to provide clients in the energy and mining industries with environmental permitting services, including the preparation of Environmental Assessments and Environmental Impact Statements (EISs) under the National Environmental Policy Act and/or relevant state programs. My environmental permitting experience also includes the preparation of permit applications under Sections 404 and 401 of the Clean Water Act, the preparation of routing and siting applications to state utility commissions, and various other local, state, and federal environmental permits and approvals. I also provide project management services wherein I lead multi-disciplinary teams in performing route and site analysis, environmental field surveys, environmental permitting, construction compliance inspections, and post-construction restoration monitoring. A copy of my resume is appended to this testimony as Exhibit___DF-1.

Q: What Professional Credentials do you hold?

A: None.

Q: What is the purpose of your testimony?

A: In 2009, NRG provided environmental consulting services in support of PUC Staff's review of Keystone's original permit application. The scope of NRG's original review included a summary of the Department of State environmental review, a review of Keystone's application to the PUC, and an evaluation of the adequacy of Keystone's state permit application with respect to alternatives, paleontology, cultural resources, soils, erosion and sedimentation, and restoration methods described in the project's Construction, Mitigation, and Reclamation Plan (CMRP). Based on this review, NRG provided hearing support to PUC Staff including the preparation of prefiled testimony and expert testimony during the PUC hearing. The purpose of this testimony is to summarize NRG's review of Keystone's September 2014 Petition for Order Accepting Certification under SDCL § 49-41B-27 and associated supporting documentation, specifically our evaluation as to whether any of the changes identified by Keystone result in a change to our original testimony.

Q: What methodology did you employ?

A: I evaluated materials submitted to the South Dakota Public Utilities Commission (PUC) by TransCanada Keystone Pipeline, LP (Keystone), including Keystone's Petition for Order Accepting Certification under SDCL § 49-41B-27 and associated supporting documentation. Primarily, I evaluated the Findings of Fact from the PUC's Amended Final Decision and Order that have changed since 2010 as detailed in Keystone's table in Appendix C, and compared those changes to NRG's original testimony prepared in 2009. I also evaluated the red-line changes to Keystone's CMRP (dated April 2012) to determine whether the changes in that document result in changes to NRG's original testimony.

Q: With respect to the changes identified by Keystone in Appendix C, South Dakota PUC Amended Final Decision and Order, Tracking Table of Changes, please summarize your review by Finding Number. Findings 14 through 18:

A: The updated project information provided by Keystone for Findings 14 through 18 has been reviewed and results in no change to NRG's original (2009) testimony.

Q: Findings 19, 20, 22, 23:

A: The updated project information provided by Keystone for Findings 19, 20, 22 and 23 is outside the scope of NRG's 2009 review and testimony, and therefore results in no change to NRG's original testimony.

Q: Findings 24 through 29:

A: The updated project information provided by Keystone for Findings 24 through 29 is outside the scope of NRG's 2009 review and testimony, and therefore results in no change to NRG's original testimony.

Q: Finding 32:

A: I reviewed the red-line changes to Keystone's CMRP (dated April 2012) and compared those changes to NRG's original testimony from Ross Hargrove and Dr. James Arndt. My findings are summarized in Exhibit____DF-2. This table lists all CMRP sections with redline changes where NRG also provided recommendations in 2009, and provides my evaluation of Keystone's change with respect to NRG's 2009 testimony. None of the redline changes to Keystone's CMRP result in a change to NRG's 2009 testimony.

Q: Finding 33:

A: The updated project information provided by Keystone for Finding 33 has been reviewed and results in no change to NRG's original testimony.

Q: Finding 41:

A: I reviewed the additional site-specific crossing plans for the HDD crossings of Bad River and Bridger Creek, and reviewed NRG's original testimony. The addition of these two waterbodies as HDD crossings, and the supporting site-specific crossing drawings, result in no change to NRG's original testimony.

Q: Finding 50:

A: The updated project information provided by Keystone for Finding 50 has been reviewed and results in no change to NRG's original testimony.

Q: Finding 54:

A: The updated project information provided by Keystone for Finding 54 has been reviewed and results in no change to NRG's original testimony.

Q: Findings 60 through 63, and 68:

A: The updated project information provided by Keystone for Findings 60 through 63 and 68 is outside the scope of NRG's 2009 review and testimony, and therefore results in no change to NRG's original testimony.

Q: Finding 73:

A: See the response to Finding Number 32 above and my summarized findings in Attachment 2.

Q: Finding 80:

A: NRG's original recommendations included that Keystone be required to provide the final Construction/Reclamation (Con/Rec) Units and associated construction, restoration and mitigation procedures and corresponding pipeline milepost references to the PUC prior to construction. NRG also recommended that the Con/Rec classification system be developed in consultation with Natural Resources Conservation Service (NRCS) staff. NRG's recommendations were based in part on an understanding that Keystone would include Badlands (sodium bentonite) soils as a Con/Rec Unit. NRG also evaluated Keystone's examples of specific reclamation measures that may be used in areas where saline, sodic, and saline-sodic soils are encountered during construction and found the sample procedures to be adequate.

Keystone's update to Finding 80 indicates that Con/Rec mapping was completed in consultation with area NRCS staff. Keystone's Response to Commission Staff's First Set of Interrogatories (#18) indicates that Con/Rec Units are not part of the updated CMRP but that the results are included with the Department of State's FSEIS in Appendix R.

I reviewed Appendix R of the FSEIS on the Department of State's website and confirmed that Con/Rec Units were developed and are included as an appendix to that federal NEPA document. I also confirmed, based on the documentation provided in Appendix R including records of correspondence, that NRCS staff and other professional resources were consulted during the development of the Con/Rec classification system. Appendix R does not, however, include pipeline milepost references for the Con/Rec Units.

Keystone's update appears largely to satisfy NRG's original recommendation in that Con/Rec Units have been developed, that NRCS staff was consulted during the Con/Rec Unit development process, and that the Con/Rec classification system is available to the PUC prior to project construction.

To the extent that the Con/Rec Units do not specifically include a Badlands soils unit, NRG originally found that Keystone's construction, reclamation, and mitigation measures for dealing with this soil type, as discussed in the application, were appropriate and represented the tools that are typically used during construction in similar soils. The absence of a Badlands soils unit does not specifically represent a change to NRG's original testimony.

Finally, although the Con/Rec Units do not appear to specifically address construction or reclamation procedures in saline, sodic, or saline-sodic soils or saline seeps, there is no change to NRG's original testimony finding that the reclamation measures discussed in the application were adequate and appropriate for those soil types.

Q: Finding 83:

A: See the response to Finding Number 41 above. The updated project information provided by Keystone for Finding 83 results in no change to NRG's original testimony.

Q: Finding 90:

A: The updated project information provided by Keystone for Finding 90 is outside the scope of NRG's 2009 review and testimony, and therefore results in no change to NRG's original testimony.

Q: Finding 107:

A: The updated project information provided by Keystone for Finding 107 is outside the scope of NRG's 2009 review and testimony, and therefore results in no change to NRG's original testimony.

Q: Does this conclude your testimony?

A: Yes.

Daniel S. Flo
Email: daniel.flo@NRG-LLC.com

Daniel Flo is a Senior Regulatory Specialist in Natural Resource Group, LLC's (NRG) Portland office. Daniel has over 12 years of environmental assessment and permitting experience and specializes in project management for liquids pipelines, electric transmission and wind energy projects. Daniel is an experienced environmental project manager and is adept at overseeing all stages of project development including agency coordination, environmental surveys, major permitting, environmental review, construction, and restoration. Daniel is also NRG's Business Development Lead for the Construction Compliance practice group and is responsible for supporting and promoting NRG's Environmental Inspection, Third Party Compliance and related service areas.

Selected Project Experience

- Enbridge Energy, Inc., 2014 Wisconsin and Illinois Environmental Surveys Initiative Project, 2013 to Present, 470 miles of environmental surveys along Enbridge's existing Line 61 utility corridor: Project Manager responsible for overseeing preparation of field deployment, initial agency consultations, field training program, and environmental surveys including wetlands and waterbodies, cultural resources, sensitive habitats and protected species.
- Enbridge Energy, Inc., Line 3 Maintenance and Flexibility Project, May 2014 to November 2014, 16-mile-long 34-inch-diameter crude oil pipeline segment replacement project in North Dakota: Project Manager for environmental inspection, compliance management and daily reporting during construction of the maintenance replacement project.
- Enbridge Energy, Inc., Line 3 Maintenance and Flexibility Project, January 2014 to May 2014, 16-mile-long 34-inch-diameter crude oil pipeline segment replacement project in North Dakota: Project Manager responsible for environmental support activities for a high-priority maintenance replacement project, including desktop analysis, risk assessment, construction planning, and environmental permitting.
- Quanta Pipeline Services, Bluegrass Memphis Pipeline Project, 2013 to 2014, 91-mile-long natural gas liquids pipeline in Tennessee, Arkansas, and Mississippi: Project Manager responsible for environmental and cultural resources surveys and permitting, including U.S. Army Corps of Engineers (COE) Nationwide Permit 12 and levee crossing permits, water appropriation permits, stormwater discharge and hydrostatic testwater discharge permits, and protected species consultations.
- Enbridge Energy, Inc., Line 79 Pipeline Project, 2011 to 2012, 35-mile-long crude oil pipeline in Michigan: Project Manager responsible for environmental surveys and permitting, as well as preparation of a Michigan Environmental Impact Report and Joint Permit Applications under Michigan administrative rules Section 301 and 303, and multiple local drain crossing and soil erosion and sediment control permits.
- Preferred Sands of Minnesota, Kasota Mine Project, 2010 to 2012, non-metallic mineral mining and processing project in Minnesota: Project Manager responsible for successful completion of a Scoping Environmental Assessment Worksheet, local permitting and zoning, environmental surveys, and hydrogeological studies and modeling.
- Preferred Sands of Minnesota, 2010 to 2012, various non-metallic mineral mining and processing project sites in Wisconsin: Project Manager responsible for overseeing changes in zoning, conditional use permits, mine reclamation plans, and state and local permits.

- ALLETE Clean Energy, North Dakota One Wind Project, 2012, 100-megawatt (MW) wind energy project in North Dakota: Project Manager responsible for managing environmental survey and permitting and energy facility siting activities including obtaining site approval from the North Dakota Public Service Commission.
- Minnesota Power, Bison 2 and Bison 3 Wind Energy Facility Projects, 2011 to 2012, two 105-MW wind projects in North Dakota: Project Manager responsible for cultural and environmental field surveys and team preparation of energy facility siting applications and other documents necessary for site approval from the North Dakota Public Service Commission.
- CapX2020, Hampton to La Crosse 345 kV Transmission Line Project, 2011, 125-mile-long electric transmission project in Minnesota and Wisconsin: Author of the Land Use section of the State of Minnesota Draft Environmental Impact Statement (EIS).
- Rangeland Energy, COLT Connector Pipeline Project, 2010 to 2012, 20-mile-long crude oil pipeline in North Dakota: Project Manager responsible for environmental permitting and review and post-construction environmental inspections, including a facility siting / route permit from the North Dakota Public Service Commission.
- CapX2020, Fargo to Monticello 345 kV Transmission Line Project, 2010, the construction of major electric transmission lines from Fargo, North Dakota to Monticello, Minnesota: Co-Project Manager responsible for overseeing technical specialists involved with environmental and cultural resources field surveys and permit applications for the COE and the Minnesota Department of Natural Resources, as well as contributing to the environmental routing analysis process supporting route permitting and state utility commission certification.
- Enbridge Energy, Alberta Clipper Pipeline Project, 2006 to 2010, 300-mile-long, 36-inch-diameter crude oil pipeline between the United States – Canada border in North Dakota and Superior, Wisconsin: Deputy Project Manager responsible for managing environmental surveys and federal and state permitting including an EIS from the U.S. Department of State, National Forest Service crossing permits, North Dakota Public Service Commission route permit, and Minnesota Department of Natural Resources land and waterbody crossing permits.
- Enbridge Energy, Southern Lights Diluent Pipeline Project, 2006 to 2009, 190-mile-long, 20-inch-diameter refined product pipeline from Superior, Wisconsin to Clearbrook, Minnesota: Project Manager responsible for managing environmental surveys and federal and state permitting.
- South Dakota Public Utilities Commission, 2009: Presented expert testimony to the South Dakota Public Utilities Commission regarding the National Environmental Policy Act (NEPA) process and federal environmental review for interstate liquids pipelines.
- Enbridge Energy, LSr Pipeline Project, 2006 to 2008, 105-mile-long, 20-inch-diameter crude oil pipeline from the United States – Canada border at Neche, North Dakota to Clearbrook, Minnesota: Supervised environmental permitting and compliance and contributed to the development and submittal of numerous federal, state, and local permit applications as well as contributed to preparing an Environmental Assessment (EA) for the U.S. Department of State.
- El Paso, Continental Connector Natural Gas Pipeline Project, 2006, 384-mile-long natural gas pipeline in Texas, Oklahoma, Arkansas, and Louisiana: Authored the Land Use section of the Federal Energy Regulatory Commission (FERC) environmental report (Resource Report 8).

- Phoenix Expansion Pipeline Project, 2006, 259-mile-long natural gas pipeline in Arizona and 25 miles of additional loops in New Mexico: Authored the socioeconomics section and co-authored the land use section of the FERC EIS.

Education and Training

- J.D., Northwestern School of Law of Lewis & Clark College, Oregon, 2002
- B.S., Geography, Minnesota State University, Minnesota, 1996
- FERC Environmental Review & Compliance for Natural Gas Facilities seminar, Denver, 2009
- University of Minnesota Certified Erosion/Sediment Control Specialist; Certified Inspector / Installer; Certified Designer of Stormwater Pollution Prevention Plans, 2009

Finding Number	NRG Response
	The Project
14	The updated information provided by Keystone for Finding Number 14 has been reviewed and results in no change to NRG's original (2009) testimony.
15	Updated information has been reviewed and results in no change to NRG's original testimony.
16	Updated information has been reviewed and results in no change to NRG's original testimony.
17	Updated information has been reviewed and results in no change to NRG's original testimony.
18	Updated information has been reviewed and results in no change to NRG's original testimony.
19	The updated information provided by Keystone for Finding Number 19 is outside the scope of NRG's 2009 review and testimony, and therefore results in no change to NRG's original testimony.
20	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
22	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
23	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
	Demand for the Facility
24	The updated information provided by Keystone for Finding Number 24 is outside of the scope of NRG's original (2009) review and testimony, and therefore results in no change to NRG's original testimony.
25	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
26	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
27	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
28	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
29	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
	Environmental
32	I reviewed the redline changes to Keystone's CMRP (dated April 2012) and compared those changes to NRG's original testimony from Ross Hargrove and Dr. James Arndt. My findings are summarized in Attachment 2. This table lists all CMRP sections with redline changes where NRG also provided recommendations in 2009, and provides my evaluation of Keystone's change with respect to NRG's 2009 testimony. None of the redline changes to Keystone's CMRP result in a change to NRG's original testimony.

33	Updated information has been reviewed and results in no change to NRG's original testimony.
41	I reviewed the additional site-specific crossing plans for the HDD crossings of Bad River and Bridger Creek, and reviewed NRG's original testimony. The addition of these two waterbodies as HDD crossings, and the supporting site-specific crossing drawings, result in no change to NRG's original testimony.
50	No change to original testimony.
54	No change to original testimony.
	Design and Construction
60	The updated information provided by Keystone for Finding Number 60 is outside of the scope of NRG's original (2009) review and testimony, and therefore results in no change to NRG's original testimony.
61	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
62	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
63	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
68	Updated information is outside the scope of NRG's original review and results in no change to our original testimony.
73	See response to Finding Number 32 above. I reviewed the redline changes to Keystone's CMRP (dated April 2012) and compared those changes to NRG's original testimony from Ross Hargrove and Dr. James Arndt. My findings are summarized in Attachment 2. This table lists all CMRP sections with redline changes where NRG also provided recommendations in 2009, and provides my evaluation of Keystone's change with respect to NRG's 2009 testimony. None of the redline changes to Keystone's CMRP result in a change to NRG's 2009 testimony.
80	NRG's original recommendation was that Keystone provide the final Construction/Reclamation Units and associated restoration and mitigation procedures and corresponding pipeline milepost references to the PUC prior to construction. Keystone's update indicates that Con/Rec Unit mapping in consultation with area NRCS offices has been completed and that the results are included with the Department of State's FSEIS in Appendix R. This update appears to satisfy NRG's original recommendation.
83	Refer to Finding Number 41. No change to NRG's original testimony.
	Operation and Maintenance
90	The updated information provided by Keystone for Finding Number 90 is outside of the scope of NRG's original (2009) review and testimony, and therefore results in no change to NRG's original testimony.
	Socio-Economic Factors
107	The updated information provided by Keystone for Finding Number 107 is outside of the scope of NRG's original (2009) review and testimony, and therefore results in no change to NRG's original testimony.

CMRP Section Number	NRG Recommendations, 2009 (summarized)	NRG Evaluation, 2015
2.13 – Weed Control	NRG recommended that Keystone obtain the permission of individual landowners or the appropriate land management or state agency in writing before treating weeds with herbicides on their property.	The redline change to this section of the CMRP states that "Keystone will prepare a weed management plan for each state crossed by the project, as required. In general, these plans will consider the following measures listed below." This change is not inconsistent with our original recommendation and does not change NRG's original testimony.
2.17 – Road and Railroad Crossings	NRG recommended that Keystone coordinate with emergency responders regarding the timing and intended duration of any temporary road closures.	The redline change to this section of the CMRP is not related to, and therefore does not change, NRG's original testimony.
3.0 – Spill Prevention and Containment	NRG recommended that fuel storage and/or refueling activities be avoided or minimized within 400 feet of municipal wells or wellhead protection areas and within 200 feet of private water wells.	The redline changes to this section of the CMRP are not related to, and therefore do not change, NRG's original testimony.
4.3 – Topsoil Removal and Storage	NRG summarized the benefits and limitations for each of three topsoil segregation methods proposed by Keystone, and recommended that Keystone work closely with landowners to determine the method most suitable for their property.	The redline changes to this section of the CMRP include the addition of a fourth available topsoil segregation method (trench and working side) and defines two additional site-specific conditions that may require one of the defined topsoil segregation methods. These redline changes are generally consistent with industry standards for pipeline construction, are not inconsistent with our original recommendation, and do not change NRG's original testimony.
4.5 – Temporary Erosion and Sediment Control	NRG recommended the installation of sediment barriers in the vicinity of delineated wetlands and waterbodies regardless of the presence of flowing or standing water at the time of installation, and that liquid mulch binders not be used within 100 feet of wetlands and waterbodies.	The redline changes to this section of the CMRP are not related to, and therefore do not change, NRG's original testimony.
4.7 – Trenching	NRG recommended the use of the triple-lift soil handling method to maintain soil productivity in agricultural lands where hard, paralithic shale and sandstone underlie unconsolidated subsoils, and where saline	The redline changes to this section include the addition of "triple ditch soil handling…at sites identified by Keystone…." NRG also reviewed the new typical drawings Detail 67 and 67A, Topsoil Conservation Ditch

	subsoils underlie non-saline subsoil horizons. NRG further recommended that Keystone consult with the state or area NRCS offices to identify soils for which alternative handling methods in agricultural lands would be appropriate, develop construction procedures to minimize impacts on such soils, and potentially make those alternative soil handling methods available to landowners to maintain soil productivity in agricultural lands.	& Spoil Stripping Triple Ditch. These redline changes and new typical drawings are generally consistent with industry standards for pipeline construction, are not inconsistent with our original recommendations, and do not change NRG's original testimony.
4.7.1 – Trench Dewatering/Well Points	NRG made several recommendations regarding setting a minimum electrical conductivity value for the discharge of saline trench water; developing procedures to follow for disposal of overly saline trench water when alternative disposal locations are not available; and implementation of best management practices to prevent heavily silt-laden trench water from reaching wetlands and waterbodies, directly or indirectly, to prevent exceeding water quality standards.	The redline changes to this section do not directly address, and therefore do not change, NRG's original testimony.
4.9 – Padding and Backfilling	NRG recommended that rock be replaced in the trench only to the top of the existing bedrock profile, and all other rock should be considered construction debris and removed from the right-of-way.	The redline changes to this section of the CMRP are not related to, and therefore do not change, NRG's original testimony.
4.10 – Cleanup	NRG recommended that final grading, topsoil replacement, and installation of permanent erosion control structures be completed in non-residential areas within 20 days of backfilling the trench and within 10 days in residential areas unless practically infeasible. In the event seasonal or other weather conditions prevent compliance with the time frames, temporary erosion controls should be maintained until conditions allow completion of cleanup and reclamation.	The redline changes to this section of the CMRP are not related to, and therefore do not change, NRG's original testimony.
4.11.1 – Reclamation and Revegetation, Relieving Compaction	NRG recommended that Keystone prepare a winterization plan.	The redline changes to this section of the CMRP are not related to, and therefore do not change, NRG's original testimony.

4.11.2 – Rock Removal	NRG recommended that excess rock be removed from at least the top 12 inches of soil in agricultural lands, to the extent possible.	The redline changes to this section do not directly address, and therefore do not change, NRG's original testimony.
4.11.5.3 – Mulching	NRG recommended that mulch be installed on slopes concurrent with or immediately after seeding, plus recommendations regarding the timing of mulching and seeding.	The redline changes to this section do not directly address, and therefore do not change, NRG's original testimony.
4.16 – Operations and Maintenance	NRG recommended that Keystone monitor the pipeline right-of-way for at least 2 years following construction; standards for determining the success of revegetation in non-cultivated areas; and that temporary erosion control devices should be maintained or replaced as necessary until successful revegetation of the right-of-way, or as required by permits.	These redline changes to this section are generally consistent with industry standards for pipeline construction and do not change NRG's original testimony.
6.2 – Wetland Crossings, Easement and Workspace	NRG made several recommendations, including the recommendation that the width of the construction right-of-way in non-cultivated wetlands be reduced to 75 feet, allowing for exceptions for site-specific conditions, instead of Keystone's stated right-of-way reduction of 85 feet.	The redline changes to this section of the CMRP indicate that the width of the construction right-of-way shall be reduced to 85 feet or less in standard wetlands…unless the USACE or other regulatory authority authorizes a greater width. This change does not change NRG's original testimony.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF DAVID SCHRAMM
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. Please state your name and business address.

A. My name is David Schramm. My business address is 28100 Torch Parkway, Warrenville, Illinois, 60555.

Q. By whom are you employed and in what capacity?

A. I am employed as a Vice President-Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design, codes compliance, integrity, and automation services for the oil and gas industry.

Q. Please describe your educational background and professional experience.

A. I hold a B.S. degree from Iowa State University (Ames, Iowa) and I am a NACE Institute No. 3178 Certified Cathodic Protection Specialist and Certified Corrosion Technologist (confirm certification at www.naceinstitute.org). My professional experience consists of employment in the pipeline industry with EN Engineering, NICOR Technologies, NICOR Gas (Northern Illinois Gas), Corrpro Companies, Inc., and Harco Corporation.

My responsibilities in these positions includes nearly 35-years of extensive experience in the assessment and application of pipeline integrity and corrosion control programs including: corrosion control engineering, analysis and design, process control and measurement, internal “smart” tooling, cathodic protection design, installation and maintenance, computerized close interval potential survey, direct current voltage gradient survey, telluric current monitoring, measurement and investigation, stray DC and AC interference testing and mitigation, coating selection and inspection and material selection and purchasing.

I am currently responsible for the technical support of the Corrosion Control and Integrity Field service offerings including: the technical oversight of project performance and standards, the development and maintenance of technical guidelines, standards and procedures, quality assurance (ISO 9001) for corrosion control, cathodic protection, field failure and integrity management projects and proposals, and the qualification and training of corrosion control field failure, and system integrity personnel.

Within the corrosion control and cathodic protection industry, I have served in a Chair position for NACE T-10-A-11: Gas Industry Corrosion Problems (1995 through 2001), NACE International Certification Committee (2001 through 2005), Chair and Vice-Chair for the NACE International Professional Activities Committee (PAC), and currently serving as the Chair of the NACE Institute Certification Commission.

In addition, I am a certified Craft Instructor for the National Center for Construction Education (NCCER) as it relates to the American Petroleum Institute (API) Operator Qualification Program, a Veriforce Operator Qualification Evaluator, and served as a member of numerous NACE task or industry groups including the NACE Cathodic Protection Training and Certification Program task group, the Chicago Region Committee on Underground Corrosion (CRCUC) and the Michigan Electrolysis Committee (MEC).

My resume is attached to this document as Exhibit___DS-1.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. Please state the purpose of your testimony in this proceeding.

A. There are three main objectives of the Staff in this testimony. First, to ensure that the proposed changes to the Findings of Fact in the Decision, as identified by TransCanada Keystone Pipeline's (the Applicant) Tracking Table of Changes, comply with the Federal Pipeline Safety Regulations 49CFR 195, Transportation of Hazardous Liquids by Pipeline. Secondly, the objective is to ensure that the Applicant has met any new requirements imposed by the Federal Pipeline Safety Regulations 49CFR 195 since the Amended Final Decision and Order was issued on June 29, 2010 with respect to the application for a permit (Permit) to construct and operate a crude oil pipeline in South Dakota. Lastly, the objective is to ensure that the amended permit conditions, and any project changes, are still able to meet the conditions upon which the permit was issued, specifically focusing on pipeline design, integrity management and compliance with PHMSA regulations (49CFR 195).

This testimony deals specifically with updates made to the project as provided by Keystone on the Tracking Table of Changes, specifically as they relate to 49 CFR Part 195 Subpart H.

Q. Keystone updated project specifications as they relate to Finding 68 in the Amended Final Decision and Order to indicate that TransCanada has experienced no evidence of corrosion on fusion bonded epoxy lines except for one instance

where an adjacent foreign utility interfered with the cathodic protection system. Do requirements set forth in 49 CFR Part 195 and / or the safety measures set forth in the DOS Final SEIS adequately address interference currents?

A. Stray DC corrosion interference testing, assessment, and mitigation is prescribed under Table 4, Special Conditions as recommended by PHMSA, page 87, item 36. The program stipulated by PHMSA should address the detection and mitigation of stray DC current effects. As interpreted, the PHMSA program requirements are considered more stringent than Part 195, Subpart H – as additional timing requirements have been established.

Q. Are there any other interference conditions that might lead to the development of corrosion on fusion bonded epoxy coated pipelines?

A. The phenomenon of AC stray current interference is becoming a more prominent concern within the industry; especially, but not exclusively, associated with FBE and/or Epoxy ARO (Abrasion Resistant Overcoat) protectively coated pipeline systems. This issue is addressed and prescribed under Table 4, Special Conditions as recommended by PHMSA, page 80, item 21. The program stipulated by PHMSA should address the detection and mitigation of stray AC current effects. As interpreted, the PHMSA program requirements stipulate that control of induced AC from parallel electric transmission lines and other interference issues (e.g., crossings, substations, transpositions or capacitive or conductive coupling (fault)) are to be incorporated into pipeline design and addressed during the construction phase. This program recommendation is also consistent with the notice contained in the DOT/OPS Advisory: 68FR64189 – 11/12/2003. If not already provided, a copy of the construction

techniques for the mitigation of AC stray current, the testing for, engineering analysis, modeling, and mitigation design for AC interference should be made available to SDPUC for record.

Q. Are there any other operational conditions that might lead to the development of corrosion on fusion bonded epoxy coated pipelines?

A. Pipeline coating requirements are prescribed under Table 4, Special Conditions as recommended by PHMSA, page 73, item 9 and on page 74, item 10 and 11. These are considered more stringent than 195, Subpart H – as additional inspection and inspection voltages are required at both the coating mill and when coating is applied at field locations. Item 15 on page 75 addresses the impact from higher operating temperatures (120-degrees F or above) and prescribes requirements for notification and operational response and follow-up testing should this occur under defined durations.

Q. Does the update made to Finding 68 violate any requirements set forth in 49 CFR Part 195 Subpart H?

A. 195.577 and 195.575 requires pipelines exposed to stray current to have a program in place to identify, test for, and minimize the detrimental effects of such currents. In addition, the design and installation of any impressed current or galvanic anode cathodic protection system must be designed to minimize any adverse effects on existing adjacent metallic structures. As such this update does not violate any requirements set forth in 49 CFR Part 195 Subpart H and does not violate the DOT/OPS Advisory: 68FR64189 – 11/12/2003 issued.

Q. Does the update made to Finding 68 violate any mandates set forth in the original or amended permit conditions?

A. As noted above, the update made to Finding 68 is adequately addressed by the incorporation of all PHMSA recommendations into the original or amended permit conditions. As such, this update does not violate any requirements set forth in the original or amended permit condition.

Q. Do any of the other project changes identified in the Tracking Table of Changes provided by Keystone violate the mandates set forth in 49 CFR Part 195 Subpart H?

A. No they do not.

Q. As they relate to 49 CFR Part 195 Subpart H, do any other project changes identified in the Tracking Table of Changes provided by Keystone violate the mandates set forth in the original or the amended Permit Conditions?

A. No they do not.

Q. Does this conclude your testimony?

A. Yes.

David A. Schramm

VP, Corrosion Control and Integrity Field Services, Integrity

Key Relevance
SME - Cathodic Protection Design
SME - Corrosion Control Field Assessments
SME - Cathodic Protection Trouble Shooting
SME - AC Mitigation Design and Analysis
SME -Atmospheric Corrosion Inspection
SME -Internal Corrosion
SME – Wall Loss Assessment (Corrosion)
SME – Coating Condition Assessment

Job Title:
VP Corrosion Control and Integrity Field Services Integrity

Years with EN Engineering: 13

Total Years of Experience: 35

Primary Office Location:
Warrenville, IL, USA

Education:

B.S., Resource Management, Iowa State University, Ames, Iowa

Professional Certifications:

- NACE Institute No. 3178 Certified Cathodic Protection Specialist
- NACE Institute No. 3178 Certified Corrosion Technologist

Overview: Mr. Schramm has over thirty-five (35) years of extensive experience in the direct and practical application of corrosion control methods, cathodic protection assessment and design, and system integrity management and field services.

Direct experience with external, internal, and atmospheric corrosion control on natural gas and liquid transmission and distribution pipeline systems, under-ground natural gas storage, under-ground storage tanks, above-grade storage tanks, power plant structures, condenser/chiller/heat exchange equipment, production and injection/withdrawal wells, lead sheath cable, underground electric cable, water transmission systems, and fresh-water marine structures

Responsible for the technical performance, quality, and operation service offerings that provide:

- Corrosion engineering analysis and design
- Cathodic protection monitoring and assessment
- Process control and measurement
- Correlation of internal “smart” tool to indirection inspection survey data
- Cathodic protection design, installation and maintenance
- AC safety and AC corrosion assessment, modeling, and mitigative design
- Computerized close interval potential survey
- Direct current and alternating current voltage gradient survey
- Stray DC interference and telluric current monitoring, measurement, and mitigation
- Coating selection and inspection
- Material selection, specification and procurement
- Technical specification and procedure
- OQ qualification and training
- Corrosion related field failure, wall loss assessment, and remaining strength evaluation
- Indirect and direct inspection program support
- Field installation oversight and inspection
- Project management and commission services
- Operational support including:
  - Leak detection
  - Purge operations
  - Watch and protect and rights-of-way inspection
  - Locating
  - High Consequence Assessment and Class Survey

Professional Organizations & Affiliations

NACE International Institute (NII)

- Chairman, Certification Committee (Board) (2012-2016)

NACE International (NACE)

- Professional Activities Director (PDAC) (Board) (2011 to 2014)
- Professional Activities (PDAC) Chair (2011 to 2014)
- Professional Activities (PDAC) Vice-Chair (2008 to 2011)
- Certification Committee Chair (2003 to 2006)
- Certification Committee Vice-Chair (2000 to 2002)
- T-10A-11: Gas Distribution Industry Corrosion Problems Chair (1997 to 2001)
- T-10A-11: Gas Distribution Industry Corrosion Problems Vice-Chair (1995 to 1997)
- SME Department of Defense (DoD) Panel on Training and Certification
- CP Interference Course Development Task Group: Cathodic Protection Interference (2006)
- Cathodic Protection Sub-Committee: Cathodic Protection Technologist (2004)
- Cathodic Protection Training and Certification Program Task Group: Cathodic Protection Level 1 (2000) and Cathodic Protection Level 2 (2000)
- Cathodic Protection Task Group: Cathodic Protection Training Program (1999 – 2000)
- Chicago Section – Special Events Chairman (1985-1986)
- Chicago Section – Membership Chairman (1986-1987)
- Chicago Regional Committee on Underground Corrosion (CRCUC) Chair and Vice-Chair
- Michigan Electrolysis Committee Chair and Vice-Chair

Corporate program support:

- ENE Health, Safety, and Environmental Committee – member
- OSHA Safety Training Programs
  - Development and documentation of program safety documents.
  - Initial creation and training of Level 0 OSHA training presentations (PowerPoint)
- Vision Accounting and Project Documentation:
  - Part of management team charged with the development of project management and project set-up (2014/2015) Vision EWMS project.
  - Developed IN proposal documentation and procedures under Opportunity section of Vision
  - Automation of reports and training of Vision to departmental Project Mangers
- Operator Qualification and Safety Records
  - Administrator for ISNETWORLD software and NCCER program audit and oversight.
  - Initial development and submittal of safety programs for RAV review
  - Initial support for Client response and safety program update.
  - Set-up and established support for Veriforce OQ programs.
- ISO 9001: 2000 Certification
  - Part of team tasked with the initial development and completion of ISO 9001 policy and procedures within EN Engineering; leading to, ISO9001: 2000 certification for the corporate office.

Relevant Projects:

Tallgrass Development
SME project direction for excavation analysis of coating and pipeline wall assessment and conductance, evaluation, and assessment if in-situ pipeline coating assessment to TMO102-2002 Standards. Direct analysis of data obtained from field and laboratory testing, written report and recommendations.

Valero Energy Corporation
SME project direction for AC Threat Assessment on 150-mile pipeline as an "active" high level management approach to evaluate both present "threat area" and future AC "threat" risk. Project included the gathering of AC voltages on the pipeline and soil resistivity at intervals not exceeding 1000-ft. AC Threat calculation, research and inclusion of historic data obtained from other sources (DFOS), generation of plots and graphs, scenario or sensitivity analysis, report, observations and recommendations.

Professional Organizations & Affiliations, cont.

National Center for Construction Education and Research (NCCER)

- Certified Master Trainer (2010)
- Certified Administrator (2010)
- Certified Craft Trainer/Evaluator: Core Curricula, Gas Pipeline Operations, Liquid Pipeline Control Center Operations, Liquid Pipeline Field Operations, Pipeline Core, Pipeline Corrosion Control, Pipeline Electrical and Instrumentation (E&I), Pipeline Maintenance, Pipeline Mechanical, Specialty Craft

Veriforce

- Authorized Evaluator

Midwest Energy Association (MEA)

- Administrator

The Society for Protective Coatings (SSPC)

- Member

Additional

- API 1161 – Task Group on Operator Qualification, Pipeline Segment – Resolution of Appreciation for contributions to the Task Group
- OSHA 510 Certified "Occupational Safety & Health Standards for the Construction Industry"
- TWIC (Transportation Workers Identification Credential)
- Clockspring Trainer/Installer Certified (2002)
- Administration Training: Assessor Training (Nicor Gas- 1994)
- Quality Awareness Training (Nicor Gas- 1993)
- Basic Corrosion Course (NACE- 1983)

Southern Star Gas Central
SME project support for 20-inch diameter natural gas pipeline damaged by 12kV AC power line arc near Joplin, Missouri including: assessment of condition, documentation of event, wall loss discovery, assessment and written report, and Client support with regulatory oversight and questions

Exxon Mobil Refinery
SME technical project support assessment of condition (cathodic protection systems), annual survey, remediation, and recommendation.

United States Gypsum
Develop, perform training, assessment and evaluation for operator qualification of Client employee resources, assess natural gas pipeline system and plant facilities, and develop initial pipeline normal operation system drawing format.

United States Gypsum
SME level support for isolation flange failure in Washington, PA including: assessment of condition, purge out of product, oversight of repairs, purge in of product, and restoration of service.

Corrosion Control Operations
Managed and directed the Corrosion Control Service Group for Nicor Technologies and Nicor Gas providing corrosion control consulting services to distribution and transmission pipelines, municipal and utility organizations, and commercial and industrial customers. Responsible for the performance of all operating corrosion control programs (internal, external and atmospheric) on the Nicor Gas pipeline system including specification, performance and day-to-day operation. As a member of the Nicor Gas welding and joining, system integrity, and code committee operating task groups provided technical expertise in pipeline integrity, research and testing, corrosion control and cathodic protection issues. Having responsibility for the due diligence corrosion control and cathodic protection evaluations on acquisition projects in Argentina and Tennessee. Developed risk, quality, and integrity management programs related to corrosion control and cathodic protection operations. Location: IL

Additional, Cont.

- Goodall Rectifier School: Goodall Electric, Inc. (1982 –
- Managing Cultural Diversity (Coleman Management Consultants (1994)
- Control, West Virginia, University (1985)
- Corrosion Prevention by Cathodic Protection (NACE– 1983)
- Effective Business Communication (IWCC – 1990)
- Appalachian Underground Course: Advanced Corrosion

Expert Witness Testimony:

- South Dakota Public Utility Commission - Testimony
  - Keystone Pipeline, October 2007- Corrosion and Protective Coating Sections and Related Code
  - Keystone XL, September 2009 – Corrosion and Protective Coating Sections and Related Code
  - Keystone XL, March, 2015 – Corrosion Protective Coating Sections and Related Code

- State of Iowa Utilities Board
  - 2002, Testimony related to AC Interference, assessment, and mitigation as it relates to: proposed pipeline construction beneath overhead AC transmission systems, Iowa.

Corrosion Control Services
Directed and coordinated the Nicor Gas corrosion control programs for distribution, transmission, and storage facilities. Directly supervision responsibility for the completion of annual corrosion control and corrosion control activities which include: annual reading programs, close interval survey, stray current interference, and impressed current rectifier system replacement.

Research Services
Managed and directed the research lab for Nicor Gas and was responsible for day-to-day operation, quality performance, testing, recommendation and approval, including the performance and analysis ASTM and ANSI test standards and methods. Directly responsible for the purge routine process for all large-diameter high- pressure pipelines. Conducted, analyzed and developed corrosion control action and recommendation for all wall loss and field failure events. Locations: IL

Lakehead Pipeline Company
Directed the completion of all annual cathodic protection reading programs, close interval survey, stray current interference, impressed current rectifier system replacement, and field failure investigations for the Lakehead Pipe Line Company over a six (6) year period on facilities that include pipeline, compression, substation, and storage facilities. Locations: ND, MN, WI, IL, MI, NY.

Portal Pipeline Company
Supervised and completed the annual cathodic protection reading program for the Portal Pipe Line Company including pipeline, gathering and wellhead systems. Location: ND

Alyeska Pipeline Service Company
In-state direction, supervision and related to the process of conducting, analyzing and performing telluric based close interval surveys for the Trans-Alaska Pipeline System (TAPS) over a four (4) year period. Direct responsible for the performance, provision, data quality, data analysis and report recommendations. Location: AK

Technical Presentations:

- PG&E – February, 2015 Technical Presentation on AC Interference and Mitigation
- NACE International, January-2015 Northern Plains Corrosion Control Short Course, Omaha, Nebraska – Speaker and presentation on AC interference and Mitigation and case examples
- USG – January, 2015 – Technical Presentation on Plant Audit Inspections
- NACE San Antonio Section Meeting, May-2014 – Speaker and presentation on AC interference and mitigation and case examples
- NACE International, January-2014 Plains Short Course (Omaha), Nebraska – Speaker and presentation on AC interference and Mitigation and case example
- NACE Wisconsin Short Course, September, 2013 – Cathodic Protection Design and Practical
- NACE Wisconsin Short Course, September, 2013 – Casings: Design and Regulations
- NACE International, August – 2013 Central Area Conference, Little Rock – Speaker and presentation on AC interference and Mitigation and case example
- Northern Natural Gas (NNG) Spring Corrosion Round Table – 2013: AC Interference and Mitigation Training (Minneapolis, Des Moines, El Paso)
- Northern Natural Gas (NNG) Spring Corrosion Round Table – 2013: CIS/ECDA Defect and Interpretation
- AGA/SPE, March 2012 – Identification and Prevention of Corrosion in Gas Storage Gathering Facilities

Desert Generation and Transmission Company
Supervised, conducted and performed the design and testing services for the Deseret Generation and Transmission Company. Planned and performed a wide variety of duties involving the evaluation, design, and installation of cathodic protection systems to inhibit corrosion on pipelines, tanks, and similar underground and submerged structures including electrical continuity and protection of concrete steel cylinder pipe. Locations: UT

Mobil Oil
Conducted and analyzed all underground facilities for the potential application of cathodic protection for the Mobil-Joliet Refinery. Operational and performance responsibilities related to installation of new and existing cathodic protection systems: design, redesign, and installation of impressed current systems for tank bottoms. Location: IL

Montana Power
Conducted, analyzed and performed close interval and leak detection surveys on large diameter - high pressure – natural gas transmission pipelines owned and operated by Montana Power near Helena, Montana. Location: MT

Northern Natural Gas
Conducted, analyzed and performed close interval surveys on large diameter - high pressure – natural gas transmission pipelines owned and operated by Northern Natural Gas (NNG) in the Upper Peninsula of Michigan. Location: MI

Mountain Bell Telephone
Supervised, conducted, analyzed and performed the corrosion control and cathodic protection analysis of the Mountain Bell Telephone lead sheath cable running between Evanston and Cheyenne. Locations: WY

Coffeen Power Plant
Supervised, conducted, analyzed, designed and installed cathodic protection systems for the Coffeen Power Plant Facilities operated by the Central Illinois Light Company (CILCO). Location: IL

Technical Presentations, cont.

- NACE Wisconsin Section – Annual Short Course – 2013: Speaker and presentation on Cathodic Protection Design and Practical's and Casings: Design and Regulations
- NACE Wisconsin Section – 2012: Speaker and presentation on AC interference and Mitigation and a case example related to a 12-inch and 20-inch pipeline system.
- 51st. Annual Underground Corrosion Short Course: Speaker and presentation on AC issues on Pipelines presented under the System Integrity section, Purdue University, 2012
- 51st. Annual Underground Corrosion Short Course: Pipeline Casing Presentation, 2012
- 51st. Annual Underground Corrosion Short Course: Station Assessment Procedures, 2012
- EPRI/Southwest Research: June 2010, Copper Grounding Presentation
- China International Oil and Gas Pipeline Conference, Langfang, Hebel, China, November-2009: Safety and Operability Assessment Report and HAZOP Study Report (PetroChina),
- China International Oil and Gas Pipeline Conference, Langfang, Hebel, China, November-2009: ECDA Implementation Case Study – Pipeline Integrity and Corrosion Control Technology
- NACE International, March, 1991 – The Development and Conversion to an "On-line" Corrosion Control Records System Using a Burroughs Mainframe Computer, Corrosion 91, Paper Number 346, NACE International

LaGrange Hospital
Designed, analyzed and supervised the installation of galvanic anode systems designed to protect the interior water box of condenser/chiller units operated by the LaGrange Hospital. Location: IL

Union 76
Supervised, conducted and analyzed the cathodic protection systems installed on over 250 underground gasoline and waste oil storage tanks systems owned and operated by Union 76. Locations: IL, KY, IN

O'Hare Airport
Designed and supervised the installation of galvanic anode protection systems for aviation fuel pipelines related to jet-way expansions. Responsible for the cathodic protection assessment, design, and mitigation on jet-way expansions of the G & H terminals as well as field supervision on the United Airlines terminal 1 construction project. Locations: IL

City of Viburnum
Designed and supervised the installation of down-hole impressed current systems for the City of Viburnum including the protection of water well casing, column and bowls. Location: MO

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF JENNY HUDSON
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. Please state your name and business address.

A. My name is Jenny Hudson. My business address is 28100 Torch Parkway, Warrenville, Illinois, 60555.

Q. By whom are you employed and in what capacity?

A. I am employed as a Vice President-Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design, codes compliance, integrity and automation services for the oil and gas industry.

Q. Please describe your educational background and professional experience.

A. I hold a B.S. degree in Geological Engineering from the University of Missouri-Rolla. Additionally, I am a registered Professional Engineer in the State of Illinois as well as a registered NACE Cathodic Protection Technologist.

My professional experience consists of employment in the pipeline industry with EN Engineering and previously with Nicor Gas. While at Nicor Gas I had roles in the Storage Department as well as in the Corrosion Control Department. At EN Engineering, my responsibilities have been focused in the areas of pipeline integrity, codes compliance and corrosion control. Additionally, I am a member of several industry technical committees. My resume is included in Exhibit___JH-1.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. Please state the purpose of your testimony in this proceeding.

A. There are three main objectives of the Staff in this testimony. First, to ensure that the proposed changes to the Findings of Fact in the Decision, as identified by TransCanada Keystone Pipeline's (the Applicant) Tracking Table of Changes, comply with the Federal Pipeline Safety Regulations 49CFR 195, Transportation of Hazardous Liquids by Pipeline. Secondly, the objective is to ensure that the Applicant has met any new requirements imposed by the Federal Pipeline Safety Regulations 49CFR 195 since the Amended Final Decision and Order was issued on June 29, 2010 with respect to the application for a permit (Permit) to construct and operate a crude oil pipeline in South Dakota. Lastly, the objective is to ensure that the amended permit conditions, and any project changes, are still able to meet the conditions upon which the permit was issued, specifically focusing on pipeline design, integrity management and compliance with PHMSA regulations (49CFR 195).

This testimony deals specifically with changes to Federal Pipeline Safety Regulations 49CFR 195 since the Amended Final Decision and Order was issued and project changes specific to the area of Integrity Management (§195.452).

Q. Please describe any changes to federal pipeline safety regulations since the Amended Final Decision and Order was issued on June 29, 2010.

A. Since the proposed Keystone Pipeline is a hazardous liquid pipeline, I will describe any changes to Part 195 – Transportation of Hazardous Liquids by Pipeline.

As part of Amendment 195-94, which went into effect October 1, 2010, section 195.207 was added as a new section covering the transportation of pipe by railroad, ship or barge. This amendment also revised sections 195.3, 195.116, 195.264, 195.307, 195.401, 195.432, 195.452, 195.571, 195.573, and 195.588. Per the Federal Register notice, these amendments did not require pipeline operators to take on any significant new pipeline safety initiatives.

On January 1, 2011, changes to Part 195 went into effect as part of Amendment 195-95. These changes addressed the National Registry of Pipeline and LNG Operators and reporting requirements. As part of the changes, new section 195.64 was added, section 195.62 was removed, and updates were made to sections 195.48, 195.49, 195.52, 195.58 and 195.63. The intent of these changes was to enhance the Pipeline and Hazardous Materials Safety Administration's (PHMSA) ability to understand, measure and assess the performance of individual operators and the industry in its entirety, as well as to expand and simplify the electronic reporting required of operators.

As part of Amendments 195-96 and 195-96C, changes were made to apply safety regulations to rural low stress hazardous liquid pipelines that were not previously covered by safety regulations. Section 195.12 was rewritten to address these new requirements. Changes were also made to sections 195.1 and 195.48. These changes went into effect October 11, 2011 and were made in

order to comply with a mandate provided in the Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006.

Amendment 195-97 expedited certain implementation dates pertaining to the Control Room Management regulations contained in section 195.446. The rule went into effect August 15, 2011.

Amendment 195-98, which went into effect October 25, 2013, updated the administrative civil penalty maximums for violation of the safety standards and made technical corrections and updates to certain administrative procedures. This amendment made changes to section 195.402.

Amendment 195-99, which went into effect March 6, 2015, incorporated by reference new, updated or reaffirmed editions of applicable consensus standards subject to the regulations, and also made non-substantive editorial corrections clarifying code language in certain sections. This amendment added new section 195.207 addressing requirements for the transportation of pipe by truck. Additionally, changes to the following sections were made: 195.5, 195.406, 195.3, 195.106, 195.116, 195.118, 195.124, 195.132, 195.134, 195.205, 195.214, 195.222, 195.228, 195.264, 195.307, 195.405, 195.432, 195.444, 195.452, 195.565, 195.573, 195.579 and 195.587. Per the Federal Register notice, these amendments did not require pipeline operators to take on any significant new pipeline safety initiatives.

Of additional note is Amendment 195-93. This amendment added a new section to Part 195 addressing Control Room Management. While the effective date of this ruling was February 1, 2010, which was prior to the Amended Final Decision and Order being issued, the regulation did not require operators to have Control Room Management procedures developed until August 1, 2011. As a result, Control Room Management was not directly discussed during the prior proceedings.

Q. Numerous sections of code were referenced previously as being modified. Were these changes significant?

A. The majority of the changes were clarifications in code language, editorial corrections, modifications to the way industry standards are referenced in the regulation and incorporating by reference updated or reaffirmed versions of industry standards. As an example, prior to Amendment 195-99, section 195.132 used the term “API Standard 620”. After the amendment, section 195.132 read “API Std 620”. However, there were some changes that could be considered more substantive, which I will discuss below.

Changes to section 195.1, made as part of Amendment 195-96, provided for a complete rewrite of the section. This section identifies which pipelines are covered by Part 195. The primary impact was the inclusion of all rural onshore hazardous liquid low stress and certain gathering pipelines under the regulation.

Changes to 195.12, made as part of Amendment 195-96, address changes to the requirements for rural low stress pipelines.

Changes to 195.64, made as part of Amendment 195-95 added reporting requirements to operators as they relate to the National Registry of Pipeline and LNG Operators.

Changes to 195.207, as made by Amendment 195-94, added this section covering the transportation of pipe by railroad, ship or barge. Amendment 195-99 added requirements for the transportation of pipe by truck.

Changes to 195.432, made as part of Amendment 195-99 added significant detail to paragraph (b) regarding internal inspection interval of in-service breakout tanks.

Amendments 93 and 97 added requirements pertaining to Control Room Management.

Q. Please describe how the changes to Part 195, described previously, will have an effect on the proposed Keystone Pipeline?

A. As mentioned previously, the majority of the changes were not substantive in nature and as a result, have minimal impact on the requirements for the design, integrity management and implementation of Part 195 requirements, as they

relate to the proposed Keystone pipeline. However, there are some changes that will.

Since the Amended Final Decision and Order was issued on June 29, 2010, changes to 49 CFR Part 195 have required operators to develop and implement a Control Room Management Plan. Control Room Management requirements were not specifically addressed in the prior proceedings. The Control Room Management Regulations will be described in more detail by Mr. Chris Hughes.

Through use of the National Registry of Pipeline and LNG Operators, Keystone will be required to notify PHMSA no later than 60 days before construction on the pipeline begins. This is addressed in 195.64(c)(1)(ii).

Transportation of pipe will need to be per the mandates set forth in section 195.207.

Significant changes relative to rural low stress pipelines were made to the federal pipeline code; however, since the proposed Keystone pipeline is not a rural low stress rural line, those regulatory changes do not have an impact on this proceeding.

Changes related to breakout tanks were made to the federal pipeline code; however, Keystone has stated there will be no tank facilities constructed in South Dakota. As a result, there is no impact relevant to these proceedings.

Q. Keystone updated project specifications as they relate to Finding 50 in the Amended Final Decision and Order to state 19.9 miles of the proposed pipe in South Dakota have the potential to impact a High Consequence Area. Previously Keystone had stated a spill had the potential to impact 34.3 miles of HCA. Can you please describe the impact this change has?

A. As a result of the change, less pipe in the state of South Dakota will be subject to integrity management regulations (195.452) due to less pipe having the potential to impact a High Consequence Area in the event of a pipeline release.

Q. Does this change violate any requirements set forth in 49 CFR Part 195?

A. Presuming the revised HCA analysis was performed in accordance with Part 195, it does not.

Q. Does this change violate any mandates set forth in the original or amended permit conditions?

A. Presuming the revised HCA analysis was performed in accordance with Part 195, it does not.

Q. Do any of the other project changes identified in the Tracking Table of Changes provided by Keystone violate the mandates set forth in 49 CFR 195.452?

A. No they do not.

Q. As they relate to 49 CFR 195.452, do any other project changes identified in the Tracking Table of Changes provided by Keystone violate the mandates set forth in the original or the amended Permit Conditions?

A. No they do not.

Q. Does this conclude your testimony?

A. Yes.

Jenny Hudson, PE
Vice President – Integrity

Key Relevance
Integrity Management
Compliance and Best Practice Audits
Risk Assessment and Prioritization
MAOP / MOP Verification
Integrity Assessments

Job Title:
Vice President
Integrity

Years with EN Engineering: 13

Total Years of Experience: 15+

Primary Office Location:
Warrenville, IL

Education:

- B.S., Geological Engineering, University of Missouri, Rolla, Missouri, 1997

Professional Registration:

- IL

Overview: Ms. Hudson has over fifteen (15) years of pipeline integrity, codes compliance, and corrosion control experience with natural gas and hazardous liquid pipeline systems. Experience includes developing pipeline integrity procedures, participating in and providing assistance with jurisdictional audits, providing expert testimony, implementing External Corrosion Direct Assessment (ECDA) and Internal Corrosion Direct Assessment (ICDA) methodologies, developing Control Room Management plans and procedures and records verification.

Relevant Projects:

Southern Star Central Gas Pipeline – Integrity Management
Develop written integrity management plan procedures and supporting documentation to meet the requirements of Subpart O. Facilitate operator committee meetings to review, finalize and implement procedures within the organization. Develop and provide training to operator personnel on new plans and procedures.

Southern Star Central Gas Pipeline – Integrity Management
Facilitate operator preparation for PHMSA jurisdictional integrity management audit. Actively participate in jurisdictional audit as client representative.

Vectren Energy Delivery – Integrity Management
Develop and modify written integrity management plan procedures and supporting documentation. Facilitate operator committee meetings to review, finalize and implement procedures within the organization. Develop and provide training to operator personnel on modified and new processes and procedures.

Vectren Energy Delivery – Integrity Management
Provide support on pipeline integrity issues as well as External Corrosion Direct Assessment and Internal Corrosion Direct Assessment.

Southwest Gas – Integrity Management
Manage team and perform audit of integrity management program to identify code compliance and best practice issues. Review included manual and procedure review, personnel interviews and documentation review.

South Dakota Public Utilities Commission - Integrity Management
Provide expert testimony on integrity management issues related to hazardous liquid pipelines on two occasions.

United States Gypsum - Integrity Management
Manage and oversee integrity management program including HCA identification, threat analysis and integrity assessment. Actively participate in jurisdictional integrity management audit as client representative.

DTE/MichCon - Integrity Management
Perform jurisdictional review of integrity management program including code compliance and best practice recommendations. Make modifications to ECDA plan.

Professional Organizations & Affiliations:

- ASME B31.8 Corrosion / O&M Subgroup
- AGA Transmission Pipeline Operations
- AGA Corrosion Control

Publications & Patents:

- Co-Author of "Cathodic Protection of a Large-Diameter Distribution System: Corrosion Monitoring and Testing", American Water Works 2004 DSS Conference
- Co-Author of "New Distribution Regulations Promote Risk Analysis", American Public Gas Association, 2008
- Presentation for NACE Central Area Conference, 2008
- Presentation for Kentucky Gas Association, 2008
- Presentation for Illinois American Water Works Association, 2010
- Presentation for AGA Operations Conference, 2012

Professional Certifications:

- NACE – International Cathodic Protection Technologist (CP Level 3)

Relevant Projects (Cont'd):

Northern Natural Gas - Integrity Management
Facilitate mock integrity management audit. Evaluated oral responses as well as written documentation and provided feedback in order to help operator prepare for jurisdictional audit.

Aux Sable Liquids Products - Integrity Management
Oversee development of liquid integrity management plan.

Oklahoma Natural Gas - Integrity Management
Perform gap analysis of written integrity management plan. Furnish documented feedback on plan including recommended modifications.

NIPSCO – Integrity Management
Oversee modifications to Transmission Integrity Management Program. Facilitate mock audit and participate in state jurisdictional audit.

Tesoro – Pipeline Safety
Perform pipeline risk management, procedure and management practice audit. Audit included review of written plans, personnel interviews and review of documentation. Formal close-out presentation given to upper management.

NIPSCO – Pipeline Safety
Perform audit of pipeline safety programs, including evaluation of written procedures, personnel interviews and documentation review.

Confidential Client - Due Diligence
Perform data research and integrity evaluation for potential buyer of pipeline assets.

NIPSCO – System Risk and Prioritization
Provide technical support for rate recovery filing including review of methodology used to select projects to reduce system risk and independent review of project cost estimating methodologies. Interact with legal counsel and state jurisdictional agencies.

Vectren – System Risk and Prioritization
Provide technical support for rate recovery filing including review of methodology used to select projects to reduce system risk and independent review of project cost estimating methodologies.

American Gas Association (AGA) – Integrity Management
Organized a study of the potential impact of increased testing requirements on AGA member companies as well as industry as a whole. Analyzed cost, timelines, configuration, inspectability, resource availability, and other barriers. Utilized PHMSA Transmission Annual Report data further substantiated through detailed interviews with subset of AGA member companies.

Ameren – MAOP Verification
Oversee team performing records research, gap analysis and data evaluation related to MAOP verification.

Relevant Projects (Cont'd):

Pacific Gas and Electric - ASV/RCVs
Performed a review of the use of Automatic Shut-off Valves (ASV) and Remote Control Valves (RCV) including industry best practice, survey of natural gas transmission and distribution companies regarding their experiences with ASVs and RCVs, alternatives and merits of available technologies, pertinent industry literature and regulations. Identified individual valve segments within the transmission system and prioritized based on risk factors.

Southern Star Central Gas Pipeline - Training
Administer training related to corrosion control field testing.

Duke - Distribution Integrity Management
Oversee development of Distribution Integrity Management Plan.

Peoples Natural Gas - Distribution Integrity Management
Oversee development of Distribution Integrity Management Plan Procedures.

PECO – Distribution Integrity Management
Perform review of Distribution Integrity Management Program.

Southern Star Central Gas Pipeline - External Corrosion Direct Assessment Manage implementation of External Corrosion Direct Assessment methodology as well as review and analyze data. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.

Nicor Gas – ECDA / ICDA
Management and implementation of External Corrosion Direct Assessment and Internal Corrosion Direct Assessment projects. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.

Nicor Gas - ECDA
Perform direct examinations as part of ECDA process.

DTE/Michcon - ECDA / ICDA
Management and implementation of External Corrosion Direct Assessment and Internal Direct Assessment projects. Provide support for Long Range Ultrasonic Testing.

United States Gypsum - ECDA / ICDA
Manage External Corrosion Direct Assessment and Internal Corrosion Direct Assessment projects to meet federal mandates.

United States Gypsum - Pipeline Operations
Develop jurisdictional manuals including Integrity Management Plan, Operation and Maintenance, Emergency Response.

Dominion - Audit / Review
Participate on team reviewing various client station assets. Focus was on corrosion control codes compliance and best practice issues.

Relevant Projects (Cont'd):

United States Gypsum - Audit / Review
Participate on team reviewing various client pipeline assets. Focus was on corrosion control codes compliance and best practice issues.

Duke - Control Room Management
Oversee modifications to existing control room management plan.

Integrys - Control Room Management
Oversee development of control room management plans.

DTE/Michcon - Control Room Management
Oversee development of control room management plan.

Northern Natural Gas - AC Mitigation
Develop plan and procedures related to AC corrosion and AC mitigation.

Nicor Gas - Corrosion Control
Perform annual cathodic protection surveys. Obtain rectifier readings and bond readings.

Nicor Gas - Corrosion Control
Perform close-interval survey and direct current voltage gradient survey.

Du Page Water Commission - Corrosion Control
Develop and assist with corrosion control program. Activities include establish monitoring program, cathodic protection design, data review, data analysis and corrosion control consulting. Field testing for steel and PCCP water transmission mains including structure-to-electrolyte readings, AC readings, isolation flange testing, Panhandle Eastern Testing, stray current interference testing and close-interval survey.

Northwest Suburban Municipal Joint Action Water Agency - Corrosion Control Evaluation of cathodically-protected PCCP water transmission main. Testing included close-interval survey (on, instant off and depolarized), isolation flange testing and cathodic protection test point readings. Project also included analysis of data and recommendations.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF CHRISTOPHER HUGHES
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. Please state your name and business address.

A. My name is Christopher Hughes. My business address is 28100 Torch Parkway, Warrenville, Illinois, 60555.

Q. By whom are you employed and in what capacity?

A. I am employed as a Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design, codes compliance, integrity and automation services for the oil and gas industry.

Q. Please describe your educational background and professional experience.

A. I hold a M.S. degree in Welding Engineering from The Ohio State University in Columbus, Ohio. In addition, I hold a B.S. degree in Mathematics from the Ohio Dominican University in Columbus, Ohio.

My professional experience consists of employment in the pipeline industry with EN Engineering and previously with the U.S. Army, Columbia Gas, CC Technologies / DNV and Enterprise Products. My responsibilities in the Army included operation and management of storage facilities and the design and construction of temporary pipelines. At Columbia Gas my responsibilities included natural gas pipeline operations via SCADA, statistical and forecast analysis, and cost analysis. My responsibilities at CC Technologies / DNV included material testing, failure analysis, stress corrosion cracking analysis, pipeline repair research and presentation as well as report, plan and procedure writing. At Enterprise Products my responsibilities included integrity assessment type determination, Information Analysis, annual reporting, evaluate defects and recommend appropriate repairs and other implementation of the Integrity

Management Program for hazardous liquids. My responsibilities at EN Engineering have been focused in the areas of control room management and pipeline integrity.

My resume is included in Exhibit___CH-1.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. Please state the purpose of your testimony in this proceeding.

A. There are three main objectives of the Staff in this testimony. First, to ensure that the proposed changes to the Findings of Fact in the Decision, as identified by TransCanada Keystone Pipeline's (the Applicant) Tracking Table of Changes, comply with the Federal Pipeline Safety Regulations 49CFR 195, Transportation of Hazardous Liquids by Pipeline. Secondly, the objective is to ensure that the Applicant has met any new requirements imposed by the Federal Pipeline Safety Regulations 49CFR 195 since the Amended Final Decision and Order was issued on June 29, 2010 with respect to the application for a permit (Permit) to construct and operate a crude oil pipeline in South Dakota. Lastly, the objective is to ensure that the amended permit conditions, and any project changes, are still able to meet the conditions upon which the permit was issued, specifically focusing on pipeline design, integrity management and compliance with PHMSA regulations (49CFR 195).

This testimony deals specifically with changes to Federal Pipeline Safety Regulations 49CFR 195 since the Amended Final Decision and Order was issued in the area of Control Room Management (§195.446). Additionally, this testimony addresses updates made by Keystone in the Tracking Table of on two specific Findings of Fact.

Q. Control Room Management regulations went into effect February 1, 2010 which required operators to have a Control Room Management Plan and procedures developed by August 1, 2011. An additional Control Room Management / Human Factors rule effective August 15, 2011 required operators to implement the procedures for roles and responsibilities, shift change, change management, and operating experience, fatigue mitigation education and training by October 1, 2011 and the other procedures for adequate information, shift lengths, maximum hours-of service, and alarm management by August 1, 2012. Please describe the Control Room Management regulations.

A. The Control Room Management regulations prescribe safety requirements for controllers, control rooms, and SCADA systems used to remotely monitor and control pipeline operations. The regulations address human factors, engineering and management solutions for the purpose of enhancing the performance reliability of operator personnel that control pipeline operations. Each operator must have and follow written control room management procedures that implement the requirements of §195.446 including (a) roles and responsibilities of CRM staff, (b) implement API RP 1165, (c) point to point verification between

SCADA and field equipment, (d) testing of back-up systems, (e) personnel fatigue mitigation, (f) alarm management plan and procedures, (g) change management procedures, and (h) incorporation of operator experience and training.

Q. How do these regulations compare to requirements set forth in the DOS final SEIS, Appendix Z, which Keystone has stated they will comply with?

A. The requirements set forth in the DOS final SEIS, Appendix Z comply with these regulations.

Q. Have you reviewed a copy of the Keystone Control Room Management Plan or Alarm Management Plan?

A. No I did not. However, these plans are subject to review by the Pipeline and Hazardous Materials Safety Administration (PHMSA) during a jurisdictional audit.

Q. Keystone updated project specifications as they relate to Finding 18 in the Amended Final Decision and Order to utilize API 5L X70M high-strength steel. Previously Keystone was planning on utilizing API 5L X70 or X80 high strength steel. Does this change violate any requirements set forth in 49 CFR Part 195?

A. 49 CFR Part 195 requires pipe be manufactured per the requirements of API Standard 5L, 44th edition. The most current edition of the API standard uses the suffix M to indicate Thermomechanical Rolled or Formed pipe. Assuming the pipe is manufactured per the requirements of the 44th edition, this change does not violate 49 CFR Part 195.

Q. Does this change violate any mandates set forth in the original or amended permit conditions?

A. Assuming the pipe is manufactured per the requirements of the 44th edition, it does not.

Q. Keystone updated project specifications as they relate to Finding 20 in the Amended Final Decision and Order to include twenty (20) mainline valves in the state of South Dakota, all of which will be remotely controlled. Previously, the design included sixteen (16) mainline valves, seven (7) of which were to be remotely controlled. Please describe the differences, if any, these changes have on pipeline safety.

A. This decision enhances pipeline safety as the decision to have all valves remotely controlled decreases the time to close the valves in the event of a rupture and the increased number of valves reduces the potential spill volume.

Q. Does this change violate any requirements set forth in 49 CFR Part 195?

A. No.

Q. Does this change violate any mandates set forth in the original or amended permit conditions?

A. No.

Q. Does this conclude your testimony?

A. Yes.

Christopher Hughes
Senior Project Manager – Integrity

Key Relevance
Liquids Integrity Management
Control Room Management
Information Analysis
Integrity Assessments
Fitness for Service
MAOP/MOP Verification
Regulatory Compliance
Project Management

Job Title:
Senior Project Manager
Integrity

Years with EN Engineering: 3

Total Years of Experience: 25

Primary Office Location:
Warrenville, IL / Houston, TX

Education:

- MS, Welding Engineering
  The Ohio State University
- BS, Mathematics
  Ohio Dominican University

Professional Organizations & Affiliations:

- American Petroleum Institute
- American Society of Mechanical Engineers
- NACE

Overview: Mr. Hughes has twenty five (25) years of experience in engineering, management, operations, sales, and education. He has fourteen (14) years of experience in asset integrity and operations specific to the energy industry. Experienced in pipeline analysis, CRM, FFS, and RCA as well as regulatory compliance.

Relevant Projects:

Control Room Management
Project Manager
Implemented and managed multiple CRM projects involving plan audits, gap analysis, plan development and alarm rationalization for multiple natural gas distribution companies.

Integrity Management Program
Project Manager
Implemented and managed multiple IMP projects involving gap analysis, plan audits and procedure & plan development for multiple companies for both hazardous liquid and natural gas assets.

Fitness for Service
Project Manager, Engineer
Manage a multi-disciplinary approach to evaluate structural components to determine if they are fit for continued service due to flaws, damage or severe operating conditions at defined maximum operating pressures for natural gas and hazardous liquid pipelines.

MAOP / MOP Verifications
Project Manager
Implemented and managed a multi-million dollar MAOP/MOP Standardization projects involving multiple teams in multiple locations to document and ensure compliance of natural gas transmission systems and hazardous liquid pipelines. Performed due diligence of pipeline material, pump location and pressure testing records, performed calculations, and determined appropriate MOP / MAOP per 49 CFR 192 and 49 CFR 195.

Information Analysis
Project Manager, Engineer
Managed and performed comprehensive review of pipeline information regarding potential impact of release, HCAs, historical data, age, product type, pipeline characteristics, terrain, response times, coating and other available information to accurately recommend assessments, program reviews and revisions, remediation and other risk factors for both natural gas and hazardous liquid pipelines.

Regulatory Compliance
Project Manager, Engineer
Spearheaded multi-departmental diagnostic review of regulatory status of company assets and implementation of changes resulting in the most comprehensive regulatory status inventory to date. Coordinated and implemented PHMSA and API annual reports.
Review of regulatory status and physical properties of client onshore and offshore assets to provide third party opinions regarding jurisdiction and applicable assessments.

Relevant Projects (Cont'd):

Operating Procedure / Qualification
Project Manager
Procedure and OQ development and maturation including welding, operator qualification and liquids Integrity Management Program procedures.

Material Testing
Engineer
Supervised destructive testing of pipe and weld samples including physical and chemical analysis for various clients. Performed metallography of samples and provided full analysis of results and recommendations.

ECDA / ICDA
Project Manager
Management and implementation of External Corrosion and Internal Corrosion Direct Assessment projects for both natural gas and hazardous liquid operators.

Workshops
Engineer
Coordinated national association's training in Pipeline Repair facilitating all schedules and the acquisition of speakers / demonstrators and caterers ensuring a successful two day experience. Delivered presentations on pipeline repair methods.

National Manuals
Engineer
Part of team that developed the DOT Pipeline Repair Manual and TTO5 as well as a contributing author.

Acquisition Due Diligence
Engineer
Coordinated with Commercial Engineering departments to develop acquisition valuation of potential pipeline acquisitions. Performed document due diligence.

Stress Corrosion Cracking Analysis
Engineer
Analyzed the factors contributing to SCC found on line pipe, determining likely causes and areas of risk for hazardous liquid pipelines.

Previous Employment

Enterprise Products Partners - Houston, TX
Pipeline Integrity Engineer
Led pipeline integrity efforts and programs in pipeline risk management and analysis. Implemented and matured the written Integrity Management Programs, standards and procedures improving efficiency. Coordinated and implemented PHMSA and API annual reports helping improve industry knowledge and safety. Matured and strengthened the assessment method selection process improving assessment data quality.
Recommended preventive and mitigative measures; determined re-assessment interval and methods through informational analysis of pipelines while maintaining system safety and regulatory compliance. Provided Engineering support including welding calculations, material selection, sizing, test pressure, MOP/MAOP/Set Point calculations, evaluation of defects and recommend appropriate repairs improving overall pipeline safety. Provided input to new construction of pipelines and due diligence supporting Pipeline Integrity safety and regulation efforts.

DNV – Columbus (formerly CC Technologies) - Dublin, OH
Staff Engineer
Developed, managed, and implemented projects for oil and gas companies resulting in successful completion on time and within budget. Directed engineers to perform applicable testing / research providing clients with detailed analysis. Analyzed pipeline designs, noted areas of concern, and recommended changes maintaining regulatory compliance. Managed and organized national association's training in Pipeline Repair facilitating all schedules and the acquisition of speakers / demonstrators and caterers.
Tested physical and chemical properties of welds, materials, and coatings providing recommendations to clients. Employed Engineering Critical Assessment methods, calculated remaining life and fatigue, determined corrosion high-risk areas, proposed solutions, and verified code compliance improving compliance and safety of client pipelines.
Developed repair, material testing, and welding manuals and procedures used by the U.S. government and various pipeline companies. Delivered presentations on pipeline stress, corrosion, and repair to clients and students

Columbia Gas - Columbus, OH
Gas Controller
Calculated cost and benefit analyses of operating strategies optimizing profitability. Performed statistical, trend, and forecast analysis for pipeline operations ensuring safe delivery of sufficient supply. Coordinated pipeline flow via SCADA ensuring uninterrupted natural gas supply to commercial markets. Trained new Gas Controllers. Established and maintained SCADA alarms. Created CADD drawings for new SCADA system. Responsible for day to day operations of the Columbia Gas System.

U.S. Army & U.S Army Reserve
Petroleum Specialist / Combat Engineer
Managed facility personnel maintaining integrity of storage tanks and pipelines as section leader and squad leader. Analyzed and managed purchasing and inventory, ensuring combat ready supplies. Constructed and managed mobile pipelines to maintain fuel supplies in the field. Operated heavy machinery as part of construction, demolition of structures, earth movement and fuel transportation.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

SUPPLEMENTAL PREFILED TESTIMONY OF CHRISTOPHER HUGHES
ON BEHALF OF THE COMMISSION STAFF
AUGUST 3, 2015

Q. Keystone updated project specifications as they relate to Finding 63 in the Amended Final Decision and Order to operate at a maximum operating pressure of 1,307 psig with use of API 5L X70 high-strength steel which results in a 0.465 inch nominal wall thickness for a design factor of 0.72. Does this change violate any requirements set forth in 49 CFR 195?

A. Yes. § 195.106 of 49 CFR 195 requires the internal design pressure of the pipe to be determined in accordance with the formula where the Internal Pressure equals two times the yield strength of the pipe multiplied by the nominal wall thickness divided by the nominal outside diameter. This in turn is multiplied by the Seam Joint Factor and the Design Factor. Applying this formula and using the proposed nominal wall thickness of 0.465 inches results in a maximum operating pressure of 1,302 psig. In order to operate at 1,307 psig, the nominal wall thickness will need to be 0.467 inches.

$$Internal\ Pressure = \frac{2 * Yield\ Strength * Nominal\ \ WT}{Nominal\ OD} * Joint\ Seam\ Factor * Design\ Factor$$

$$Internal\ Pressure = \frac{2 * 70{,}000\ psig * 0.465\ in}{36\ in} * 1.00 * 0.72 = 1{,}302\ psig$$

$$Nominal\ WT = \frac{Internal\ Pressure * Nominal\ OD}{2 * Yield\ Strength * Joint\ Seam\ Factor * Design\ Factor}$$

$$Nominal\ WT = \frac{1{,}307\ psig * 36\ in}{2 * 70{,}000\ psig * 1.00 * 0.72}$$ = 0.46679 in = 0.467 in nominal

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF PAIGE OLSON
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. State your name.

A. Paige Olson.

Q. By who are you employed?

A. State of South Dakota.

Q. For what department or program do you work?

A. State Historic Preservation Office (SHPO)

Q. Please explain the program goals and your role and duties within SHPO.

A. The National Historic Preservation Act of 1966 is the foundation for the preservation work of the South Dakota State Historical Society (SDSHS). The State Historic Preservation Office (SHPO), a program under the SDSHS is charged to survey historic properties and maintain an inventory; identify and nominate properties to the National Register of Historic Places; advise and assist federal, state, and local government agencies in fulfilling their preservation responsibilities; provide education and technical assistance in historic preservation; develop local historic preservation programs, consult with federal and state agencies on their projects affecting historic properties; and advise and assist with rehabilitation projects involving federal assistance. My specific role is to monitor federally funded, licensed or permitted projects and to ensure historic properties are taken into consideration. I provide technical analyses, reviews and assistance to government agencies to ensure compliance with state and federal guidelines. I serve as the lead over the review and compliance function of SHPO.

From Class Specifications

Functions: (These are examples only; any one position may not include all of the listed examples nor do the listed examples include all functions which may be found in positions of this class.)

1. Reviews construction work plans for federally funded projects to determine if they are in compliance with state and federal preservation laws.

a. Assesses impact of the project on historic properties and ensures those properties are given due consideration during the planning and implementation of projects.

b. Concurs or disagrees with determinations of eligibility for historic properties and the effect of proposed project on those properties within legally mandated timelines.

c. Reviews archaeological survey reports and documentation submitted by principal investigators and Senior Archaeologists to determine if proper methodology and standards established by state and federal government are met.

d. Works with agency officials to determine appropriate mitigation techniques when resources cannot be avoided.

e. Negotiates with and assists agencies in developing legal agreements to mitigate effects to historic properties and agreements to provide for alternative review and compliance procedures.

2. Provides technical assistance to government officials, contractors, lending institutions and agencies, and the general public to help them understand federal and state laws and to suggest compliance requirements

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a. Reviews survey reports developed for construction projects to determine if findings are in compliance with appropriate federal and state rules and regulations.

b. Monitors additions, deletions, or changes in interpretation of federal rules and regulations.

c. Writes and recommends guidelines for government agencies or federal fund recipients.

d. Compiles and analyzes data from a variety of sources to determine if agencies are having difficulty complying with requirements.

e. Maintains a record of all determinations about construction projects to be used as the basis of reports and future federal funding requests.

3. Prepares and writes comprehensive plans to manage cultural resources in South Dakota and establish guidelines to ensure that cultural resources are identified and protected.

a. Determines eligibility of archaeological sites and makes recommendations for their inclusion in the National Register of Historic Places and contributes research to a statewide comprehensive historic preservation plan.

b. Responds to requests from property owners, government agencies, and others to provide technical information about significance of sites.

4. Develops effective public information programs to inform South Dakota citizens about archaeology, pre-history, and the need to preserve South Dakota's cultural heritage.

a. Develops and manages public education programs to inform amateur archaeology groups, students, and the general public.

b. Designs and develops educational handouts, brochures and presentations.

c. Manages and participates in archaeological excavation projects to maintain a working knowledge of South Dakota pre-history and to mitigate the impact of development on significant sites.

5. Oversees the maintenance of a computerized system that tracks information relating to archaeological sites in order to provide an accurate and effective data base for research projects.

6. Provides work direction and training for review and compliance program staff to ensure projects are reviewed in an accurate, consistent and timely manner.

a. Establishes program priorities.

b. Assigns and reviews work.

c. Sets goals and recommends changes in work plans.

d. Develops office procedures.

e. Recommends the hiring of new staff.

f. Makes budget recommendations.

7. Performs other work as assigned.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission

Q. Were you involved in the Keystone XL permitting docket, HP09-001?

A. Yes.

Q. State and explain the South Dakota laws and federal regulations that protect archaeological and historic resources in this state.

A. Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their project on historic properties. The federal regulations 36 CFR part 800 – Protection of Historic Properties explain how federal agencies take into consideration historic properties. In general, Section 106 is a four step process.

Step 1: Initiate Section 106 Process – the federal agency establishes if it has a federal undertaking. (A federal undertaking in general is any project, activity, or program funded, permitted or licensed by a federal agency. This also includes federal approval.) The agency determines if the federal undertaking has the potential to affect historic properties. (Historic properties are prehistoric or historic district, site building, structure, or object listed on the National Register of Historic Places or eligible for listing on the National Register. This term includes properties of religious and cultural significance to Indian tribes.) If the federal undertaking does not have the potential to affect historic properties the agency is done. If the agency determines the undertaking does have the potential to affect historic properties they go to step 2.

Step 2: Identify Historic Properties – the federal agency identifies historic properties within the project area or area of potential effect (APE). If after conducting the appropriate level of research the agency determines that no historic properties are located within the APE, the agency documents their

findings and exits the process. If however, historic properties are identified the agency moves to the next step.

Step 3: Assess Adverse Effect – if historic properties are identified in the APE, the federal agency determines how the project will impact the identified properties. If the project can be modified or conditions are imposed as to minimize the impact of the project on historic properties the federal agency may determine the project will have a “No Adverse Effect”. If this is the case, the agency consults with the consulting parties, documents their decision, and exits the process. However, if the agency determines the project will have an “Adverse Effect” on historic properties the agency moves to the final step.

Step 4: Resolution of Adverse Effect – the federal agency, in consultation with other consulting parties, develops a memorandum of agree to mitigate the adverse effects.

Throughout this process the federal agency should be consulting with various parties as described in the regulations.

South Dakota Codified Law 1-19A-11.1Preservation of historic property – Procedures. The state or any political subdivision of the state may not undertake any project which will encroach upon, damage or destroy any property included in the State or National Register of Historic Places.

However, in this case the National Historic Preservation Act supersedes SDCL 1-19A-11.1. The U.S. Department of State will be issuing a permit to TransCanada for the Keystone XL project. The U.S. Department of State is required to comply with Section 106 of the National Historic Preservation Act.

Q. Did you file prefiled testimony in HP09-001?

A. Yes. (Exhibit____PO-1)

Q. Did you also provide testimony at the evidentiary hearing in HP09-001?

A. Yes.

Q. Have you thoroughly reviewed all of the information filed in HP14-001?

A. Yes.

Q. Have you reviewed the Final Supplemental Environmental Impact Statement for the Keystone XL project?

A. I have reviewed the cultural resource sections of the FSEIS.

Q. Has Keystone XL, to the best of your knowledge, complied with the state and federal rules and regulations you described previously?

A. To the best of my knowledge Keystone XL is in the process of complying with Section 106 of the National Historic Preservation Act through the programmatic agreement.

Q. Has your opinion on the Keystone XL project changed?

A. No.

Q. Are there any conditions in the Amended Final Decision and Order, dated June 29, 2010, that you believe, at this time, that Keystone XL cannot continue to meet?

A. SHPO would like to ensure that proper monitoring measures are in place for the four proposed horizontal directional drilling (HDD) locations known as the Bad River HDD, Cheyenne River HDD, Little Missouri River HDD and the White River HDD. As part of consultation under Section 106 of the National Historic Preservation Act, SHPO recommended that geomorphological/ geoarchaeological monitoring of the four HDD installations be conducted. These recommendations were not included in Attachment F "Historic Trail and Archaeological Monitoring Plan" of the Programmatic Agreement. It is unclear if Keystone XL intends to follow these recommendations which will ensure that if deeply buried cultural deposits are present they can be taken into consideration. SHPO recommends including these areas in the plan entitled "Keystone XL Pipeline Project, Historic Trail and Archaeological Monitoring Plan" to be monitored by a qualified geomorphologist/ geoarchaeologist.

SHPO would like to ensure that Keystone XL is aware of our continued concerns about the construction of electrical distribution/transmission facilities and the potential impacts to the Slim Buttes area.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF PAIGE HOSKINSON OLSON
ON BEHALF OF THE COMMISSION STAFF
SEPTEMBER 2009

BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA

PREFILED TESTIMONY OF PAIGE HOSKINSON OLSON

Q. State your name.

A. Paige Hoskinson Olson

Q. State your employer.

A. State of South Dakota, Tourism and State Development, State Historical Society

Q. State the program for which you work.

A. State Historic Preservation Office (SHPO)

Q. State the program goals and your specific role in the department.

A. The National Historic Preservation Act of 1966 is the foundation for the preservation work of the South Dakota State Historical Society (SDSHS). The State Historic Preservation Office (SHPO), a program under the SDSHS is charged to survey historic properties and maintain an inventory; identify and nominate properties to the National Register of Historic Places; advise and assist federal, state, and local government agencies in fulfilling their preservation responsibilities; provide education and technical assistance in historic preservation; develop local historic preservation programs; consult with federal and state agencies on their projects affecting historic properties; and advise and assist with rehabilitation projects involving federal assistance. My specific role is to monitor federally funded, licensed or permitted projects and to ensure historic properties are taken into consideration. I provide technical analyses, reviews and assistance to government agencies to ensure compliance with state and federal guidelines. I serve as the lead over the review and compliance function of SHPO.

Q. Explain the range of duties you perform.

A. From Class Specifications

Functions:

(These are examples only; any one position may not include all of the listed examples nor do the listed examples include all functions which may be found in positions of this class.)

1. Reviews construction work plans for federally funded projects to determine if they are in compliance with state and federal preservation laws.

a. Assesses impact of the project on historic properties and ensures those properties are given due consideration during the planning and implementation of projects.

b. Concurs or disagrees with determinations of eligibility for historic properties and the effect of proposed project on those properties within legally mandated timelines.

c. Reviews archaeological survey reports and documentation submitted by principal investigators and Senior Archaeologists to determine if proper methodology and standards established by state and federal government are met.

d. Works with agency officials to determine appropriate mitigation techniques when resources cannot be avoided.

e. Negotiates with and assists agencies in developing legal agreements to mitigate effects to historic properties and agreements to provide for alternative review and compliance procedures.

2. Provides technical assistance to government officials, contractors, lending institutions and agencies, and the general public to help them understand federal and state laws and to suggest compliance requirements.

a. Reviews survey reports developed for construction projects to determine if findings are in compliance with appropriate federal and state rules and regulations.

b. Monitors additions, deletions, or changes in interpretation of federal rules and regulations.

c. Writes and recommends guidelines for government agencies or federal fund recipients.

d. Compiles and analyzes data from a variety of sources to determine if agencies are having difficulty complying with requirements.

e. Maintains a record of all determinations about construction projects to be used as the basis of reports and future federal funding requests.

3. Prepares and writes comprehensive plans to manage cultural resources in South Dakota and establish guidelines to ensure that cultural resources are identified and protected.

a. Determines eligibility of archaeological sites and makes recommendations for their inclusion in the National Register of Historic Places and contributes research to a statewide comprehensive historic preservation plan.

b. Responds to requests from property owners, government agencies, and others to provide technical information about significance of sites.

4. Develops effective public information programs to inform South Dakota citizens about archaeology, pre-history, and the need to preserve South Dakota's cultural heritage.

a. Develops and manages public education programs to inform amateur archaeology groups, students, and the general public.

b. Designs and develops educational handouts, brochures and presentations.

c. Manages and participates in archaeological excavation projects to maintain a working knowledge of South Dakota pre-history and to mitigate the impact of development on significant sites.

5. Oversees the maintenance of a computerized system that tracks information relating to archaeological sites in order to provide an accurate and effective data base for research projects.

6. Provides work direction and training for review and compliance program staff to ensure projects are reviewed in an accurate, consistent and timely manner.

a. Establishes program priorities.

b. Assigns and reviews work.

c. Sets goals and recommends changes in work plans.

d. Develops office procedures.

e. Recommends the hiring of new staff.

f. Makes budget recommendations.

7. Performs other work as assigned.

Decision-making Authority:

Decisions include interpreting state and federal preservation laws, amount and type of guidance provided to state and federal agencies, whether to concur or not concur with an agency's determination of National Register eligibility for identified properties, and whether to concur or not concur with determination of the project's effect on historic properties, establishment of work priorities, goals and work plans for program staff; and content of handouts, brochures and presentations.

Decisions referred include final approval of Memoranda and Programmatic agreements; final content of presentation materials; budgetary recommendations and approval; and new staff hires.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. State and Explain the South Dakota laws or Federal regulations that protect archaeological and historic resources in this state.

A. Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their project on historic properties. The federal regulations 36 CFR part 800 – Protection of Historic Properties explain how federal agencies take into consideration historic properties. In general, Section 106 is a four step process.

Step 1: Initiate Section 106 Process – the federal agency establishes if it has a federal undertaking. (A federal undertaking in general is any project, activity, or program funded, permitted or licensed by a federal agency. This also includes federal approval.) The agency determines if the federal undertaking has the potential to affect historic properties. (Historic properties are any prehistoric or historic district, site building, structure, or object listed on the National Register of Historic Places or eligible for listing on the National Register. This term includes properties of traditional religious and cultural importance to Indian tribes.) If the federal undertaking does not have the potential to affect historic properties the agency is done. If the agency determines the undertaking does have the potential to affect historic properties they go to step 2.

Step 2: Identify Historic Properties – the federal agency identifies historic properties within the project area or area of potential effects (APE). If after conducting the appropriate level of research the agency determines that no historic properties are located within the APE, the agency documents their findings and exits the process. If however, historic properties are identified the agency moves to the next step.

Step 3: Assess Adverse Effect – if historic properties are identified in the APE, the federal agency determines how the project will impact the identified

properties. If the project can be modified or conditions are imposed as to minimize the impact of the project on historic properties the federal agency may determine the project will have a "No Adverse Effect." If this is the case, the agency consults with the consulting parties, documents their decision, and exits the process. However, if the agency determines the project will have an "Adverse Effect" on historic properties the agency moves to the final step.

Step 4: Resolution of Adverse Effect – the federal agency, in consultation with other consulting parties, develops a memorandum of agree to mitigate the adverse effects.

Throughout this process the federal agency should be consulting with various parties as described in the regulations.

South Dakota Codified Law 1-19A-11.1 Preservation of historic property – Procedures. The state or any political subdivision of the state may not undertake any project which will encroach upon, damage or destroy any property included in the State or National Register of Historic Places until the Office of History has been given notice and an opportunity to investigate and comment on the proposed project.

However, in this case the National Historic Preservation Act supersedes SDCL 1-19A-11.1. The U.S. Department of State will be issuing a permit to TransCanada for the Keystone XL project. The U.S. Department of State is required to comply with Section 106 of the National Historic Preservation Act.

Q. Has Keystone XL, to the extent you are involved and know, complied with the process?

A. To the best of my knowledge the U.S. Department of State is in the process of complying with Section 106 of the National Historic Preservation Act.

Q. Are there any archaeological and or historically sensitive areas crossed by the Keystone XL pipeline?

A. The U.S. Department of State is in the process of determining if any archaeological and or historically sensitive areas will be impacted by the Keystone XL Pipeline. On July 7, 2009, we received a letter from Ms. Elizabeth Orlando, U.S. Department of State, and the report entitled "Level III Cultural Resource Survey for the Steele City Segment in South Dakota of the Keystone XL Project, Butte, Haakon, Harding, Jones, Lyman, Meade, Perkins, and Tripp Counties, South Dakota," prepared by SWCA Environmental Consultants. The report details the results of the archaeological survey for portions of the proposed centerline. However, there is a discrepancy between Ms. Orlando's letter and the survey report regarding the amount of survey conducted. The report indicates that 9 new sites were located during the current survey efforts and one known site was revisited. See below. The report does not include the identification of places of religious and cultural significance, or the identification of deeply buried archaeological deposits. To date, sites 39BU0039, 39HK0138, 39JN0051, 39LM0519 and 39PE0400 are located within the APE and will be affected by construction.

Q. Please briefly summarize each.

A. Ten archaeology sites and 15 isolated finds were identified during this portion of the survey. Isolated finds by definition are not eligible for listing on the National Register of Historic Places and are not taken into consideration. The ten archaeological sites are as follows:

39PE0400 – undated rock alignment

39MD0823 – prehistoric lithic scatter

39MD0824 – historic artifact scatter

39JN0051 – historic farm/ranch

39JN0052 – historic trash dump

39LM0518 – historic trash scatter

39TP0058 – historic artifact scatter

39BU0039 – prehistoric stone circle

39HK0138 – historic homestead

39LM0519 – historic burial place

We concurred with the U.S. Department of States findings for the following sites: 39MD0823, 39MD0824, 39JN0052, 39LM0518, and 39TP0058 should be considered not eligible for listing on the National Register of Historic Places, and therefore, do not need to be taken into consideration.

39JN0051 and 39LM0519 should be considered eligible for listing on the National Register of Historic Places, and therefore, need to be taken into consideration. 39LM0519 is a burial and should be avoided regardless of its eligibility.

39BU0039 and 39HK0138 should be considered unevaluated for listing on the National Register of Historic Places. These sites should be formally evaluated for listing.

39PE0400 was recommended as not eligible, but we disagreed with this assessment and requested additional information about this site.

Site 39BU0039, 39HK0138, 39JN0051, 39LM0519 and 39PE0400 are located within the APE and will be affected.

Q. Can the Applicant mitigate the risks associated with crossing those sensitive areas?

A. Because the identification efforts are not complete this has not been determined.

Q. If so, please explain.

A. The U.S. Department of State intends to conduct "phased identification and evaluation." A programmatic agreement will be developed to facilitate compliance with Section 106 of the National Historic Preservation Act. The agreement should establish mitigation measure to ensure the above sites and any new sites located within the APE are taken into consideration.

Q. Please provide any additional information that may be helpful or necessary for us to investigate further.

A. During an informal meeting with the consultants for TransCanada, but prior to establishment of the federal action, we discussed having an archaeologist monitor the open trench for deeply buried deposits during construction. We have since recommended that a geomorphologic study be conducted to identify areas with the potential for deeply buried archaeological deposits. We further recommended those areas be tested prior to construction, so if deposits are located, they can be taken into consideration as part of the identification process. We have received no response to our recommendations from the U.S. Department of State.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF DARREN KEARNEY
ON BEHALF OF THE COMMISSION STAFF
APRIL 2, 2015

Q. State your name.

A. Darren Kearney.

Q. State your employer and business address.

A. South Dakota Public Utilities Commission, 500 E Capitol Ave, Pierre, SD, 57501.

Q. State your position with the South Dakota Public Utilities Commission.

A. I am a Staff Analyst, which is also often referred to as a Utility Analyst.

Q. What is your educational background?

A. I hold a Bachelor's of Science degree, majoring in Biology, from the University of Minnesota. I am also in the process of getting a Masters of Business Administration degree from the University of South Dakota and I expect to be awarded that degree in May of 2015.

Q. Please provide a brief explanation of your work experience.

A. I began my career in the utility industry working as contract biologist for Xcel Energy, where I conducted biological studies around various power plants, performed statistical analysis on the data collected, and authored reports in order to meet National Pollutant Discharge Elimination System (NPDES) permit requirements.

After two years of performing biological studies, I then transitioned into an environmental compliance function at Xcel Energy as a full time employee of the company and became responsible for ensuring Xcel's facilities maintained compliance with the Oil Pollution Act of 1990. This involved writing Spill Prevention Control and Countermeasure (SPCC) plans and also ensuring Xcel facilities maintained compliance with those plans. During this time I was also responsible for the company's Environmental Incident Response Program, which involved training Xcel employees on

spill reporting and response, managing spill cleanups, and mobilizing in-house and contract spill response resources. I was also responsible for aboveground storage tank permitting during this time.

I was in that role for approximately three years and then I transitioned to a coal-fired power plant at Xcel and became responsible for environmental permitting and compliance for the plant. Briefly, my responsibilities involved ensuring that the facility complied with all environmental permits at the plant, which included a Clean Air Act Title V Air Permit, a Clean Water Act NPDES permit, and a hazardous waste permit. I also submitted reports on the plant's operations to various agencies as required by permit or law. After three years at the power plant, I left Xcel Energy to work for the South Dakota Public Utilities Commission (SD PUC).

I have been at the SD PUC for just over two years now. During this time I worked on a variety of matters in the telecom, natural gas, and electric industries. The major dockets that I worked on were transmission siting dockets, pipeline siting dockets, and energy efficiency dockets. I also attended a number of trainings on public utility policy issues, electric grid operations, regional transmission planning, electric wholesale markets, and utility ratemaking.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission.

Q. Were you involved in the Keystone XL permitting docket, HP09-001?

A. No.

Q. Did you file prefiled testimony in HP09-001?

A. No. However, I adopt the testimony of Staff witness Tim Binder in docket HP09-001. (Exhibit___(DK-1))

Q. Did you provide testimony at the evidentiary hearing in HP09-001?

A. No.

Q. Have you thoroughly reviewed all of the information filed in HP14-001?

A. Yes. I also reviewed the following: relevant sections of the Department of State's Final Supplemental Environmental Impact Statement; relevant background information included in docket HP09-001; South Dakota Codified Laws and Rules applicable to the Petition; and discovery requests and responses of all parties.

Q. Were other Staff involved in the review of this petition?

A. Yes. Other Staff members involved in the review consisted of Brian Rounds (Staff Analyst) and Mary Zanter (Pipeline Safety Inspector).

Q. Explain, in your words, the role of the SDPUC Staff in the Petition proceedings.

A. After initial review of the filing, Staff identified the findings of fact changes provided by Keystone XL in Exhibit C of the petition that Staff believed could impact the opinions of Staff's expert witnesses that were provided in docket HP09-001. Staff then procured consultants, making a good-faith effort to utilize the same witnesses or consultants used in docket HP09-001, to review the changes identified by Keystone XL and determine the following: 1) if the changes identified in Exhibit C resulted in a change to the professional opinion provided by Staff's witnesses in HP09-001, 2) if the changes identified in Exhibit C comply with the rules and regulations that the witnesses are subject matter experts of, and 3) whether any other Keystone XL project changes or

information in the witnesses' possession resulted in a change to their professional opinion.

In regards to processing the Petition by the Commission, Staff made great efforts to educate interveners on the process. Specifically, Staff responded to calls and emails from interveners with questions on a number of matters, including: the role of an intervener, the procedural schedule, the proper form of discovery, what laws and rules are applicable to the proceeding, and other miscellaneous information requests.

Staff was also active in discovery, where Staff submitted interrogatories to Keystone XL and responded to interrogatories submitted to Staff by Keystone XL and other interveners. Upon closure of discovery, Staff reviewed all interrogatories and responses communicated between all parties in order to understand the issues that could potentially be contested during the proceeding.

Q. What did Staff focus on during its review of the Petition?

A. In accordance with the Commission's order in this docket to limit the scope of discovery only to issues relevant to whether the proposed Keystone XL Pipeline continues to meet the fifty permit conditions set forth in Exhibit A of the June 29, 2010, Amended Final Decision and Order and the changes identified by Keystone XL in Exhibit C, Staff focused its review on the fifty permit conditions and Exhibit C changes. Moreover, Staff's experts focused their review on the project changes identified in Exhibit C that fell within their areas of expertise.

Q. How many parties were granted party status?

A. The commission granted party status to forty-two parties. All individuals who filed for party status were granted party status, however it is Staff's recollection that

during the hearing it was clarified that Jane Kleeb and Benjamin D. Gotschall had both filed for party status on behalf of Bold Nebraska. Therefore, their applications for party status were combined and the Commission approved one application of party status for the Bold Nebraska organization.

Q. How many parties withdrew as interveners?

A. As of the date of writing this testimony, two interveners requested withdrawal of their party status and the Commission so approved. These interveners were the South Dakota Wildlife Federation and the Sierra Club.

Q. Did Staff review the road repair indemnity bond amount required in the Amended Final Decision and Order issued on June 29, 2010? If so, should the amount change?

A. Yes. In condition 23, subpart f, of the HP09-001 Amended Final and Decision and Order, the Commission identified that "Keystone shall obtain and file for approval by the Commission prior to construction in such year a bond in the amount of $15.6 million for the year in which construction is to commence and a second bond in the amount of $15.6 million for the ensuing year, including any additional period until construction and repair has been completed…" This bond amount was set based on Staff witness Tim Binder's recommendation and was calculated as being ten percent of the estimated construction cost in South Dakota of $312 million and spread over two years.

According to revised finding of fact No. 23 in Exhibit C of the Petition, Keystone XL identifies that the total estimated project cost in South Dakota increased from $921.4 million to $1.974 billion in South Dakota. Keystone XL states that the project cost increased due to new technical requirements, inflation, and additional costs associated

with increased project management, regulatory, material storage, and material preservation that resulted from the six year delay in starting construction. Staff believes that not all of the project cost increases identified by Keystone XL would directly impact that estimated construction cost in South Dakota. Staff does believe, however, that inflation would have a direct impact on construction costs. Therefore, Staff recommends the Commission increase the bond amount to account for inflation.

In order to determine the appropriate bond amount as a result of the six year delay in starting construction, Staff used the 2009 estimated South Dakota construction cost of $312 million and escalated the cost to the year 2015 using a 2.5% inflation rate. This resulted in an estimated construction cost of $361.8 million for year 2015. Using the same method established in docket HP09-001 to calculate the appropriate bond amount, Staff determined that the bond should be set at $18 million for two years. Therefore, Staff recommends the Commission increase the bond amount identified in finding of fact No. 88 and condition No. 23 in the Amended Final Decision and Order from $15.6 million to $18 million. Should Keystone XL not agree with Staff's methodology used for updating the bond amount, then Staff proposes that Keystone XL should provide its most current estimate of South Dakota construction costs and then recommend a bond amount in accordance with the methodology used in docket HP09-001 in order to maintain consistency between the two dockets.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF TIM BINDER
ON BEHALF OF THE COMMISSION STAFF
SEPTEMBER 2009

BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA

PREFILED TESTIMONY OF TIM BINDER

Q. State your name.

A. Tim Binder.

Q. State your employer and business address.

A. South Dakota Public Utilities Commission, 500 E Capitol Ave, Pierre, SD.

Q. State you position with the South Dakota Public Utilities Commission (SDPUC)

A. I am a Staff Analyst.

Q. What is your educational background?

A. I hold a Bachelor's degree in Political Sciences from the University of South Dakota of Vermillion, SD.

Q. When did TransCanada file the siting application for the Keystone XL pipeline?

A. The South Dakota Public Utilities Commission received the application on March 13, 2009.

Q. Did you review the TransCanada Keystone XL siting application?

A. Yes, along with the company's prefiled testimony, exhibits and data responses.

Q. Were other SDPUC Staff involved in the review of this application?

A. Yes, a variety of Staff, each with a different background are "assigned" to each docket the SDPUC considers. In this case, Staff members directly assigned to this application are:

(i) Nathan Solem, an engineer and a pipeline safety inspector;

(ii) Stacy Splittstoesser, an engineer and a pipeline safety inspector, with previous experience in the South Dakota Department of Environment and Natural Resources, and;

(iii) Bob Knadle, a staff analyst with an economics background.

Q. Was the application considered complete at the time of filing?

A. Generally, the application was complete. There were several areas, however, that both commission Staff and Staff subject matter experts believed needed additional detail or otherwise were not in strict compliance with the rules or statutes. Attached as Exhibit A are relevant portions of Staff's first two data requests along with applicant's answers. Staff believes this information, along with data request information provided later by expert subject matter witnesses completes the application.

Q. Explain, in your words, the role of the SDPUC Staff in siting permit applications.

A. It is our, Staff's, role to ensure that all applicable statutes and administrative rules are addressed. We study the application in order to determine whether the proposed project, in this case the pipeline, presents any overly burdensome threat of harm or impact to South Dakota's resources and citizens. Pipelines, just like cars, airplanes and boats are legal to operate in South Dakota, despite the inherent dangers associated with each. Staff further seeks to determine whether the planned construction, operation and maintenance of this pipeline present any undue or uncharacteristic dangers in comparison to other pipelines of similar type. With that in mind, Staff received the approval of the Commission to engage several independent experts to help identify potential mitigative measures which will lessen any dangers or potential damages presented by this application if the project is approved by the Commission.

Q. Please explain the burden of proof of applicants involved in siting applications of this nature.

A. South Dakota Codified Law 49-41-22 lays out four specific burdens for the applicant. Staff reads these burdens as follows:

(1) The proposed facility will comply with all applicable laws and rules;

(2) The facility will not pose *an unacceptable* threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;

(3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and

(4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

Q. Staff has inserted "unacceptable" into burden two (2) above, why?

A. As the SD Supreme Court recognized in *The Matter of Otter Tail Power Company on Behalf of Big Stone II for an Energy Conversion Facility Permit for the Construction of the Big Stone II Project* (attached as Exhibit B), nothing in SDCL Chapter 49-41B restricts the PUC as to require it to prohibit facilities posing any threat of injury to the environment. Such a standard could potentially eliminate all siting projects in South Dakota. Rather, it is a question of the *acceptability* of a possible threat. As previously stated, Staff engaged several independent experts to help identify any potentially unacceptable threats. The experts also identified potential mitigative measures to lessen any threat.

Q. Does Staff have any recommendations regarding an appropriate indemnity bond for damages according to SDCL 49-41B-38?

A. Yes. Staff reviewed the statute, prior commission action and all information submitted by the applicant (See Exhibit A) regarding the proper bond amount. Based on Staff's review, we find the applicant's recommendation of a $15,600,000 indemnity for 2011 and a second indemnity bond in the same amount for 2012 to be appropriate.

Q. How many parties submitted a request to intervene?

A. 15 parties requested intervention.

Mary Jasper (Jasper)

Paul F. Seamans (Seamans)

Darrell Iversen (D. Iversen)

The City of Colome (Colome)

Glen Iversen (G. Iversen)

Jacqueline Limpert (Limpert)

John H. Harter (Harter)

Zona Vig (Vig)

Tripp County Water User District (TCWUD)

Dakota Rural Action (DRA)

David Niemi (David Niemi)

Debra Niemi (Debra Niemi)

Lon Lyman (Lyman)

Ruth M. Iversen (Iversen)

Martin R. Lueck (Lueck)

Q. Were all those parties granted intervener status?

A. Yes, all parties requesting intervention status were granted party status to this proceeding.

Q. Did Staff communicate with the interveners? If so, how?

A. Yes, Staff's first discovery request sent on June 12, 2009, to interveners included a cover letter outlining the procedural schedule as approved by the Commission on June 9th, as well as a brief description of the intervention process. The correspondence is attached as Exhibit C. It was Staff's hope that interveners would come forward with

concerns that could be vetted by the independent experts, referenced below, as well as through the process of further discovery.

Q. Did Staff receive any responses or objections from interveners regarding Staff's discovery request?

A. No, with the exception of Dakota Rural Action, Staff did not receive discovery responses or objections from interveners. Staff asked that initial responses be submitted by July 13, 2009, and with the exception of Dakota Rural Action, Staff received no substantive replies to our discovery request.

Q. Did Staff receive *any* communication from interveners, other than Dakota Rural Action, regarding the pre-hearing process? (pre-filed testimony, discovery, etc.)

A. Yes, one intervener, Debra Niemi, responded to Staff's June 12, 2009, communication on August 24, 2009. Staff assisted Ms. Niemi and her brother in filing testimony.

Q. Has Staff received any other communications from any of the intervening parties other than Dakota Rural Action or Ms. Niemi?

A. No, as of the filing date of this testimony, September 25, 2009, Staff has not received any communications, replies or responses from any of the other interveners.

South Dakota Public Utilities Commission
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Response to Staff's First Data Request

May 1, 2009
Page 1 of 1

1-1

Data Request:

Provide a description of the present US demand for crude oil per 20:10:22:10.

Response:

U.S. crude oil demand, as represented by U.S. crude oil refinery inputs, averaged about 14.5 million barrels per day (bpd) for the week ending April 17, 2009, up 529 thousand bpd from the previous week's average. Net U.S. imports of crude oil averaged nearly 9.9 million bpd during that same period, up 464 thousand bpd. (EIA Weekly Petroleum Status Report, week ended April 17, 2009 **DOE/EIA-0208(2009-16)**).

Response prepared by: Robert Jones

South Dakota Public Utilities Commission
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1-2

Data Request:

Provide a map showing cemeteries and places of historical significance adjacent to or abutting the transmission site per 20:10:22:11. The towns of Buffalo and Midland show on the route maps but the cemeteries are not noted.

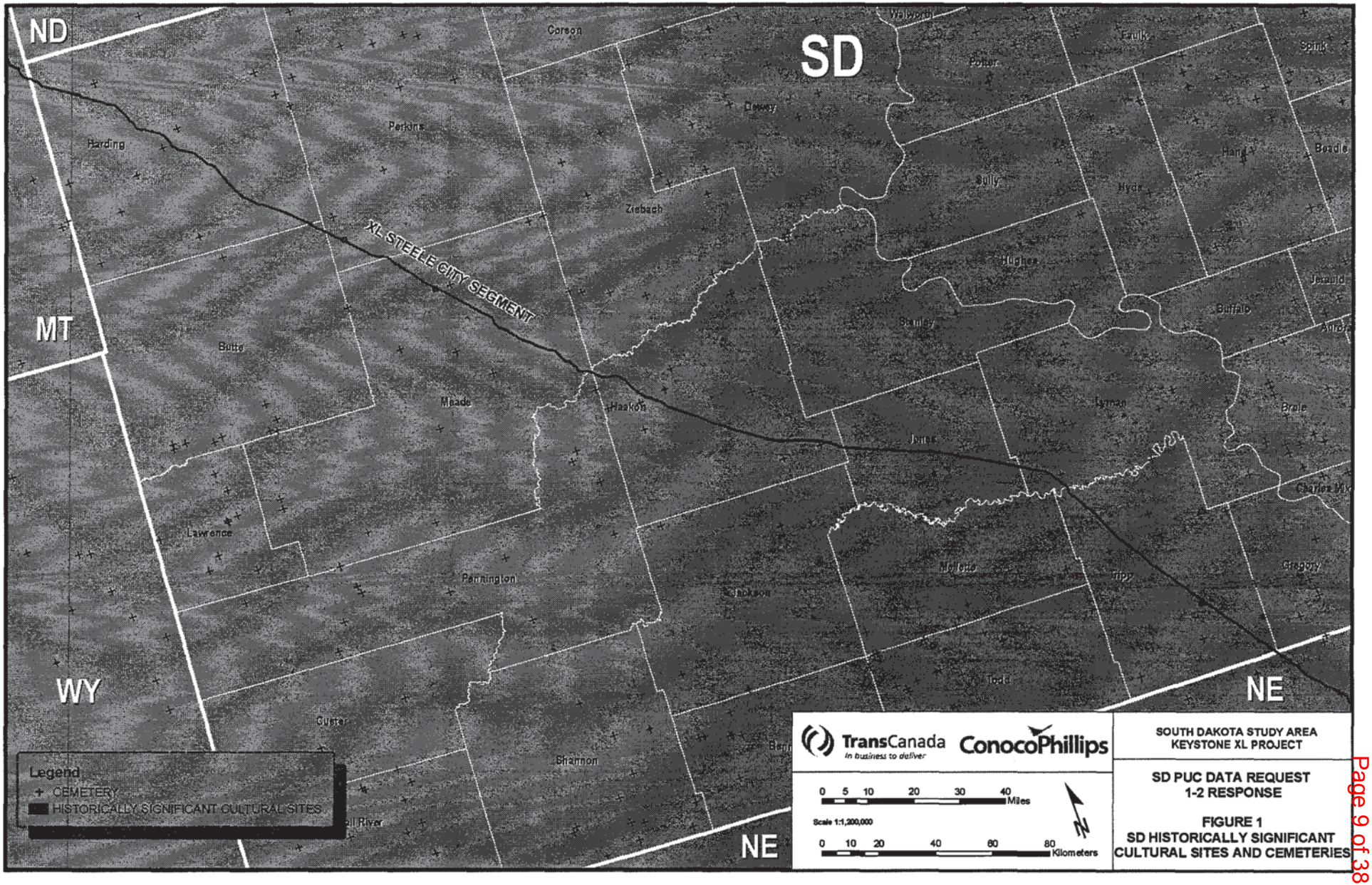
Response:

Cemeteries adjacent to or abutting the Project are noted in Exhibit A of the application as labels on Mapbook 1 and as included on the USGS 1:24,000 topographic maps base on Mapbook 2. The cemetery near the Town of Buffalo is located south of town which is not shown on the submitted maps. The cemetery of the Town of Midland is labeled in both mapbooks. Please see the attached **Figure 1** for locations of cemeteries in South Dakota.

Keystone understands "places of historical significance" to mean prehistoric or historic districts, sites, buildings, structures, or objects included in or eligible for the National Register of Historic Places (NRHP). Due to the sensitive nature of these locations, they have only been identified to the Section scale (see attached letter). Please see the attached **Figure 1** for locations of the four identified places of historical significance near the route in South Dakota.

Department of State will assess the information provided and determine eligibility for the NRHP with the South Dakota State Historic Preservation Officer.

Response prepared by: Jon Schmidt



Exhibit___DK-1
Page 9 of 38

South Dakota Department of Tourism and State Development

January 15, 2009

The South Dakota Office of the State Historic Preservation Officer encourages State and Federal agencies to protect fragile and non-renewable sacred and cultural resources through the restriction of site location data. The release of this information could result in the vandalism, looting or other damage of scared and cultural resources. The following laws prohibit the public dissemination of site location data.

South Dakota Codified Law 1-20-21.2.

Confidentiality of records pertaining to location of archaeological site-- **Exceptions**. Any records maintained pursuant to § 1-20-21 pertaining to the location of an archaeological site shall remain confidential to protect the integrity of the archaeological site. The state archaeologist may make the information from the records of an archeological site available to any agency of state government and any political subdivision of the state or to any tribe, which, in the opinion of the state archaeologist, may conduct an activity that affects any such site. The state archaeologist shall also make the information from the records of an archeological site available to the owner of the land that is an archeological site and may make the information available to any qualified researcher or research entity.

Section 304 (16 U.S.C. 4702-3)

(a) Authority to Withhold from Disclosure. The head of a Federal agency or other public official receiving grant assistance pursuant to this Act, after consultation with the Secretary, shall withhold from disclosure to the public, information about the location, character, or ownership of a historic resource if the Secretary and the agency determine that disclosure may-

(1) cause a significant invasion of privacy;

(2) risk harm to the historic resource; or

(3) impede the use of a traditional religious site by practitioners.

(b) Access Determination.-When the head of a Federal agency or other public official has determined that information should be withheld from the public pursuant to subsection (a), the Secretary, in consultation with such Federal agency head or official, shall determine who may have access to the information for the purpose of carrying out this Act.

(c) Consultation with Council.-When the information in question has been developed in the course of an agency's compliance with section 106 or 110(f), the Secretary shall consult with the Council in reaching determinations under subsections (a) and (b).

Archeological Resources Protection Act - Section 9

(a) Information concerning the nature and location of any archaeological resource for which the excavation or removal requires a permit or other permission under this Act or under any other provision of Federal law may not be made available to the public under subchapter II of chapter 5 of title 5 [of the United States Code] or under any other provision of law unless the Federal land manager concerned determines that such disclosure would—

(1) further the purposes of this Act or the Act of June 27, 1960 [the Reservoir Salvage Act, as amended, 16 U.S.C. 469- 469c-1] and

(2) not create a risk of harm to such resources or to the site at which such resources are located.

South Dakota Public Utilities Commission
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Response to Staff's First Data Request

May 1, 2009
Page 1 of 5

1-3

Data Request:

Provide a written summary of the geological features using a topographical map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area. Current description does not utilize map.

Response:

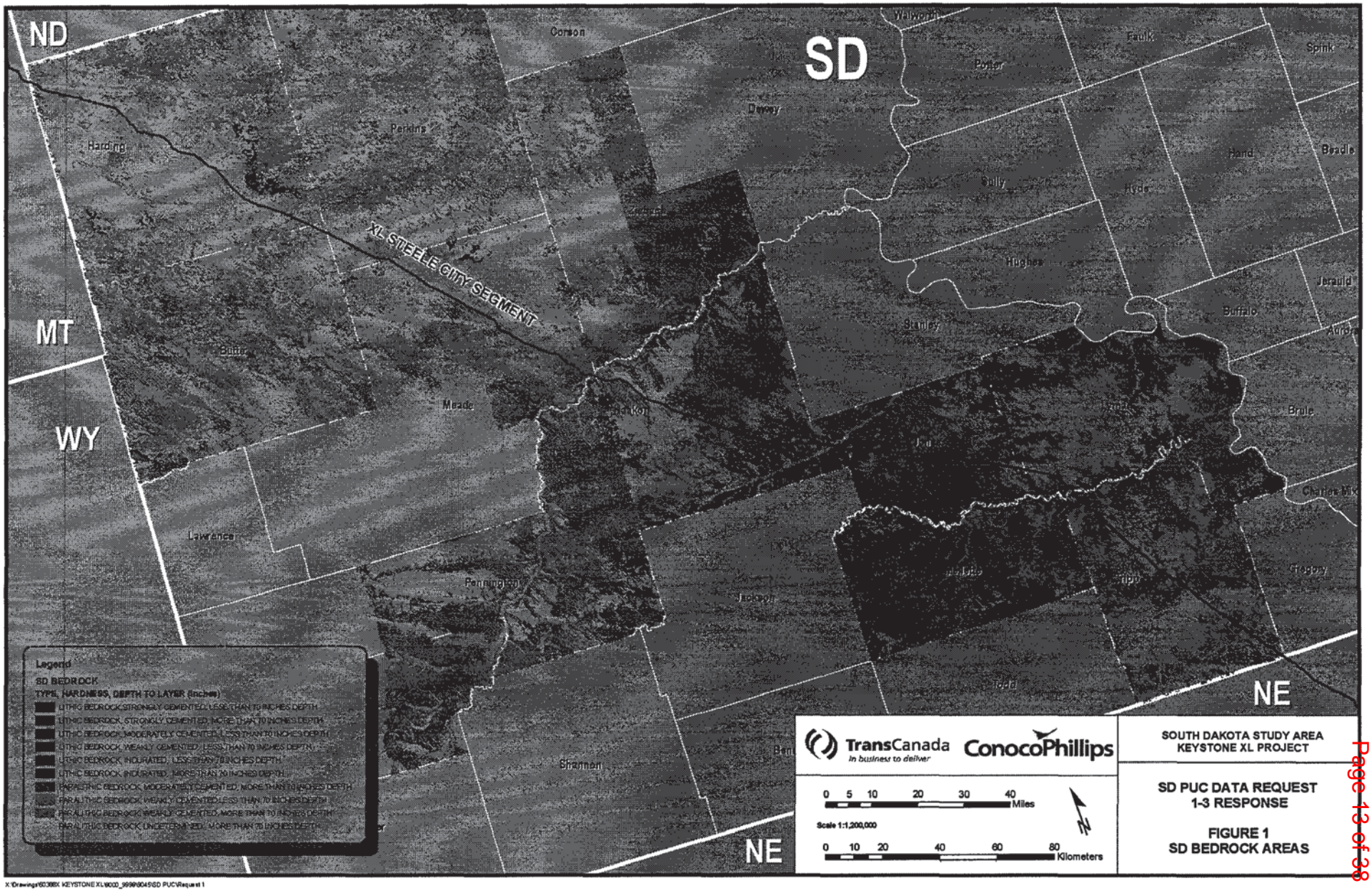
Maps depicting the bedrock and surficial geology of the Project area, along with a figure depicting available geologic cross-sections of the Project area are provided as an attachment to this response. South Dakota Geological Survey 15 minute geologic maps are also provided for reference where available in the Project area.

Figure 1 depicts the bedrock type, hardness, and depth within counties crossed by or near the route.

Figure 2 depicts the surface geology of the State of South Dakota according to the SDGS (Martin et al., 2004). Please note, that according to Martin et al. (2004) "This map should not be enlarged or otherwise used in an attempt to interpret more detail than can be seen at the 1:500,000 scale."

Figure 3 contains available generalized geologic cross sections that have been modified to reflect the relative location of the Project in the northern portion of the route.

Response prepared by: Richard Gale



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Exhibit___DK-1
Page 13 of 38

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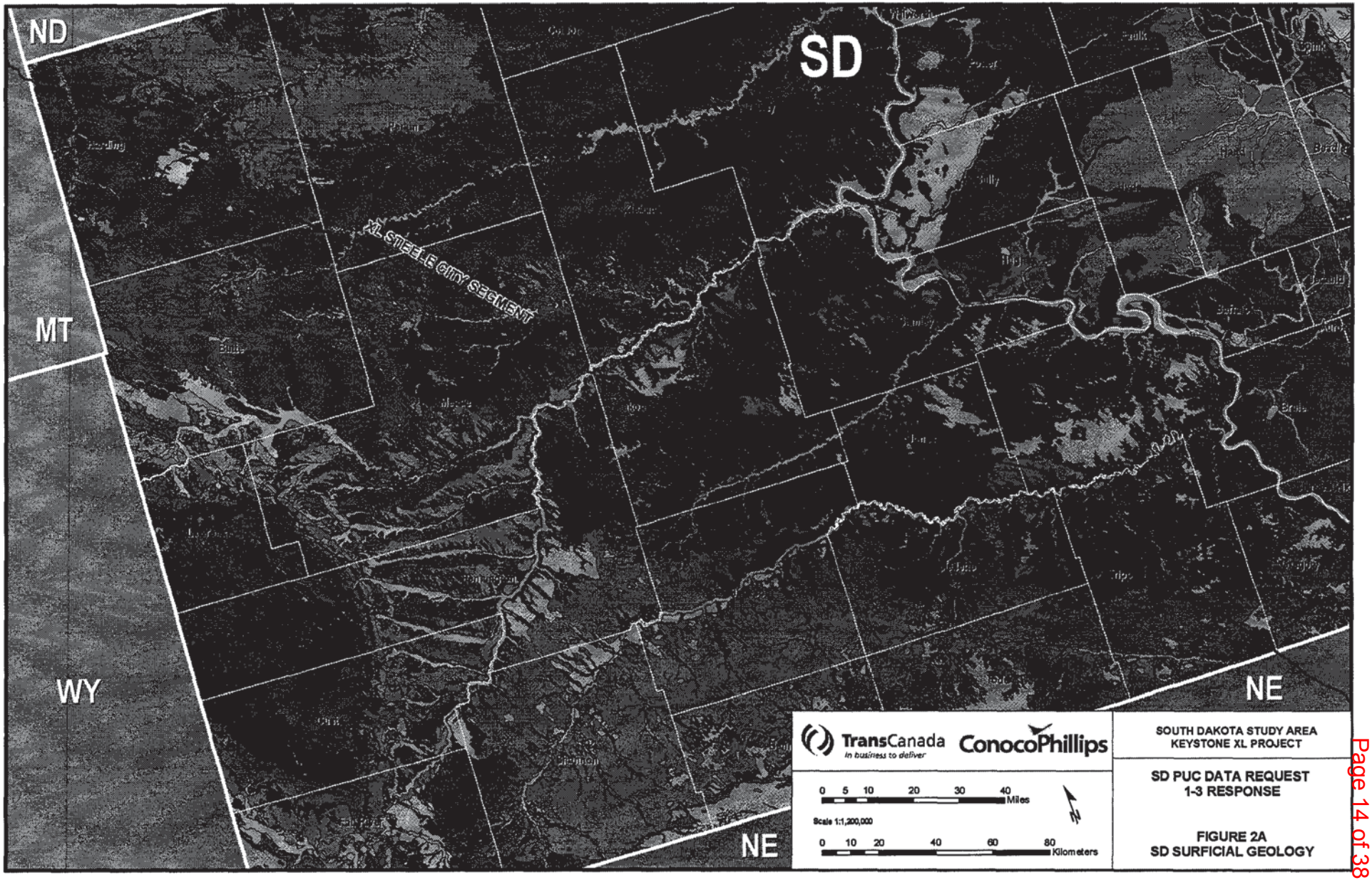
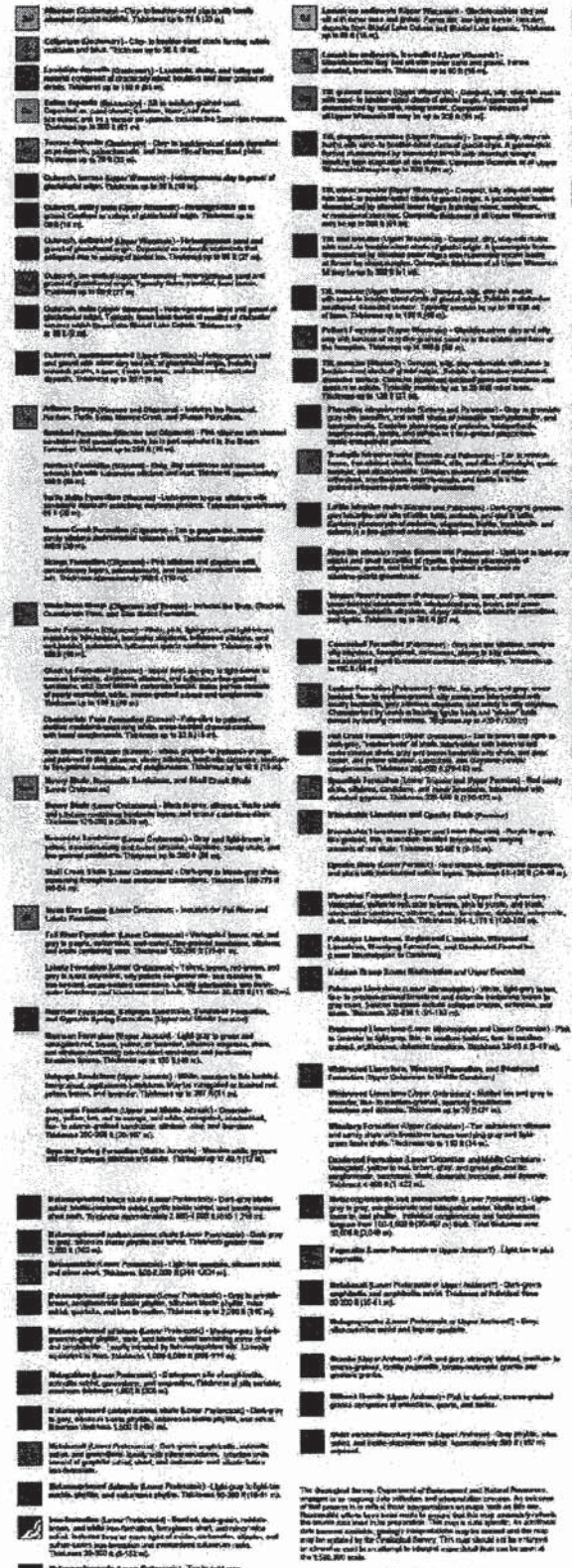


Exhibit___DK-1
Page 14 of 38



Publication Date: June 16, 2004

SOUTH DAKOTA STUDY AREA
KEYSTONE XL PROJECT

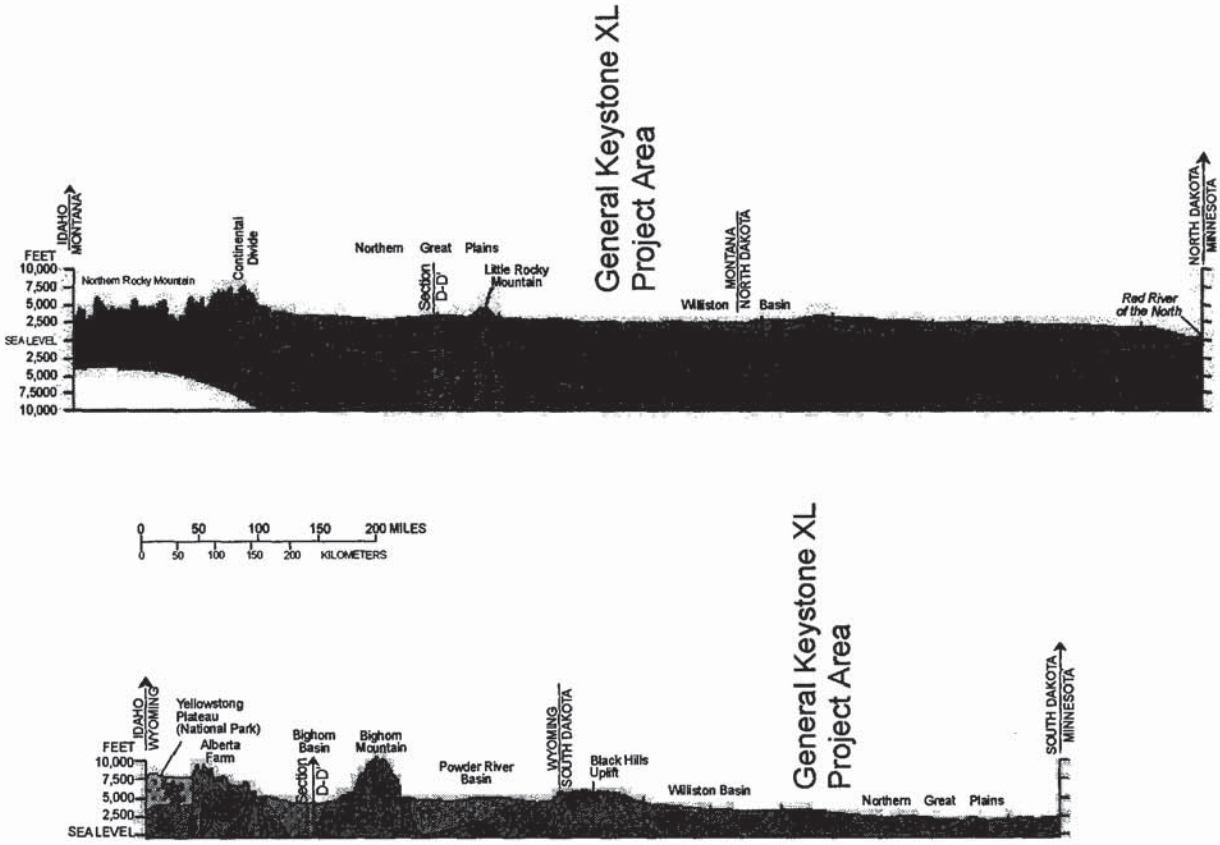
SD PUC DATA REQUEST
1-3 RESPONSE

FIGURE 2B
SD SURFICIAL GEOLOGY LEGEND

TransCanada
In business to deliver

ConocoPhillips

X:\Drawings\60398X KEYSTONE XL\6000_9999\60398D PUC\Request 1



Modified from:

Whitehead, R.L. 1996. Groundwater Atlas of the United States, Segment 8: Montana, North Dakota, South Dakota, and Wyoming. US Geological Survey Hydrologic Atlas 730-I; Figure 11.

EXPLANATION

- Quaternary volcanic rocks
- Quaternary and Tertiary valley-fill deposits
- Tertiary intrusive and volcanic rocks
- Tertiary sedimentary rocks
- Mesozoic sedimentary rocks
- Paleozoic sedimentary rocks
- Precambrian Belt Supergroup
- Precambrian igneous and metamorphic rocks
- Fault—Arrows show relative vertical movement
- Bend in section

SOUTH DAKOTA STUDY AREA
KEYSTONE XL PROJECT

SD PUC DATA REQUEST
1-3 RESPONSE

FIGURE 3
GENERAL GEOLOGIC
CROSS-SECTIONS

South Dakota Public Utilities Commission
TransCanada Keystone Pipeline, LP
Docket HP09-001
Response to Staff's First Data Request

1-5

Data Request:

Provide a table to show breeding times of sensitive SD species and a map to show migration pathways of sensitive SD species. Additionally, provide a map of recorded occurrences of the prairie fringed orchid. (SDCL 20:10:22:16).

Response:

Breeding periods of sensitive species potentially occurring within the Keystone XL Project area in South Dakota are listed below.

Species	Breeding Periods
Bald Eagle	February 1 - August 15
Greater Sage Grouse	March 1 - June 15
Interior Least Tern	April 15 - August 15
Whooping Crane	NA – Migrant through the project area only.
River Otter	February 15 - June 15
Swift Fox	April 1 - August 31
Blacknose Shiner	June 1 - July 31
Northern Redbelly Dace	April 1 - June 30
Pearl Dace	June 1 - July 31
Sturgeon Chub	June 1 - July 31
American Burying Beetle	June and August

Consultation with the South Dakota Department of Game, Fish and Parks (SDGFP) indicates that there is no specific information on migration pathways of sensitive South Dakota species (SDGFP 2009). It is assumed that riparian corridors function as pathways for some species.

Comparison of the western prairie fringed orchid historical and extant ranges shows the species apparently has been lost from South Dakota (USFWS 1996), but factors that indicate the species could still be present include 1) incomplete surveys in areas of suitable habitat crossed by the project route on private lands; and 2) erratic flowering patterns and long dormancies make it difficult to detect populations (Phillips 2003). Based on these factors and agency review of the project route through South Dakota, the USFWS recommends surveys for occurrence along the

Response prepared by: Jon Schmidt

1-5

project route south of Hwy 18 in Tripp County (USFWS 2008). Surveys are planned for June 2009 and information will be provided following survey completion.

References:

Phillips, L. 2003. Pollination of Western Prairie Fringed Orchid, *Platanthera praeclara*: Implications for Restoration and Management. Restoration and Reclamation Review Student On-Line Journal (Hort 5015/5071). University of Minnesota, St. Paul, Minnesota (USA) Department of Horticultural Science. (http://hort.agri.umn.edu/h5015/rrr.htm).

South Dakota Department of Game, Fish, and Parks (SDGFP). 2009. Email correspondence from D. Backlund (SDGFP) to P. Lorenz (AECOM). April 2, 2009.

U.S. Fish and Wildlife Service (USFWS). 2008. Correspondence during a meeting held on June 10, 2008 between C. Besskin (USFWS) and P. Lorenz (AECOM) in Pierre, SD.

USFWS. 1996. Western Prairie Fringed Orchid Recovery Plan (*Platanthera praeclara*). U.S. Fish and Wildlife Service. Fort Snelling, Minnesota. Vi + 101 pp.

Response prepared by: Jon Schmidt

South Dakota Public Utilities Commission
TransCanada Keystone Pipeline, LP
Docket HP09-001
Response to Staff's First Data Request

1-6

Data Request:

Provide a description of the steps you will take to foster positive public relations per ARSD 20:10:22:23 (7).

Response:

Please refer to Section 6 of the Keystone XL permit application for discussion of impacts that the construction, operation, and maintenance of the proposed pipeline will have on the affected area. Amelioration of potential adverse community impacts is discussed within the section and throughout other parts of the application. In general, community impacts are expected to be positive and potential negative impacts will be ameliorated through thoughtful design, construction and operation.

Complementing the design, construction and operation of the pipeline, TransCanada's approach to siting and construction fosters positive public relations by striving to:

- Provide information about the project and the company to landowners, communities and other interested parties along the route;
- Gather feedback on the proposed project from interested parties;
- Provide information in response to stakeholder issues and concerns; and
- Build a foundation for the development of long-term relations with key stakeholders and communities.

The approach includes:

- Project open houses /informational meetings;
- Local meetings and briefings with public officials and other interested parties;
- Providing information and responding to queries from local and regional media;
- Meetings and discussions with landowners;
- Establishment of toll-free information lines and project e-mail to facilitate questions about the project;
- Establishment of a project website;
- Development of fact sheets describing the project;
- Issuance of newsletters regarding project developments; and
- Monitoring and additional actions as appropriate.

Response prepared by: Robert Jones

South Dakota Public Utilities Commission
TransCanada Keystone Pipeline, LP
Docket HP09-001
Response to Staff's First Data Request

May 1, 2009
Page 1 of 1

1-7

Data Request:

Supply more detailed labor estimate by type of position per 20:10:22:24 for:

a) Number of permanent positions with Keystone XL and estimated annual labor costs
b) Number of contractor permanent positions and estimated annual labor costs
c) Number of subcontractor permanent positions and estimated annual labor costs
d) Number of construction positions with Keystone XL and estimated annual labor costs
e) Number of contractor construction positions and estimated annual labor costs
f) Number of subcontractor construction positions and estimated annual labor costs

Response:

a) Permanent staff positions with Keystone XL are planned to be in two locations, one location will have 4 employees (2 technical, 1 manager and 1 administrator), and the second location will have 2 employees (both technical). The total is 6 employees, with an estimated annual labor costs @ $860,000.
b) Keystone does not anticipate that any new contractors or subcontractors will form to construct and operate the Project; however Keystone will utilize existing local firms for brush clearing, snow removal, and emergency response contractor personnel.
c) Please see response to (b).
d) The number of construction positions associated with the Keystone XL Project is 90 with an annual labor const of $13 million over tow years.
e) **Table 16** in the original application reflects the number of contractor and subcontractor construction positions and estimated annual labor costs.
f) Please see response to (e).

Response prepared by: Robert Jones

South Dakota Public Utilities Commission
TransCanada Keystone Pipeline, LP
Docket HP09-001
Response to Staff's First Data Request

1-8

Data Request:

Please provide for each classification in question 1-7 above, the percentage of employees that will remain in the area after construction is completed.

Response:

a) 100%
b) Although Keystone does not anticipate having permanent positions after construction, the local firms hired as described in the response to 1-7 (b) will be located in South Dakota.
c) 0% Please see response to DR 1-7 (b).
d) 0%
e) 10%-15% It is estimated that approximately 10 to 15 percent of the total construction work force could be hired locally. This same 10 to 15 percent is expected to remain in the area after construction is complete.
f) Please see response to (e).

Response prepared by: Robert Jones

South Dakota Public Utilities Commission
TransCanada Keystone Pipeline, LP
Docket HP09-001
Response to Staff's First Data Request

May 1, 2009
Page 1 of 1

1-9

Data Request:

Provide a flowchart showing design capacity of the transmission system per 20:10:22:38 (1). The current flowchart does not show the design capacity.

Response:

The Mechanical Flow Schematic provided in the application as Exhibit 3 reflects the nominal design capacity of 900,000 bpd.

Response prepared by: Meera Kothari

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF SOUTH DAKOTA

In the Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit under the South Dakota Energy Conversion and Transmission Facility Act to Construct the Keystone XL Project

DOCKET HP09-001

STAFF'S SECOND DATA REQUEST

May 22, 2009

2-1. Please provided estimated time schedules for accomplishment of major events in the commencement and duration of the proposed facility per ARSD 20:10:22:22. Provide the same information for each construction spread in South Dakota.

Description	Start	End
2011 Mobilization	**04/15/11**	**05/15/11**
Spread 5	04/15/11	05/14/11
Spread 7	04/15/11	05/14/11
2012 Mobilization	**04/16/12**	**05/15/12**
Spread 4	04/16/12	05/15/12
Spread 6	04/16/12	05/15/12
Spread 8	04/16/12	05/15/12
2011 Construction	**05/16/11**	**10/12/11**
Spread 5	05/16/11	10/12/11
Spread 7	05/16/11	10/12/11
Final Clean Up for 2011 Spreads	**08/29/11**	**10/12/11**
Spread 5	08/29/11	10/12/11
Spread 7	08/29/11	10/12/11
Complete T&E Species Exclusion Windows & HDD Crossings	**09/15/11**	**12/15/11**
Spread 4	09/15/11	12/15/11
Spread 6	09/15/11	12/15/11
Spread 8	09/15/11	12/15/11
2012 Construction	**05/16/12**	**10/12/12**
Spread 4	05/16/12	10/12/12
Spread 6	05/16/12	10/12/12
Spread 8	05/16/12	10/12/12
Final Clean Up 2012 Spreads	**10/13/12**	**11/30/12**
Spread 4	10/13/12	11/30/12
Spread 6	10/13/12	11/30/12
Spread 8	10/13/12	11/30/12

2-2. Please provide the total number of open cuts across public gravel and the total across public paved roads.

Keystone does not anticipate the open cutting of any public gravel or paved road. Site visits confirm that successful road bores should be achievable at all public roads. Private roads will likely be crossed by open cutting.

2-3. Please provide the total estimated cost of the road restoration for all public road open cuts and the total estimated cost for road restoration of all public paved road open cuts.

This is not applicable, as Keystone will not open-cut any public roads.

2-4. What is the average width of an open cut across a road? (Not road width but length of road disturbed by the open cut.)

Again, Keystone does not anticipate open cutting of any public roads. Open cutting of private roads is a function of the pipe diameter. For the 36-inch Keystone XL project, it is anticipated that the length of disturbance along the private road would be 12 feet.

2-5. SCDL 49-41B-38 requires an indemnity bond for damage to roads and bridges. Propose an equitable amount for said bond and provide the basis for determining that amount.

In the Keystone Pipeline proceeding, the Commission adopted an indemnity bond amount based on 10 percent of the value of construction in South Dakota for each year of construction, as recommended in Witness Muehhausen's testimony and report. For the Keystone XL project, the total construction costs for South Dakota are approximately $312,000,000. Accordingly, using the Commission's Keystone approach, Keystone suggests a $15,600,000 indemnity bond each for 2011 and 2012.

2-6. Provide an estimate of the number of miles of gravel or stone surfaced roads that may require grading and/or replenishment of the surface materials due to deterioration from pipeline construction traffic.

The total estimated number of miles of gravel or stone surfaced roads that will be utilized during construction is approximately 600 miles. Based on experience from a previous project in North Dakota, approximately 50% or 300 miles of the roads may require grading and/or replenishment of the surface materials due to deterioration from pipeline construction traffic.

2-7. Provide an estimate of the cost of the grading and replenishment in the previous question.

An estimate of the cost of the grading and replenishment in question 2-6 is in the range of $3,168,000 to $3,326,400

744 N.W.2d 594, 2008 SD 5
(Cite as: 744 N.W.2d 594)

C

Supreme Court of South Dakota.
In the Matter of OTTER TAIL POWER COMPANY on Behalf of **BIG STONE II** co-Owners for an Energy Conversion Facility Permit for the Construction of the **Big Stone II** Project.
No. 24485.

Argued on Nov. 7, 2007.
Decided Jan. 16, 2008.

Background: Electric utility applied for a permit to construct a coal-fired conversion facility. The Public Utilities Commission (PUC) approved the permit, and environmental organizations appealed. The Circuit Court of the Sixth Judicial Circuit, Hughes County, Lori S. Wilbur, J., affirmed, and environmental groups appealed.

Holdings: The Supreme Court, Konenkamp, J., held that:
(1) the PUC's decision to grant the permit would not be reviewed de novo, and
(2) evidence was sufficient to establish that the facility would not pose a threat of serious injury to the environment, though it would emit 4.7 million tons of carbon dioxide annually.

Affirmed.

West Headnotes

[1] Public Utilities 317A 194

317A Public Utilities
317AIII Public Service Commissions or Boards
317AIII(C) Judicial Review or Intervention
317Ak188 Appeal from Orders of Commission
317Ak194 k. Review and Determination in General. Most Cited Cases
Findings of fact by the Public Utilities Commission (PUC) are reviewed under the clearly erroneous standard, while its conclusions of law are reviewed de novo. SDCL § 1-26-36.

[2] Public Utilities 317A 194

317A Public Utilities
317AIII Public Service Commissions or Boards
317AIII(C) Judicial Review or Intervention
317Ak188 Appeal from Orders of Commission
317Ak194 k. Review and Determination in General. Most Cited Cases
In an appeal of a decision by the Public Utilities Commission (PUC), a reviewing court must consider the evidence in its totality and set the PUC's findings aside if the court is definitely and firmly convinced a mistake has been made. SDCL § 1-26-36.

[3] Electricity 145 8.6

145 Electricity
145k8.6 k. Environmental Considerations in General. Most Cited Cases
Supreme Court would not review decision by Public Utilities Commission (PUC) to issue electric utility a permit to construct a coal-fired conversion facility de novo, and instead would review the decision under the clearly erroneous standard, despite contention by environmental groups that the PUC erroneously applied statute, requiring a permit applicant to establish that a proposed facility did not pose a serious threat to the environment, by approving the permit when the PUC also found that the facility would emit 4.7 million tons of carbon dioxide annually; no matter how grave the Court's concerns were on global warning, the Legislature designated the PUC as the responsible agency for the question of granting a permit, and the Legislature and Congress were the government bodies which had to balance the competing interest of economic development and protection of the environment. SDCL §§ 1-26-36, 49-41B-22.

[4] Public Utilities 317A 194

317A Public Utilities
317AIII Public Service Commissions or Boards
317AIII(C) Judicial Review or Intervention
317Ak188 Appeal from Orders of Commission
317Ak194 k. Review and Determina-

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744 N.W.2d 594, 2008 SD 5
(Cite as: 744 N.W.2d 594)

tion in General. Most Cited Cases
In an appeal of a decision by the Public Utilities Commission (PUC), while a reviewing court gives due regard to the agency's well-reasoned and fully informed decision, the court will not uphold clear errors of judgment or conclusions unsupported in fact. SDCL § 1-26-36.

[5] Electricity 145 ⚿8.6

145 Electricity
145k8.6 k. Environmental Considerations in General. Most Cited Cases
Evidence was sufficient to establish, in permit proceeding before the Public Utilities Commission (PUC), that electric utility's proposed coal-fired conversion facility would not pose a threat of serious injury to the environment; though the PUC found that the facility would emit 4.7 million tons of carbon dioxide annually, environmental groups opposing the facility did not dispute there was a need for additional wattage and did not present a viable alternative to the facility, no carbon dioxide emission standards had been enacted by Congress, and there was evidence that the facility would only increase carbon dioxide emissions by 0.0007 percent nationally and that the facility would produce 18% less carbon dioxide that existing coal-fired plants. SDCL §§ 1-26-36, 49-41B-22.

***595** Janette K. Brimmer of Minnesota Center for Environmental Advocacy St. Paul, Minnesota, John H. Davidson, Vermillion, South Dakota, Attorneys for appellants ***596** Fresh Energy, Izaak Walton League of America-Midwest Office, Union of Concerned Scientists & Minnesota Center for Environmental Advocacy.

Thomas J. Welk, Christopher W. Madsen of Boyce, Greenfield, Pashby & Welk Sioux Falls, South Dakota, Attorneys for appellee **Big Stone II** Co-Owners.

John J. Smith, Assistant Attorney General, SD Public Utilities Commission, Pierre, South Dakota, Attorneys for appellee SD Public Utilities Commission.

KONENKAMP, Justice.

[¶ 1.] Otter Tail Power Company, on behalf of several utilities, applied for a permit to construct **Big Stone II**, a coal-fired energy conversion facility. Certain non-profit environmental organizations intervened to oppose the application. They asserted that the carbon dioxide (CO_2) emissions from **Big Stone II** would contribute to global warming, thereby posing a threat of serious environmental injury. The South Dakota Public Utilities Commission (PUC) concluded that although the facility will emit CO_2, the amount will not pose a threat of *serious* injury to the environment. It found that CO_2 emissions are not currently regulated by Congress or South Dakota and that **Big Stone II** would only increase the national amount of emissions by seven hundredths of one percent. Because the PUC followed existing legal guidelines in approving the permit, and its findings were not clearly erroneous, we uphold its decision.

Background

[¶ 2.] The South Dakota Legislature acknowledged the significant impact energy development has on "the welfare of the population, the environmental quality, the location and growth of industry, and the use of the natural resources of the state." SDCL 49-41B-1. It enacted legislation to "ensure that [energy conversion and transmission] facilities are constructed in an orderly and timely manner so that the energy requirements of the people of the state are fulfilled." *Id.* The Legislature deemed it "necessary to ensure that the location, construction, and operation of facilities will produce minimal adverse effects on the environment and upon the citizens of this state by providing that a facility may not be constructed or operated in this state without first obtaining a permit from the [PUC]." *Id;* SDCL 49-41B-4.

[¶ 3.] A permit application must include:

(1) The name and address of the applicant;

(2) Description of the nature and location of the facility;

(3) Estimated date of commencement of construction and duration of construction;

(4) Estimated number of employees employed at the site of the facility during the construction phase and during the operating life of the facility. Estimates shall include the number of employees who are to be utilized but who do not currently reside

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within the area to be affected by the facility;

(5) Future additions and modifications to the facility which the applicant may wish to be approved in the permit;

(6) A statement of the reasons for the selection of the proposed location;

(7) Person owning the proposed facility and person managing the proposed facility;

(8) The purpose of the facility;

(9) Estimated consumer demand and estimated future energy needs of those consumers to be directly served by the facility;

*597 (10) The potential short and long range demands on any estimated tax revenues generated by the facility for the extension or expansion of public services within the affected areas;

(11) Environmental studies prepared relative to the facility;

(12) Estimated construction cost of the facility.

SDCL 49-41B-11.

[¶ 4.] After a request for a permit is filed, the PUC must enlist a local review committee, which "shall meet to assess the extent of the potential social and economic effect to be generated by the proposed facility, to assess the affected area's capacity to absorb those effects at various stages of construction, and formulate mitigation measures." SDCL 49-41B-7. This committee issues a final report to the PUC with its findings and "recommendations of the committee as to mitigation measures and minority reports." SDCL 49-41B-10. The PUC may also "prepare or require the preparation of an environmental impact statement[.]" SDCL 49-41B-21. An applicant is required "to establish that: (1) The proposed facility will comply with all applicable laws and rules; (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area; (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government." SDCL 49-41B-22.

[¶ 5.] On November 8, 2004, in accord with SDCL 49-41B-5, the Otter Tail Corporation, doing business as Otter Tail Power Company, submitted a proposal to the PUC for permission to construct an energy conversion facility. Otter Tail submitted the proposal on behalf of Central Minnesota Municipal Power Agency, Great River Energy, Heartland Consumers Power District, Montana-Dakota Utilities Company, a division of MDU Resources Group, Inc., Southern Minnesota Municipal Power Agency, and Western Minnesota Municipal Power Agency (Applicants).[FN1] As proposed, the facility would be a 600 megawatt (MW) coal-fired electric generating plant to be located in Grant County, South Dakota, east of Milbank and Northwest of Big Stone.[FN2] The facility would be named **Big Stone II** and be situated next to an older facility, Big Stone I.

FN1. As confirmed by counsel at oral argument, some utilities have since pulled out of the project. Otter Tail and Montana-Dakota Utilities Company indicate that they will proceed with a smaller facility.

FN2. In 1972, various electrical utilities and other electrical industry participants voluntarily joined Mid-Continent Area Power Pool (MAPP), an association organized to promote efficiency and reliability in the industry by pooling power generation and transmission. MAPP noted that by the summer of 2011, the MAPP United States region would have an 819 megawatt deficit. To alleviate the forecasted deficit, MAPP concluded that members would need to construct power generators, purchase additional capacity, and/or reduce the growth in demand.

[¶ 6.] Several organizations sought to intervene: Clean Water Action; South Dakota Chapter Sierra Club; Union of Concerned Scientists; Mary Jo Stueve; Minnesotans for an Energy-Efficient Economy; Izaak Walton League of America, Midwest Office; and Minnesota Center for Environmental Ad-

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vocacy (Intervenors). The Intervenors opposed the application on multiple grounds related to the environmental impact of **Big Stone II**. ***598** The PUC granted intervention to all parties.[FN3]

FN3. Clean Water Action and the Sierra Club later withdrew.

[¶ 7.] The Applicants' petition to the PUC triggered SDCL 49-41B-6, and a local review committee was established to prepare a social and economic assessment of **Big Stone II**. The assessment (1) examined the potential impacts of **Big Stone II**; (2) addressed the area's ability to absorb those impacts; (3) identified a list of actions needed to ensure a smooth project; and (4) prepared a list of recommended mitigation measures. The committee's findings relate to issues not implicated in this appeal, and therefore, will not be discussed.

[¶ 8.] An environmental impact statement was also prepared. Among many other things, the impact statement assessed the air quality effects of **Big Stone II**. In so doing, the statement first identified the applicable regulations, stating

> The Clean Air Act, and its amendments (CAA), requires the Federal U.S. Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standard (NAAQS) for pollutants considered harmful to public health and the environment.... The USEPA Office of Air Quality Planning and Standards has set NAAQS for six principal pollutants, which are called "criteria" pollutants.[FN4]
>
> FN4. These include: carbon monoxide (CO), lead, nitrogen dioxide, two types of particulate matter, ozone, and sulfur dioxides.

Draft Environmental Impact Statement May 2006 at 3-1, 3-2. The statement also recognized applicable regulations from Prevention of Significant Deterioration (PSD), New Source Performance Standards (NSPS), Best Available Control Technology (BACT), and the Clean Air Mercury Rule (CAMR). *Id.* at 4-2.

[¶ 9.] Although CO_2 is not regulated, the statement recognized that **Big Stone II** was estimated to emit approximately 4.7 million tons of CO_2 per year. It remarked, however, that "[p]rojected emissions of all hazardous air pollutants from the existing and proposed plants would be reduced by approximately 41 [million] tons/year (from approximately 63 [million] tons/year by the existing plant to approximately 22 [million] tons/year by the combined existing and proposed plant operations)." *Id.* at ES-18. Moreover, the statement noted that "[t]he proposed super-critical combustion technology for the proposed Project is three-to-four percent more efficient, and would result in lower CO_2 emissions per MWh [megawatt hours] of electrical energy output as compared to the sub-critical boiler technology." *Id.* at 4-11.

[¶ 10.] The statement summarized the air quality effects of **Big Stone II**:

> Overall, no air quality impacts exceed significance criteria for air resources. The long-term impacts from the proposed Project for NAAQS and PSD increment would be less than significant. The Grant County, South Dakota area is in attainment or is unclassifiable for all criteria pollutants. Emissions from the proposed project would not conflict with or obstruct implementation of any applicable air quality plan. Since the increase in criteria pollutant emissions would either be less than the PSD significance levels or well within the NAAQS and PSD increments, the proposed Project long-term and short-term emissions impacts on distant air quality areas that are not in compliance with NAAQS is unlikely. In addition, visibility impacts to Class I and Class II areas would be less than significant....

***599** *Id.* at 4-13. Nevertheless, according to the statement, "[t]he proposed **Big Stone II** plant would generate unavoidable emissions of air pollutants that would be an adverse impact." *Id.* at 5-1. This was determined notwithstanding that **Big Stone II** "would operate under [an] appropriate air emission permit from the state of South Dakota that requires operation of the plant under regulatory limits.... Even with the permit requirements and air emission control equipment, these impacts would be adverse and unavoidable." *Id.*

[¶ 11.] In accord with SDCL 49-41B-16, the PUC is required to hold a public hearing near the proposed facility's location. Two public hearings were held. At

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the first hearing, fifteen people provided testimony. At the second hearing, twenty people attended, with twelve giving testimony. In addition to the public hearings, the Applicants, Intervenors, and the PUC exchanged substantial written discovery, with the Applicants answering more than 500 discovery requests and making available more than 47,000 pages of documents. All parties submitted pre-filed testimony and a formal evidentiary hearing was held on June 26-29, 2006. Oral argument was heard by the PUC on July 11, 2006.

[¶ 12.] Through their testimony, the Applicants asserted that **Big Stone II** would provide the energy necessary to serve consumers in South Dakota, North Dakota, Minnesota, Iowa, Montana, and Wisconsin. **Big Stone II** is projected to produce 4.6 million MW hours of electricity per year. The estimated cost to construct **Big Stone II** is $1 billion in 2011 dollars. The Applicants claimed that if construction of **Big Stone II** was delayed or prohibited, the member companies would not be able to generate sufficient energy, which would affect the reliability of their systems and harm consumers.

[¶ 13.] The Intervenors opposed construction of **Big Stone II**. They asserted that **Big Stone II** would pose a threat of serious injury to the environment under SDCL 49-41B-22 and should not be constructed. The threat of serious injury, the Intervenors alleged, would be caused by the amount of CO_2 **Big Stone II** would emit. These emissions, according to the Intervenors, would contribute to global warming, which they contend seriously harms the environment.

[¶ 14.] To support their contention that global warming harms the environment and CO_2 emissions contribute to global warming, the Intervenors submitted expert testimony from Dr. Ezra Hausman. Dr. Hausman is employed with Synapse Energy Economic, Inc., a company specializing in energy and environmental concerns. Dr. Hausman holds a Ph.D. in Atmospheric Science from Harvard University, a master's degree in Applied Physics from Harvard, and a master's degree in Water Resource Engineering from Tufts University.

[¶ 15.] Dr. Hausman testified that "[h]uman induced climate change is a grave and increasing threat to the environment and to human societies around the globe." According to Dr. Hausman, an increase in many greenhouse gases has caused a 0.6° C increase in global temperature in the twentieth century. More notably, he opined, "This means that the planet as a whole does not lose heat to space as efficiently as it otherwise would, so the system as a whole is warming up. This is the phenomenon commonly referred to as 'global warming.' "

[¶ 16.] According to Dr. Hausman, the increase in global temperature "has come primarily from the burning of fossil fuels (coal, oil, and natural gas), and also from changes in land use such as deforestation." Of the fossil fuels, he stated that "coal ***600** emits the most CO_2 per unit of energy obtained." Dr. Hausman said that "[t]here is an unequivocal scientific consensus on many aspects of the issue of global climate change." Specifically, according to Dr. Hausman, there is a consensus that:

(1) "the CO_2 content of the atmosphere is increasing rapidly;"

(2) "this rate of increase, and resulting abundance of CO_2 in the atmosphere, is unprecedented in at least the past 200,000 years and probably much longer;"

(3) "the primary source of the increase is the combustion of fossil fuels by human industrialized societies, i.e., that is the anthropogenic CO_2;" FN5

> FN5. According to Dr. Hausman, the term "anthropogenic" refers to human caused emissions of CO_2.

(4) "the increased abundance of CO_2 has a direct radiative forcing effect on climate by altering the heat transfer characteristics of the atmosphere;"

(5) "this change in the heat transfer properties of the atmosphere will have an impact on the climate of the planet;"

(6) "the climate of the earth is currently changing in ways that are consistent with model predictions based on the increased radiative forcing due to the anthropogenic increase in the atmospheric CO_2[;]"

(7) "the magnitude of climate impacts will increase with increasing atmospheric CO_2 content;" and

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(8) "once the atmospheric abundance of CO_2 has been increased, it will only return to equilibrium levels through natural processes on a timescale of several centuries."

[¶ 17.] In regard to coal-fired power plants in general, Dr. Hausman testified that the ones "in the United States already emit almost one-third of the U.S. emissions, or 8% of all the world's anthropogenic CO_2 into the atmosphere, a staggering contribution to the global buildup of greenhouse gases." Moreover, he testified that because "base load coal plants in the United States are built to produce electricity for decades, as long as 70 years in the case of some of the older plants still operating today", the threat to the environment "is becoming increasingly obvious and severe."

[¶ 18.] With respect to **Big Stone II**, Dr. Hausman testified that it would "add over 4.5 million tons of CO_2 to the atmosphere every year of its operational life, inexorably and significantly contributing to the buildup of greenhouse gases in the atmosphere." This amount represents a 34% increase in South Dakota's emission record from the EPA in 2001. Further, he said that "[a]t 4.5 million tons per year, emissions from **Big Stone II** would be equivalent to emissions from almost 670,000 cars." The emissions from **Big Stone II**, Dr. Hausman explained, "would cause irreversible damage to the environment, especially considering its expected lifetime of 50 years or more and the slow recovery time for atmospheric CO_2." He stated, "Human societies and ecosystems will find themselves poorly adapted to their local climate and this will result in disruption of ecosystems[.]" He also predicted that the warming in a region like South Dakota will cause increased temperatures in the summer, resulting in more droughts and reduced crop yields.

[¶ 19.] He concluded that the emissions from **Big Stone II** will cause "a significant and irreversible impact on the environment, both globally and in South Dakota.... My opinion is that this facility will have a cumulative effect, in combination ***601** with other operating energy conversion facilities, both existing and under construction, of causing the level of atmospheric carbon dioxide to be significantly elevated relative to what it would be without this plant.... In my opinion, the environmental effects of this facility will pose a threat of serious injury to the environment in South Dakota and in the broader region."

[¶ 20.] In response to Dr. Hausman's testimony, the Applicants presented the rebuttal testimony of Ward Uggerud, Otter Tail's senior vice-president. Uggerud testified that Dr. Hausman's opinion that **Big Stone II** will have a significant adverse impact on South Dakota "lacks perspective, to say the least." Although he conceded that " **Big Stone II** will emit approximately 4.7 million short tons of carbon dioxide per year," Uggerud explained:

> The Energy Information Administration (EIA) reports that U.S. anthropogenic carbon dioxide emissions for 2010 are projected to be 6,365 million metric tons.... This means that **Big Stone II's** share of total U.S. anthropogenic carbon dioxide emissions in 2010 (assuming the plant came on line then) would be 0.0007 (0.07%, or seven hundredths of one percent). According to EIA, global anthropogenic CO_2 emissions in 2010 will be 30,005 million metric tons. **Big Stone II's** share of this amount will be 0.00014 (0.014% or less than two one-hundredths of one percent).

Moreover, Uggerud asserted that "[c]arbon dioxide is not the only greenhouse gas. Other gasses, such as methane and water vapor, also trap heat in the atmosphere. Water vapor is by far the most dominant greenhouse gas." He thought, therefore, that "the evidence is simply insufficient to conclude that CO_2 emissions associated with the proposed **Big Stone II** will cause [a] 'costly adverse impact on the environment both in South Dakota and throughout the region, the continent and the planet.' "

[¶ 21.] After considering Dr. Hausman's and Uggerud's testimony and the voluminous record, the PUC issued a thirty-four page letter decision, which, among other things, identified the applicable rules and regulations, the site description, alternative locations, and the impact of the plant on the environment. It also evaluated the regulatory and environmental costs associated with construction of **Big Stone II**. The PUC found that **Big Stone II** complied with all rules and regulations under SDCL Chapter 49-41B and ARSD Chapter 20:10:22. As for alternative energy sources, the PUC considered a study submitted by the Applicants from Burns & McDonnell Engineering Co. It examined alternative baseload genera-

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tion technologies, such as wind, biomass, hydropower, solar, landfill gas, geothermal energy, distributed generation, atmospheric circulating fluidized bed, combined cycle natural gas turbine, and integrated coal gasification combined cycle. The PUC concluded that "there were no renewable generation options available to address the need for 600 MW of baseload power within the timeframe required, and that other fossil fuel sources were more expensive and less desirable." Further, according to the PUC, there was no single next best alternative source where the Applicants could obtain the needed energy and the "Intervenors have not proposed an alternative to provide base load capacity through natural gas or oil instead of coal" and "have not suggested any specific alternative to **Big Stone II**...."

[¶ 22.] The PUC also addressed an issue that arose at the hearing where the Intervenors argued that the Applicants should pay the costs associated with possible future regulation of CO_2 emissions. Because neither Congress nor South Dakota***602** has regulated CO_2 emissions, and the PUC found it speculative whether such regulations would be established, it concluded that imposing costs would be unwarranted.

[¶ 23.] The PUC considered the environmental impact statement filed by the Applicants. The statement indicated that **Big Stone II** would emit approximately 4.7 million tons of CO_2 each year and over 225 million tons of CO_2 over the expected life of the plant. But the plant would "produce about 18% less CO_2 than other existing coal-fired plants because the super-critical boiler proposed here is more efficient than other forms of coal-fired technologies." Thus, the PUC found that **Big Stone II** "will not contribute materially to the increase in the production of anthropogenic carbon dioxide[.]" The PUC also found that **Big Stone II** "would increase U.S. emissions of carbon dioxide by approximately .0007, or seven-hundredths of one percent[.]"

[¶ 24.] In sum, considering the voluminous record, including the pre-filed testimony, the committee report, the environmental impact statement, and the applicable rules and regulations, the PUC concluded that "if constructed in accordance with the terms and conditions" set forth in its decision, **Big Stone II** "will not pose a threat of serious injury to the environment or to the social and economic conditions of the inhabitants or expected inhabitants in the siting area."

[¶ 25.] Accordingly, the PUC granted the Applicants a permit to construct **Big Stone II** in compliance with the terms and conditions of the PUC's decision. In circuit court, the Intervenors' appeal was affirmed. They now appeal to this Court asserting that the PUC's decision (1) violated the plain language of SDCL 49-41B-22; and (2) was clearly erroneous in light of the evidence as a whole.

Standard of Review

[1][2] [¶ 26.] Our review of the PUC's decision granting the Applicant's request for a permit to construct **Big Stone II** is controlled by SDCL 1-26-36. *See Tebben v. Gil Haugen Const., Inc.*, 2007 SD 18, ¶ 15, 729 N.W.2d 166, 171 (quoting *Wells v. Howe Heating & Plumbing, Inc.*, 2004 SD 37, ¶ 9, 677 N.W.2d 586, 590 (quoting SDCL 1-26-36)). The PUC's findings of fact are reviewed under the clearly erroneous standard, while its conclusions of law are reviewed de novo. *See id.* "A reviewing court must consider the evidence in its totality and set the [PUC's] findings aside if the court is definitely and firmly convinced a mistake has been made." *Id.* (citing *Sopko v. C & R Transfer Co., Inc.*, 1998 SD 8, ¶ 7, 575 N.W.2d 225, 228-29).

Analysis and Decision

[3] [¶ 27.] According to the Intervenors, the PUC erroneously applied SDCL 49-41B-22, and therefore, our review must be de novo, and we should accord no deference to the PUC's decision that **Big Stone II** will not pose a threat of serious injury to the environment. They argue that the PUC "was duty-bound to recognize" the findings by the scientific community concerning the impact of CO_2 emissions on global warming. Moreover, they argue that the PUC's finding that **Big Stone II** will emit 4.7 million tons of CO_2 each year clearly demonstrates that the plant will pose a threat of serious harm to the environment.

[¶ 28.] The Applicants respond that there are no regulations governing the emission of CO_2, and thus there are no standards by which to conclusively establish what amount of emission constitutes a threat of serious injury to the environment. According to the Applicants, the PUC was required to determine if **Big Stone II**, not all coal-fired facilities, will ***603** pose a

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threat of serious injury to the environment. Because **Big Stone II** is calculated to increase U.S. emissions by 0.0007, or seven hundredths of one percent, the Applicants contend that the PUC's conclusion is not clearly erroneous in light of all the evidence. Moreover, the PUC required that the Applicants report annually on any CO_2 regulations and their efforts to bring **Big Stone II** into compliance.

[4][5] [¶ 29.] We review the PUC's decision and decide whether, based on the evidence as a whole, we are left with a definite and firm conviction that a mistake has been made. *See* Sopko, 1998 SD 8, ¶ 6, 575 N.W.2d at 228. While we give due regard to an agency's well-reasoned and fully informed decision, we will not uphold clear errors of judgment or conclusions unsupported in fact. Our task in this appeal is to decide the narrow question of whether the PUC's conclusion that **Big Stone II** will not pose a threat of serious injury to the environment was clearly erroneous in light of all the evidence. *See id.*

[¶ 30.] There were over 1,400 pages of documentary evidence submitted in this case. The Applicants offered evidence of studies conducted concerning the effect **Big Stone II** might have on the environment and the community. They also submitted evidence regarding the alternative sources of energy they considered, but ruled out. The Intervenors do not dispute the Applicants' need for the additional wattage. Nor do they present an argument that there exists a viable alternative to **Big Stone II's** coal-fired facility. More significantly, the Intervenors suggest no standards by which the PUC may assess what amount of CO_2 emissions are tolerable. Rather, they maintain that CO_2 emissions, at any measurable level, seriously harm the environment.

[¶ 31.] Global warming presents a momentous and complex threat to our planet. A resolution for this problem, critical though it is, cannot be made in the isolation of judicial proceedings. The social, economic, and environmental consequences of global warming implicate policy decisions constitutionally reserved for the executive and legislative branches. To date, no CO_2 emission standards have been enacted by our political leaders. "Congress has recognized that carbon dioxide emissions cause global warming and that global warming will have severe adverse impacts in the United States, but it has declined to impose any formal limits on such emissions." *Connecticut v. American Elec. Power Co., Inc.*, 406 F.Supp.2d 265, 268-69 (S.D.N.Y.2005) (citing The Global Climate Protection Act of 1987, PL 100-204, Title XI, §§ 1102-03, reprinted at 15 U.S.C § 2901 note).[FN6]

> FN6. Recently, the United States Supreme Court ruled that the EPA was authorized to regulate CO_2 when the Court interpreted the phrase "any air pollutant" in the Clean Air Act to include automobile carbon dioxide emissions. *See Massachusetts v. E.P.A.*, 549 U.S. 497, 127 S.Ct. 1438, 1460-61, 167 L.Ed.2d 248 (2007). The Court reasoned that the use of the word "any" indicated that the statute was intended to require regulation of all air pollutants. *Id.*

[¶ 32.] As members of the judiciary, we refrain from settling policy questions more properly left for the Governor, the Legislature, and Congress. No matter how grave our concerns on global warming, we cannot allow personal views to impair our role under the Constitution. In South Dakota, the Legislature designated the PUC as the responsible agency for this question of granting a permit. We must uphold the PUC's decision unless we conclude that the ruling was "clearly erroneous in light of the entire evidence in the record or arbitrary or capricious or characterized by abuse of discretion or clearly unwarranted exercise of discretion." *See* ***604***Korzan v. City of Mitchell, 2006 SD 4, ¶ 12, 708 N.W.2d 683, 686 (citing SDCL 1-26-36).

[¶ 33.] The PUC, in its thirty-four page decision, entered several findings of fact concerning the issue of global warming and CO_2 emissions. It recognized that despite the asserted scientific consensus on the harm caused from global warming, neither Congress nor the South Dakota Legislature has chosen to regulate CO_2 emissions. Therefore, the PUC addressed the potential harm from **Big Stone II** by comparing the projected level of CO_2 emissions from **Big Stone II** to the level of emissions nationally. Because **Big Stone II** would increase CO_2 emissions by 0.0007, or seven hundredths of one percent, the PUC concluded the threat of harm would not result in serious injury. Nonetheless, as a condition on the permit, the PUC required that the Applicants submit annual reviews of any regulations on CO_2 emissions and their efforts to comply with those regulations.[FN7]

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FN7. The Applicants must "submit an annual report to the [PUC] on CO_2" which "shall review any federal or state action taken to regulate carbon dioxide, how the operator plans to act to come into compliance with those regulations, the expected costs of those compliance efforts and the estimated effect of such compliance on ratepayers. The report should also evaluate operational techniques and commercially-available equipment being used to control CO_2 emissions at pulverized coal plants, the cost of those techniques or equipment, and whether or not the operator has evaluated the prudence of implementing those techniques or equipment."

[¶ 34.] Our review of the record shows the PUC entered a well-reasoned and informed decision when it concluded that **Big Stone II** would not pose a threat of serious injury to the environment. It addressed the parties' contentions regarding global warming and CO_2 emissions and also provided a detailed explanation of why it rejected the findings proposed by the Intervenors.

[¶ 35.] While global warming and CO_2 emissions are considered harmful by the scientific community, what will pose a threat of *serious* injury to the environment under SDCL 49-41B-22 is a judgment call initially vested with the PUC by the Legislature. Nothing in SDCL Chapter 49-41B so restricts the PUC as to require it to prohibit facilities posing any threat of injury to the environment. Rather, it is a question of the acceptability of a possible threat. Resolving what is acceptable for the people of South Dakota is not for this Court. The Legislature and Congress must balance the competing interests of economic development and protection of our environment. Based on all the evidence and our limited scope of review, the PUC's decision was not clearly erroneous.

[¶ 36.] Affirmed.

[¶ 37.] GILBERTSON, Chief Justice, and SABERS, ZINTER, and MEIERHENRY, Justices, concur.
S.D.,2008.
In re Otter Tail Power Co. ex rel. Big Stone II
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Dustin Johnson, Chair
Steve Kolbeck, Vice Chair
Gary Hanson, Commissioner

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TO: HP09-001 Interveners
FROM: Public Utilities Commission Staff

DATE: June 12, 2009

Thank you for intervening in the TransCanada Keystone XL pipeline siting docket. At its June 9th meeting, the Commission approved the following schedule:

- Final discovery requests served by July 31, 2009, with replies due by August 24, 2009
- Additional Applicant (TransCanada) prefiled testimony due September 1, 2009
- Intervener prefiled testimony due September 8, 2009
- Staff prefiled testimony due September 25, 2009
- Applicant (TransCanada) rebuttal testimony due October 19, 2009
- Hearing in the Capitol Building, Pierre, South Dakota November 2 through 6, 2009

You are considered an "Intervener" and may provide testimony and participate in discovery if you wish. You must, however, submit your testimony in writing by September 8, 2009, if you intend to testify in the November live hearing. "Prefiled" testimony is a mechanism whereby all parties are put on notice, through written submissions, regarding his or her position in the case. You then must appear at the November hearing for your testimony to be placed into the formal record.

The Commission also approved consultant contracts at its June 9th meeting. PUC Staff will with work with environmental, engineering and socio-economic experts. To properly complete our research, we now ask for your input. Please answer the questions on the attached page. We ask that you submit your answers by July 13, 2009. You may submit answers electronically to Kara Semmler at: kara.semmler@state.sd.us or send them to the PUC offices at 500 E. Capitol, Pierre, SD 57501. Thank you for your research assistance. Please contact Kara Semmler at 605-773-3201 with any questions.

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT	)	INTERROGATORIES AND REQUEST FOR PRODUCTION OF DOCUMENTS HP09-001

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION STAFF'S FIRST SET OF INTERROGATORIES AND REQUEST FOR DOCUMENTS TO ALL INTERVENERS EXCEPT DAKOTA RURAL ACTION

The Staff of the Public Utilities Commission ("Staff"), by and through its Staff Attorney, hereby submits the following Interrogatories and Requests for Production of Documents to you. Responses should be received on or before July 13, 2009.

INSTRUCTIONS

1. You are required to stipulate in writing that your responses may be treated exactly as if they were filed under oath.

2. A verification or signature of the answering individual or counsel is requested with the answers for these requests as an indication of the genuineness and completeness of the responses and documents provided.

DEFINITIONS

1. "Commission" refers to the South Dakota Public Utilities Commission.

2. "Request" includes any and all interrogatories, requests for production of documents, information requests or other document request.

3. "Person" or "Persons" shall mean any individual, association, partnership, corporation, firm, organization, or entity.

4. "Refer," "referring to," "relate" and "relating to" shall mean having a legal, factual or logical connection, relationship, correlation, or association with the subject matter of the request.

5. Words of gender shall be construed as including all genders, without limitation.

6. Words in the singular shall be construed to mean the plural or vice versa as appropriate.

REQUEST 1: State your name, address and telephone number.

REQUEST 2: State whether you own land crossed by the pipeline, own land on which a pumping station is planned or believe your property is otherwise affected by the pipeline. Provide detail regarding the pipeline and associated facilities location relative your property.

REQUEST 3: If you do not own land or have an interest in land crossed or affected by the Pipeline, please state any perceived impacts the pipeline will have upon yourself, your property, or your interests.

REQUEST 4: The applicable applicant burden of proof reads as follows:

> *49-41B-22. Applicant's burden of proof. The applicant has the burden of proof to establish that:*
>
> *(1) The proposed facility will comply with all applicable laws and rules;*
>
> *(2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;*
>
> *(3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and*
>
> *(4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.*

Specify particular aspect(s) of the applicant's burden of proof for which you have specific concerns.

REQUEST 5: If your property is crossed by the pipeline, specify and explain any unique characteristics or conditions on your property that could affect the analysis of the pipeline siting.

REQUEST 6: Generally what issues do you have with the pipeline relative to PUC jurisdiction?" Examples would be sensitive wildlife, reclamation, roads, emergency services, etc. Please do not include non-jurisdictional issues such as easements, pipe wall thickness and the 80 % waiver. (If you have questions about what is jurisdictional, please contact Kara Semmler.)

REQUEST 7: Do you intend to submit prefiled testimony? If so, of whom?

REQUEST 8: As an ongoing request, provide Commission Staff with a copy of all data, documentary or interrogatory requests you send any party to this docket along with its complete answer to such request.

REQUEST 9: Please specify any other information that may be useful as we begin our research and analysis of this pipeline siting application.

Dated at Pierre, South Dakota, this 12th day of June, 2009.

Kara Semmler
Staff Attorney
South Dakota Public Utilities Commission
500 East Capitol
Pierre, SD 57501
(605) 773-3201

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT	)	HP 09-001
	)	**CERTIFICATE OF SERVICE**

I hereby certify Interrogatories and Requests for Production of Documents were served upon all of the parties listed below on the 12th day of June, 2009, either electronically or by mailing a true and correct copy thereof to them by first class mail, postage prepaid, at their last known addresses, to-wit:

MS MARY JASPER - maryjasper@hotmail.com
MR. PAUL SEAMANS - jacknife@goldenwest.net
MS CAROL MOYER - dakotamum@yahoo.com
MS JACQUELINE LIMPERT - slimbuttes@hughes.net
MR JOHN HARTER - johnharter11@yahoo.com
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BY: Kara Semmler

Kara Semmler
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BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

DOCKET HP14-001

PREFILED TESTIMONY OF DARREN KEARNEY
ON BEHALF OF THE COMMISSION STAFF
ORIGINAL APRIL 2, 2015 – AMENDED JULY 23, 2015

Q. State your name.

A. Darren Kearney.

Q. State your employer and business address.

A. South Dakota Public Utilities Commission, 500 E Capitol Ave, Pierre, SD, 57501.

Q. State your position with the South Dakota Public Utilities Commission.

A. I am a Staff Analyst, which is also often referred to as a Utility Analyst.

Q. What is your educational background?

A. I hold a Bachelor's of Science degree, majoring in Biology, from the University of Minnesota. I also hold Masters of Business Administration degree from the University of South Dakota.

Q. Please provide a brief explanation of your work experience.

A. I began my career in the utility industry working as contract biologist for Xcel Energy, where I conducted biological studies around various power plants, performed statistical analysis on the data collected, and authored reports in order to meet National Pollutant Discharge Elimination System (NPDES) permit requirements.

After two years of performing biological studies, I then transitioned into an environmental compliance function at Xcel Energy as a full time employee of the company and became responsible for ensuring Xcel's facilities maintained compliance with the Oil Pollution Act of 1990. This involved writing Spill Prevention Control and Countermeasure (SPCC) plans and also ensuring Xcel facilities maintained compliance with those plans. During this time I was also responsible for the company's Environmental Incident Response Program, which involved training Xcel employees on spill reporting and response, managing spill cleanups, and mobilizing in-house and

contract spill response resources. I was also responsible for aboveground storage tank permitting during this time.

I was in that role for approximately three years and then I transitioned to a coal-fired power plant at Xcel and became responsible for environmental permitting and compliance for the plant. Briefly, my responsibilities involved ensuring that the facility complied with all environmental permits at the plant, which included a Clean Air Act Title V Air Permit, a Clean Water Act NPDES permit, and a hazardous waste permit. I also submitted reports on the plant's operations to various agencies as required by permit or law. After three years at the power plant, I left Xcel Energy to work for the South Dakota Public Utilities Commission (SD PUC).

I have been at the SD PUC for just over two years now. During this time I worked on a variety of matters in the telecom, natural gas, and electric industries. The major dockets that I worked on were transmission siting dockets, pipeline siting dockets, and energy efficiency dockets. I also attended a number of trainings on public utility policy issues, electric grid operations, regional transmission planning, electric wholesale markets, and utility ratemaking.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission.

Q. Were you involved in the Keystone XL permitting docket, HP09-001?

A. No.

Q. Did you file prefiled testimony in HP09-001?

A. No. However, I adopt the testimony of Staff witness Tim Binder in docket HP09-001. (Exhibit___(DK-1))

Q. Did you provide testimony at the evidentiary hearing in HP09-001?

A. No.

Q. Have you thoroughly reviewed all of the information filed in HP14-001?

A. Yes. I also reviewed the following: relevant sections of the Department of State's Final Supplemental Environmental Impact Statement; relevant background information included in docket HP09-001; South Dakota Codified Laws and Rules applicable to the Petition; and discovery requests and responses of all parties.

Q. Were other Staff involved in the review of this petition?

A. Yes. Other Staff members involved in the review consisted of Brian Rounds (Staff Analyst) and Mary Zanter (Pipeline Safety Inspector).

Q. Explain, in your words, the role of the SDPUC Staff in the Petition proceedings.

A. After initial review of the filing, Staff identified the findings of fact changes provided by Keystone XL in Exhibit C of the petition that Staff believed could impact the opinions of Staff's expert witnesses that were provided in docket HP09-001. Staff then procured consultants, making a good-faith effort to utilize the same witnesses or consultants used in docket HP09-001, to review the changes identified by Keystone XL and determine the following: 1) if the changes identified in Exhibit C resulted in a change to the professional opinion provided by Staff's witnesses in HP09-001, 2) if the changes identified in Exhibit C comply with the rules and regulations that the witnesses are subject matter experts of, and 3) whether any other Keystone XL project changes or

information in the witnesses' possession resulted in a change to their professional opinion.

In regards to processing the Petition by the Commission, Staff made great efforts to educate interveners on the process. Specifically, Staff responded to calls and emails from interveners with questions on a number of matters, including: the role of an intervener, the procedural schedule, the proper form of discovery, what laws and rules are applicable to the proceeding, and other miscellaneous information requests.

Staff was also active in discovery, where Staff submitted interrogatories to Keystone XL and responded to interrogatories submitted to Staff by Keystone XL and other interveners. Upon closure of discovery, Staff reviewed all interrogatories and responses communicated between all parties in order to understand the issues that could potentially be contested during the proceeding.

Q. What did Staff focus on during its review of the Petition?

A. In accordance with the Commission's order in this docket to limit the scope of discovery only to issues relevant to whether the proposed Keystone XL Pipeline continues to meet the fifty permit conditions set forth in Exhibit A of the June 29, 2010, Amended Final Decision and Order and the changes identified by Keystone XL in Exhibit C, Staff focused its review on the fifty permit conditions and Exhibit C changes. Moreover, Staff's experts focused their review on the project changes identified in Exhibit C that fell within their areas of expertise.

Q. How many parties were granted party status?

A. The commission granted party status to forty-two parties. All individuals who filed for party status were granted party status, however it is Staff's recollection that

during the hearing it was clarified that Jane Kleeb and Benjamin D. Gotschall had both filed for party status on behalf of Bold Nebraska. Therefore, their applications for party status were combined and the Commission approved one application of party status for the Bold Nebraska organization.

Q. How many parties withdrew as interveners?

A. As of the date of writing this testimony, three interveners requested withdrawal of their party status and the Commission so approved. These interveners were the South Dakota Wildlife Federation, the Sierra Club, and Jeff Jensen.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	))))))	**CERTIFICATE OF SERVICE** **HP14-001**

I hereby certify that true and correct copies of Prefiled Direct Testimony of Brian Walsh and Exhibit BW-1, Derric Iles and Exhibit DI-1, Kim McIntosh and Exhibit KM-1, Tom Kirschenmann and Exhibit TK-1, Daniel Flo and Exhibit DF-1 and DF-2, David Schramm and Exhibit DS-1, Jenny Hudson and Exhibit JH-1, Christopher Hughes and Exhibit CH-1, Paige Olson and Exhibit PO-1, Darren Kearney and Exhibit DK-1, and Certificate of Service were served electronically to the Parties listed below, on the 2nd day of April, 2015, addressed to:

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And on April 2, 2015, a true and accurate copy of the foregoing was mailed via U.S. Mail, first class postage prepaid, to the following:

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, MP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PROJECT	:	HP 14-001

Pursuant to the Commission's order granting motion to define issues and setting procedural schedule, Intervener Gary F. Dorr offers the following direct testimony of Wayne Frederick.

1. Please state your name and address for the record.
   Answer: My name is Wayne Frederick. My business address is 11 Legion Avenue, Rosebud, South Dakota 57570.

2. Please state your position and provide a description of your areas of responsibility with respect to the Keystone XL project.
   Answer: I am an elected member of the Rosebud Sioux Tribal Council. I have been appointed as the lead contact with respect to the Rosebud Sioux Tribe's opposition to the proposed Keystone XL pipeline. I sponsored a resolution which the Rosebud Sioux Tribe overwhelmingly approved that opposes the Keystone XL pipeline crossing through Rosebud Sioux Territory and over the Mni Wicnoni Waterline otherwise known as the Ogallala Sioux Rural Water Supply System.

3. Please state your professional qualifications and experience with tribal government.
   Answer: My professional background is attached as exhibit A. I have an Associate of Arts degree in Diesel Mechanics, and two bachelor degrees in Human Services and Criminal Justice. I have several years in buffalo herd management having managed both Sinte Gleska University's and the Rosebud Sioux Tribe's herds. I have the oldest continuous native owned ranch in Todd County. I have served on the Tribal Land

Enterprise Board, Economic Development Board, the Tribal Ranch Board as well as the Law and Order Subcommittee. In addition I am a regional director for the Inter-Tribal Buffalo Council.

4. Please state the position of the Rosebud Sioux tribe with respect to an infringement of treaty rights upon the Treaty Territory of the Rosebud Sioux Tribe.
   Answer: The Keystone XL pipeline will be a Gross violation of Article 16 and Article 11 of the Treaty of 1868. Although the land ownership has changed, the nature of the treaty stipulations was never removed or abrogated by Congress and they remain as part of the land like an encumbrance or you might equate it with a conservation easement. Until the easement has been removed it stays with the land. Our treaty-reserved rights carry with the land where today counties sit. Article 16 gives the Rosebud Sioux the right to say who passes through the territory. The Rosebud Sioux is supremely opposed to the Keystone XL pipeline passing through the territory and also endangering our Mni Wiconi Waterline. The entire Mni Wiconi waterline supply "system" is held in trust for four tribes by the United States as part of their trust responsibility. Thus if the State approves a permit for the Keystone XL pipeline they will be in violation of Article 6 of the U.S. Constitution which states the "Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the Constitution or laws of any State to the contrary notwithstanding. Therefore, allowing this pipeline to cross even though the Rosebud Sioux Tribe opposes it being built here will place South Dakota in violation of Article 6 of the United States constitution. We therefore as a Tribe, as a Sovereign Tribal Government oppose the Keystone XL pipeline.
5. Are you aware of any reason that Keystone cannot continue to meet the condition on which the permit was granted by the Commission?
   Answer: Yes, there is an easement negotiated by the United States for the Tribes as part of their trust responsibility to provide safe drinking water to the tribes. This easement agreement for the Oglala Sioux Rural Water Supply System was amended to add the Rosebud Sioux Tribe, the Lyman-Jones Rural Water system, the Cheyenne River Sioux Tribe and the Lower Brule Sioux Tribe to the Oglala Sioux Tribe as beneficiaries of the water line. The entire system is held in trust for the Tribes by the United States. The wording in the agreement signed by the grantors in the State of South Dakota stipulates that the ground above and surrounding the easement for the Oglala Sioux Rural Water Supply System cannot be disturbed without permission from the Oglala Sioux Rural Water Supply System and the United States. The Rosebud Sioux Tribe does not give permission and I am aware of other members of the Great Sioux Tribe who have passed

resolutions opposing the disturbing of ground around, under, or on top of the Oglala Sioux Rural Water Supply System. We call it the Mni Wiconi water line. This easement agreement and the entire water system was created and is supported by Public Law 100-516. Since the Rosebud Sioux Tribe has not approved of the disturbance of ground in the Oglala Sioux Rural Water Supply System easement agreement, this Keystone XL permit cannot be granted. If TransCanada has truly conducted meaningful consultation this would have been revealed to them and the Department of State.

Also if the State of South Dakota would have consulted with tribes as part of South Dakota Codified Law 1-54-6, then in their consultation with the Bureau of Indian Affairs, the state of South Dakota would have learned of the Federal recognition of the Rosebud Sioux Tribe's opposition to the Keystone XL pipeline crossing their territory and crossing the Mni Wiconi waterline easement. Further, if the State of South Dakota would have consulted with the Rosebud Sioux Tribe in accordance with South Dakota Codified Law1-54-5, then the State of South Dakota would have found directly that the Rosebud Sioux Tribe is opposed to the Keystone XL pipeline and South Dakota would have complied with its own "policy" of consulting with tribal governments. For these reasons, the pipeline should not be approved because in addition to the Federal Government not negotiating with tribes in accordance with Section 106, National Historic Preservation Act, the State of South Dakota did not negotiate with tribes in accordance with South Dakota Codified Law, and TransCanada did not meaningfully consult with the Rosebud Sioux Tribe in accordance with the Treaty of 1868 stipulations which have never been abrogated.

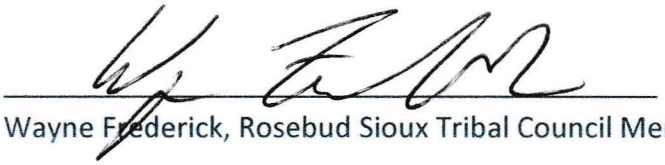
Additionally, a cultural effigy has been discovered along the route on a cultural survey conducted by the Rosebud Sioux Tribal Historic Preservation Office in late 2014. This effigy deserves protection and is eligible for registry as a Tribal Cultural Property and a National Landmark.

6. Has the Tribal Council been made aware of the results of the cultural survey conducted by TransCanada?

   Answer: Yes, I believe that the survey was published in the FSEIS and it indicated that a tribe conducted the survey on Rosebud territory and in several political precincts of the Rosebud Sioux Tribe. For those reasons, the Rosebud Sioux Tribe is the "appropriate Tribe" for purposes of the consultation as part of the Section 106 of the National Historic Preservation Act. If this permit is granted by South Dakota, it will be in violation of a Federal Law. It is understood that South Dakota does not have jurisdiction over those actions; however, it is also understood that you cannot violate the Tribe sitting in the middle of the process by allowing the permit to proceed. If for instance, at a later time, the United States determined that the cultural survey conducted by TransCanada from a moving vehicle was insufficient and that no U.S. Permit should proceed, then any

previously approved permit from South Dakota would not meet the stipulations of the first amended permit condition to obey all laws and regulations. This would place South Dakota and TransCanada in violation of a theoretically approved permit. This permit now, being approved before the Federal process is premature and should not be allowed.

7. Has the Rosebud Sioux Tribal Government through its Tribal Historic Preservation Office been consulted about an unanticipated discoveries plan by TransCanada?
   Answer: No they have not been meaningfully consulted. Publishing a plan or an environmental impact statement does not amount to meaningful consultation with a government. When the United States consults with the Rosebud Sioux Tribe there is meaningful dialogue. Our Tribal Historic Preservation Office is a Federally recognized office and deserves to be part of any unanticipated discovery plan for any project taken on traditional territory of the Rosebud Sioux Tribe. We have four housing areas off the reservation which sit on Trust land and are still under the jurisdiction of the Rosebud Sioux Tribal government which are in areas of impact from the Keystone XL pipeline. Those tribal housing areas are Ideal, Winner, Milk's Camp, and Bonesteel. These are traditional tribal living areas and as a result they have many sites to be protected. Many of our tribal burial sites were protected by secrecy because of the looting that took place in historic times and even continues today. As a result, many sites are known only by families and even the Tribal Historic Preservation Office may not know until they ask where these sites are. Our people are very protective of our sites and so they will more willingly give information to our tribal archaeology department staff rather than a foreign corporation's staff. We use specialized techniques that cannot be done from a moving vehicle in conducting a cultural survey. The result is that since TransCanada did not coordinate and continues not to coordinate with the Rosebud Sioux Tribe by not including the Rosebud Sioux Tribal Government's Tribal Historic Preservation Office as part of the unanticipated discoveries plan, they could disturb significant burial and cultural sites and areas. If the Tribe is not included as part of this process, again, this places the South Dakota Public Utilites Commission and TransCanada in violation of Article 1 of the 50 Amended Permit Conditions.
8. Does this conclude your pre-filed direct testimony?
   Answer: yes.
   Dated this 2nd day of April, 2015.



Wayne Frederick, Rosebud Sioux Tribal Council Member

Honorable Wayne Frederick,
Rosebud Sioux Tribal Council

Years of Tribal Government Experience: 16

Community Government Elected Experience

- 1 term as Treasurer at Okreek Community Board
- 1 term as Sergeant at Arms at Okreek Community Board
- 1 3-year term on Rosebud Economic Development Company Board
- 1 3-year term on Tribal Ranch Board of Directors
- 1 3-year term on Inter Tribal Buffalo Council
- Currently serving a 3 year term on Rosebud Sioux Tribal Council, the governing body of the Rosebud Sioux Tribe
- Currently serving on the Rosebud Sioux Tribe Police Commission
- Currently serving on the Rosebud Sioux Tribe Land and Natural Resources Committee

Work Experience

- 9 years as the Buffalo foreman for the Sinte Gleska University Herd
- 4 years as the Director of the Rosebud Sioux Tribe buffalo herd
- Owner of the oldest continuous Native Owned Ranch in Todd County spanning 7 generations

Education

- Dual Bachelor of Science in Human Services and Criminal Justice, Sinte Gleska University
- Associate of Applied Science in Diesel Technology, Northeast Community College

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	)	Docket 14-001 **TESTIMONY OF CINDY MEYERS**

Statement for the South Dakota Public Utilities Commission ("PUC")

My name is Cindy Myers, R.N. My address is 87925 468th Ave., PO Box 104, Stuart, NE 68780.

This testimony is submitted regarding Amended Conditions: 2, 34, 35, 36, 40, 46 and Finding of Facts: 41, 50, 107 of the Amended Final Decision and Order in HP 09-001.

Introduction

Benzene, a potent carcinogen, has increasingly become the most threatening of all environmental toxins. Cancer is primarily an environmental disease. Allowing one of the largest pipelines filled with the world's dirtiest oil, under the most extreme pressure to funnel benzene and other toxins into South Dakota is a major public health threat. The lifeblood of South Dakota, the Missouri River, which supplies water to over 50% of the state must be protected. The pristine High Plains Aquifer in Tripp County will have this mega toxic infrastructure immersed in water which supplies a municipal well and several private wells. Water protection and Medical Response Planning are not sufficiently considered for this project.

SDCL 49-41 B-22 states: The applicant for a facility construction permit has the burden of proof to establish that:

> "The facility will not substantially impair the health, safety or welfare of the inhabitants."

TransCanada Keystone Pipeline, LP ("TransCanada") has failed to meet this burden of proof. TransCanada has failed the most important condition of this application: the health, safety and welfare of South Dakotans. I ask the PUC to put aside economic benefits for a foreign company and instead think about what is in the best interest of the good people of South Dakota.

010979

Testimony

As a Registered Nurse, I believe two issues are of paramount importance in ensuring the health, safety, and welfare of South Dakota's residents: (1) clean drinking water, and (2) medical preparedness. If the PUC approves the proposed KXL Pipeline, I believe the health, safety, and welfare of citizens will be impaired or at risk.

Toxicity

Benzene is a potent carcinogen. According to E.P.A. standards, the maximum contamination goal in water is zero. The allowable limit in drinking water is only 5 parts per billion! This is so dilute, you can't taste, see or smell this toxic amount in drinking water. It can only be discovered by testing. Therefore, it would be possible to drink benzene unknowingly. Benzene is a component of oil and the diluent used to thin heavy tar sands oil. We don't know the exact amount because this information is kept from the public by TransCanada, even though such minute amounts of benzene can have major adverse health effects.

NAPHTHA is the primary diluent for bitumen. It is a brew of chemicals, including benzene. Up to 50% of the tar sands product is diluent, meaning 10,000,00 gallons a day of this poison would be gushing through South Dakota daily through a 36 inch pipe under extremely high pressure. NAPHTHA is a known carcinogen, but also capable of causing birth defects and reproductive harm. Scientists and medical professionals in Utah are connecting benzene to a host of severe medical diagnoses, thinking benzene, toluene, and xylenes cross the placental barrier, resulting in dead babies and birth defects.

TransCanada admits: "Benzene can result in health impacts from short-term exposure or long-term exposure." But according to John Stansbury, Ph.D., Associate Professor of Environmental/Water Resources Engineering at U.N.L. , TransCanada has failed to adequately study benzene: "If the leak does go undetected for 90 days as the TransCanada document reports, a groundwater user could be exposed to unacceptable concentrations of benzene for a significant period of time. There should have been a human health risk assessment that would have estimated the increased risk of cancer, but there isn't any such assessment. They simply indicate that there could be a significant, undetected release of benzene which could be consumed by human receptors and leave it at that."

The 2010 permit clearly indicates concern about chemicals in the KXL product: BTEX (benzene, toluene, ethyl benzene, xylene). The 2010 permit directs: "At least forty-five days prior to construction, Keystone shall publish a notice in each newspaper of general circulation in each county through which the Project will be constructed advising landowners and public water supply systems of this condition."

Dr. Cleve Trimble is a Nebraska physician concerned about health impacts from the unknown chemical composition and the difficulty in providing treatment.

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Aquifers

This massive toxic infrastructure is routed to go straight through the Ogallala Aquifer in Tripp County. This is a major health threat to people drinking from the several private wells and public water system drinking water from that source. Condition of Permit #35 states "The evidence in the record demonstrates that in some reaches of the Project in southern Tripp County, the High Plains Aquifer is present at or very near ground surface and is overlain by highly permeable sands permitting the uninhibited infiltration of contaminants." Residents are not even informed if they live in a "high consequence area" and risks associated with that designation.

I live where the first KXL route was to cross in Nebraska. That route was moved because of the high water table and sandy soil, similar to the situation in Tripp County which is also underlain by the Ogallala Aquifer. If this was reason to change the route in Nebraska, how come it is still acceptable in South Dakota?

Neither TransCanada nor SD have plans to do prophylactic analyses for the very potential undetected leaks, choosing only to do analyses "in the event of a release." TransCanada ran the route straight through the Ogallala Aquifer to get the shortest route to the Bakken Oil, telling me: "Meeting the proposed project's purpose and need, including the extent to which additional infrastructure (pipeline) is necessary to access Bakken crude oil." The priority here should be the people who drink water in Tripp County.

TransCanada admits other aquifers may not be identified until construction, implying that a thorough pre-evaluation of route has not been accomplished. Oil migrates deep into the ground. In the wheat field near Tioga, ND, 50 feet of soil was required to be removed to evacuate all the spilled oil.

Waterways

TransCanada plans to route KXL through major river valleys in South Dakota: Little Missouri, Cheyenne and White River. These waterways feed into the life blood of South Dakota, the Missouri River. Intakes from the Cheyenne and Missouri Rivers provide drinking water to many cities and reservations across the state, stretching from the Pine Ridge Reservation in western SD to Sioux Falls near the state's eastern border.

We know the tar sands spill into Michigan's Kalamazoo River spread several miles downstream. Visible oil from the 2011 Silvertip pipeline break into the Yellowstone River was found 70 miles downstream. An oil sheen was seen an estimated 100 miles downriver three days after the Jan 2012 pipeline break in the Yellowstone River near Glendive, MT. What we don't know and see is exactly how far and where the benzene plumes migrate to down the rivers.

Arden Davis and John Stansbury both estimate hundreds of miles. The Department of State's environmental study, relied on by South Dakota, only takes into consideration the impact of spills 10 miles downstream.

Waterway Crossing	Distance to Missouri River	Public Water Intake	Distance from KXL to Water Intake
Cheyenne River	89.5 miles	Cheyenne Reservation	50-60 miles, est.
Cheyenne River	89.5 miles	OSRWSS	89.5, est.
Cheyenne River	89.5 miles	Chamberlain	156 miles, est.
White River	82.4 miles	Yankton	222 miles, est
White River	82.4 miles	Sioux Falls	unknown location

Health Impact Assessment

The Commission's 2010 permit relies on the federal EIS, prepared by the Department of State.

SDCL 49-41 B-21:"Environmental impact statement. Prior to the issuance of a permit, the commission may prepare or require the preparation of an environmental impact statement that complies with the provisions of chapter 34A-9"

The federal EIS, required for a cross-border Presidential permit, is not sufficient to adequately address concerns pertinent to South Dakota, particularly health concerns

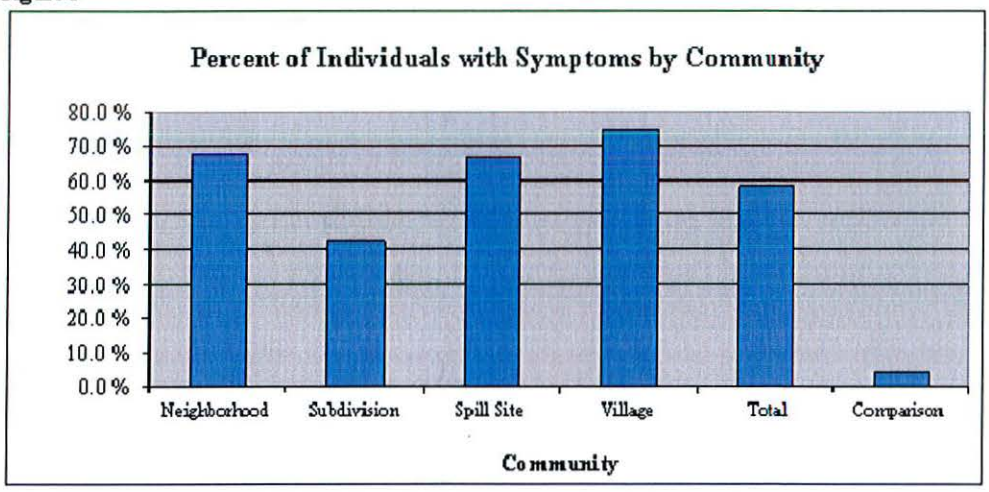
The FSEIS has several chapters. There are chapters exclusively for wildlife, fisheries and threatened and endangered species. There is even a chapter just about terrestrial vegetation, but….there is not even one chapter devoted to how KXL will impact people! The federal study does not include a health impact assessment and the state of SD did not do a health impact assessment.

Medical Preparedness

Tar sands oil spills into Michigan's Kalamazoo River and into the community of Mayflower, Arkansas have demonstrated that medical communities must be prepared to respond to major oil spills and the specifics of benzene toxicity. Emergency response is mentioned in the 2010 permit, implying a response plan for cleaning up spills, but this does not describe an emergency medical response plan.

Acute Health Effects of the Enbridge Oil Spill (Kalamazoo) Michigan Department of Health identified 320 (58%) of 550 individuals with adverse health effects from four community surveys along the impacted waterways.

Figure 3



TransCanada's pamphlet "Oil Pipeline for Emergency Responders", contains absolutely no information geared toward health care providers. It simply says to "Monitor for I-EL, H S and benzene if possible". What lay person knows what that means? Are first responders equipped to test for benzene in the air?

TransCanada declares "Public disclosure of the emergency response plan could commercially disadvantage keystone." Not preparing the medical community for tar sands oil spills could physically disadvantage South Dakotans.

TransCanada has not communicated with Indian Health Services or South Dakota health care facilities medical information such as specifics about tar sands oil product, KXL spill scenarios, and staff education and training for effective treatment of people exposed to benzene. Treating adverse health effects from massive benzene toxicity is not usual for most health professionals.

The "Draft" TransCanada-Keystone Emergency Response Plan in the FSEIS, Appendix Q does not include medical response planning, only a place to list the nearest hospital.

I visited with Kevin Schlosser, Emergency Management Coordinator
Avera McKennan in Sioux Falls (Assists Avera St. Mary's, Pierre, SD) He has not seen a Safety Data Sheet, SDS, describing chemicals involved in tar sands oil. He would like to know "What are we dealing with? What is the time-frame? When would it would reach us (in the water). I have not seen any of that. For decontamination purposes and for treating patients, we rely on a SDS. If they would provide a SDS, it would be kept in the Emergency Department to have readily available."

Kevin is not aware of education or training to prepare medical communities to affectively respond to major oil spills. TransCanada directed me to the FSEIS when I asked about an MSDS. The FSEIS gave samples of an MSDS, but stated they do not represent the actual product that would flow through the proposed Keystone XL pipeline. TransCanada has responded "TransCanada is not a medical provider and does not provide medical

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information. The local medical authority has jurisdiction during an incident or emergency."

Contamination of Public Water Intakes

GLENDIVE MONTANA, January 2015
"Breach in pipeline found; cancer-causing agent detected in water "
--- Billings Gazette

What happened in Glendive MT, could happen in SD. After an oil pipeline spilled miles upstream, benzene was found to be up to triple the mcl in the public water system. The residents weren't warned not to drink the water until two days later! Because water treatment plants do not remove benzene, water plants must be shut down.

Are Water Treatment Plants Prepared in SD?

I contacted three water treatment plants using Missouri River water. Two plants responded they were unaware of any emergency plan in response to a tar sands oil spill directly or indirectly affecting the Missouri. One plant stated the Bureau of Reclamation would notify them if an oil spill threatened the water supply. Another plant stated DNR usually sends out information, but "haven't heard a word from them" when asked what he knew about tar sands spillage into water. One plant thought benzene analysis was done quarterly and another plant thought benzene analysis was done yearly. The third plant did say a spill kit (for water analyses) is available for emergencies.

Dr. Madden Testimony

Testimonial analysis by Dr. Madden is woefully inadequate to meet SDCL 49-41 B-22. which requires the project must protect the health, safety and welfare of SD residents. He is not a medical doctor, but an economist

INDUSTRY	SOURCE OF ECONOMIC IMPACTS	DIRECTION OF IMPACT	NET IMPACT
HEALTH	Revenue	Positive	Positive
	Labor Costs	None Significant	
	Displacement of Traditional Users	None	

Conclusion

Who is responsible for the health,safety and welfare of SD citizens? TransCanada responded these concerns were addressed by the commission, but the law clearly states the applicant is responsible.

SDCL 49-41 B-22 states: The applicant for a facility construction permit has the burden of proof to establish that:

"The facility will not substantially impair the health, safety or welfare of the inhabitants."

TransCanada has not met the burden of proof establishing this project will not impair the health, safety or welfare of the good people of South Dakota and the many other US citizens living downstream.

TransCanada affirmed to me "Keystone has not asserted that the project would have 'no impact on the health, safety and welfare of SD'".

April 2, 2015

CINDY MYERS, R.N.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	)	Docket 14-001 **TESTIMONY OF PAUL F. SEAMANS**

Statement for the South Dakota Public Utilities Commission:

My name is Paul F. Seamans. I ranch south of Draper and the Keystone XL route crosses my land.

Eminent Domain:

First and foremost my biggest problem with TransCanada is their use of the threat of eminent domain. The first time that TransCanada's land agents came on my place they told me that I had just as well sign an agreement now as this would be the best offer that I would get, their next offer would probably be less, and oh, by the way, they have the power of eminent domain and they could condemn my land if I refuse to sign. I consider myself one of the lucky ones in that the Universal Field Services land agent in my area is a friend from the Kennebec area who realizes that he has to live around here and treated landowners with some respect. I have talked to friends from other areas that weren't quite so lucky.

During the past year TransCanada has stated in the press that they had 100% of the landowners in South Dakota and Montana willingly sign easements. The key word here is "willingly". Dakota Rural Action and their sister organization in Montana, Northern Plains Resource Council, issued a joint press release soon after this claim and in part questioned the use of the word "willingly". DRA and NPRC pointed out that most landowners signed under duress knowing that most court cases that challenge eminent domain are rarely successful. TransCanada's claim of not having used eminent domain in South Dakota is also false. A landowner one mile east of my land would not sign an easement and TransCanada had his land condemned in a Jones County jury trial. There may be other cases of this happening of which I am not aware.

TransCanada's promise of huge property tax revenues:

Local citizens will usually welcome TransCanada's pipelines fully expecting windfall yearly property tax revenues. Over the past couple of years TransCanada has been promising yearly property tax payments of $10.3 million to the counties along the route in South Dakota. They have recently almost doubled this promise to $20 million per year for the 313 miles of pipeline in South Dakota.

As part of my first round discovery I requested to know the total yearly property tax payments made to counties along the Keystone 1 route in South Dakota. The figures provided to me by TransCanada for the 200 miles of route are: $2,954,846 for 2010; $3,145,207 for 2011; $3,435,037 for 2012; and $3,934,669 for 2013. This four year average figures out to be $3,367,439 per year. TransCanada had promised $9 million per year. The counties are receiving 37.5% of the taxes that they were promised.

Figuring taxes paid by TransCanada on a per mile basis would give $16,839 per mile. To make an estimate of what the property taxes paid by TransCanada would be for the 313 miles of Keystone XL in South Dakota one could multiply the $16,839 of taxes paid per mile times the 313 miles of KXL pipeline. This would give a figure of $5,270,000 in new property tax revenue received by counties along the route. TransCanada has been promising $20 million per year. This is a huge difference and goes directly to TransCanada's credibility – or more appropriately, their lack of credibility.

Threats to our drinking water:

I feel that some of the biggest threats to our drinking water come from where the Keystone XL crosses major tributaries of the Missouri River. In South Dakota I feel the biggest problems could arise where the pipeline crosses the Cheyenne River and the White River. Both of these rivers have a wide river bottom and will carry huge amounts of water during flood stage. A pipeline break during flood stage would be nearly impossible to clean up. The soils in the river breaks of both rivers are highly susceptible to slides. Unless horizontal directional boring is started at the top of the breaks quite a distance back from the edge then there is a possibility of a pipe being broken by a large slide. I don't think that TransCanada fully realizes the enormity of these slides.

The latest route maps of the Keystone XL available on the PUC website show mainline check valves (mlv) for where the pipeline crosses the Cheyenne River. The mlv on the north side of the Cheyenne River in Meade County is at mile post (mp) 415. The next mlv is on the south side of the river in Haakon County at mp 431. This is a distance of 16 miles. There are 279,190 gallons of dilbit in one mile of 36" pipe. For sixteen miles of pipe this would be 4,467,032 gallons in the pipeline. In case of a break a conservative estimate is that 40% of the oil in the pipe would drain back after the valves are closed. This means that 1,786,000 gallons could drain back into the Cheyenne River in case of a major break.

With the addition of the Lewis and Clark water project now serving the Sioux Falls metro area combined with all the other rural water systems dependent upon the Missouri River for water I would estimate that at least 50% of South Dakota's population relies on the Missouri River for their drinking water. A major pipeline spill in the Cheyenne River that flows into the Missouri River could have major consequences.

Emergency Response Plans and High Consequence Area's

I have told TransCanada in discovery that I would like to see their Emergency Response Plan (ERP) for the Keystone 1 pipeline. TransCanada has informed me that their ERP is covered by a confidentially clause. I then told TransCanada that I wanted to see the list of High Consequence Areas (HCA's) and that I wanted to know why the total length of HCA's in South Dakota along the Keystone XL route has decreased from 34.3 miles in the Draft EIS down to 19+ miles in the FSEIS. I was told by TransCanada that the HCA's are addressed in the ERP and that again the ERP is considered confidential information. I feel that all portions of the ERP that can't be considered proprietary information should be made available to the public. Without this information, there is no way the public can be fully informed about the risks posed to our water resources.

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I hereby affirm under penalty of perjury that the above testimony is true and correct.

Paul F. Seamans
PAUL F. SEAMANS

April 2, 2015
(date)

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	)	Docket 14-001 **TESTIMONY OF EVAN VOKES ON BEHALF OF DAKOTA RURAL ACTION**

Statement for the South Dakota Public Utilities Commission

The current management of TransCanada is in my opinion, a very significant technical threat to the safety of pipelines, including the proposed KXL pipeline through South Dakota and Nebraska.

I have a Master's Degree in Materials Engineering and worked for five years at TransCanada Pipelines; I witnessed both firsthand and from the sidelines the effects of their political/business decisions that flew in the face of common sense and science. In 2012, I was terminated without cause, as I was pointing out how wrong the business model followed by management of this corporation was and what a threat to public safety they were. The reason why an employee such as myself knows so much is that my small department of 12 engineers operated as a small Engineering Specialist company within the corporation, although project managers did not have to engage us for projects. Our department owned many of the engineering specifications and my name appeared on several of these specifications, or I was a contributor to many core engineering specifications. As such, I saw the successes but more frequently, we saw the failures and firefighting required when a pipeline project was in trouble. I have given testimony on the public record before the Canadian Senate where I answered the question; what I did to stop the problem. The fact is the problem has not stopped because the same players are carrying on the same way.

Currently, in 2015, I have had to help another ex-TransCanada Pipelines employee that was being harmed by TransCanada and the National Energy Board after he spent a year bringing forward major code violations that were an immediate threat to the public, yet in the recent Reuters stories, in their official communications, TransCanada and the National Energy Board maintain the farcical position that nothing is wrong. As I have seen the evidence, TransCanada's and the regulators response to an employee's serious engineering allegations were not dealt with for over a year and some still are not. It reminds me of the recent crash landing of an AirCanada Flight in Halifax Nova Scotia, where the political powers called an obvious crash landing that destroyed a large commercial jet, "a hard landing" regardless of the fact that the plane contacted terra firma remote to the runway.

I have presented a lot of material over the last few years that is preserved as part of the permanent public record, but for now I want to start with a rupture of a new generation pipeline called the North Central Corridor Buffalo West section, consisting of 30 miles of 36 inch pipe that was the

best technology the world can expect to see from a technical engineering perspective. This TransCanada pipeline provides fuel gas to the Oil Sands extraction in Fort McMurray Alberta and is very relevant as it ruptured in October 2013 as a result of cost/schedule decisions that were made by my peers and project managers in August 2008, and the regulators not dealing with a major problem and falsification of documentation with this line in 2009. The last insult to public safety was after the line ruptured, when the regulators and TransCanada reported that no one was within 30 miles of the site – notwithstanding the existence of documentation showing that people were literally standing on rupture site hours before it blew up.

Notwithstanding all the other construction deficiencies, the long lead materials were understrength and failed pressure testing before construction commenced months later. Ordering new materials for large diameter pipelines takes quite a while. I did not know that the failed materials were used in North Central Corridor to preserve the construction schedule until PHMSA flagged expanded fittings on the Keystone Phase II expansion. When I was shown pictures of the metallographic cross sections of both Buffalo West and Keystone failed fittings in 2010, it was obvious that the necessary quality control steps were also ignored when the Keystone fittings were ordered. Approximately 600 of these fittings are in service in United States and an equal number in Canada. Neither PHMSA nor the National Energy Board have made a positive action requiring replacement of these substandard fittings since discovering them, regardless of the fact that this problem has now resulted in a rupture on North Central Corridor Buffalo West. From a purely metallurgical pipeline point of view there is no functional difference between an oil or gas pipeline. The only difference is in how the fluid is moved mechanically. However, the use of substandard materials have a further meaning in that the Keystone phase II pump-stations did not meet the minimum federal regulations or engineering design for construction, and the PHMSA special permit for construction which required mandatory quality control was not adhered to.

I had a history of involvement with Keystone from initial construction that persists to the present day as engineering work persists for incredibly long periods. I was heavily involved in the construction of Keystone in Canada for the 500 miles of new construction, spending over one month directly on-site for the automated ultrasonic inspection of girth welds. On Keystone Phase II we were forced into allowing the Keystone project to allow substandard inspection techniques at the direction of the then-Director of Engineering.

While my primary responsibility was Non-Destructive Examination, because of my flexibility afforded with respect to education and industry experience, my engineering opinions were engaged for materials and welding engineering consultations, information requests, and nonconformance dispositions. As such, my Engineering group had a ring-side seat to a most spectacular event, the deterioration of quality management practices in both Canada and United States on a pipeline with mandatory quality control. My peers and I were constantly overruled by management on code violations and other technical matters (which I can prove), while the Keystone project became a legend in inefficiency. Some of the examples of unskilled practice of engineering I saw submitted to regulators have had serious repercussions – yet no one has been held accountable. After fighting many levels of managers, I wrote a response to an invitation from CEO Russ Girling, who was surprised these projects were working out so poorly. I pointed out that many of these events were no surprise to me and my peers, but just the way science was working itself out independently of the “learned” opinions and business practices of managers.

I can assure you that trying to correct a management path at TransCanada was career-ending as I pointed out the misdeeds of company officials and managers. I sought the truth and made a series of information requests to the National Energy Board while I was still employed by TransCanada that resulted in my procuring documents that show clearly that TransCanada has too close a relationship and direct influence with regulators so as to allow TransCanada to ignore law. This situation has allowed and will continue to allow TransCanada to construct its pipelines in a manner which too often ignores quality control issues necessary for the pipeline to be capable of being operated in a manner which would be safe for the environment and in compliance with applicable laws, regulations and permit conditions. Indeed, PHMSA is aware of many of these misdeeds, such as entire pipeline sections that do not have a legitimate code-compliant inspection, yet the pipelines remain in service.

Significantly, and for example, the information requests reveal a problem with the original SNC Lavalin Engineering design of the Keystone pumpstations. I found out about this problem in 2011 when a TransCanada lawyer sent me information showing that the corporation victimized an inspector for a practice of contractor self-inspection. It was the Keystone project, and TransCanada lawyers that told the regulator they were implementing contractor self-inspections in a PowerPoint presentation months earlier. When things went wrong, they blamed the inspectors for a management policy for which I can produce evidence of both occurrence and response. There are many engineering problems with Keystone that persist unrectified to the present day, such as salt induced microcracking on large amount of pipe that was ordered for the Keystone XL section. I can show the pictures but I can't tell exactly which pipe it is.

If I had to pick an immediate threat to public safety, I could not, nor could anyone else; but I can tell you that there are hundreds of incidences of code violations and forbidden construction practices by TransCanada that are buried in ditches across North America and figuratively in files that many people take home containing proof, in case they become problems. Many of these problems are immediate danger issues waiting for something to disturb them before they propagate into failed pipelines, but they may never become problems.

On the Gulf Coast section of Keystone, the violations were obvious and were documented by landowners, activists and PHMSA, just the same as they always are. For instance, TransCanada maintains that they are just doing due diligence by removing 200 anomalies (which is a politically correct way of saying substandard workmanship) from the pipeline as sections. I have been on larger pipeline jobs here no anomalies had to be cut out, as the defects are reflective of construction contractors not following the code of construction and inspectors not enforcing rules. When TransCanada told everyone that the removal was due diligence, it wasn't. Removal of the sections containing those 200 anomalies have now resulted in 400 welds that are not pressure tested, which is the fundamental test to make sure the pipeline is safe to operate. After I was dismissed from TransCanada a former work peer forwarded a TransCanada Keystone project post mortem and ad nauseam, the PowerPoint repeats the same endless message that things will get better on the Keystone Gulf Coast project with all the lessons learned on Keystone I, II and Bison. If so, why was Keystone Gulf Coast just the same, and how will this renamed section of Keystone XL be better?

In the post mortem presentation, there were pictures where the pipe has fallen off the skid piles, and many references to substandard inspections, but additionally there are TransCanada internal reports showing incompetence in inspection that I did not write.

Keystone Gulf Coast pipe was photographed by landowners and activists with an extensive list of problems as follows: pipe falling off the skid piles or ready to fall off skid piles, heavy equipment marks consistent with collision with the pipes, serious coating damage present from the pipe not being handled according to minimum standards, repair coatings were shown as incorrectly applied, and extensive evidence of pipes installed on top of large rocks. The Non-Government Organization, Public Citizen, has hundreds of photographs of code violations and even the Houston Chronicle printed pictures of a code violation holding up construction activities in a manner that would soon be resulting in damage to the pipe. Humorously, the subject of the Houston Chronicle news article covered delays to the Keystone pipeline schedule while they were repairing the very subject matter of the photograph.

During Keystone Gulf Coast construction, I had written a letter to PHMSA admonishing them for substandard engineering oversight on Gulf Coast, which then issued warning letters for substandard practices to TransCanada. Obviously the same practices that CEO Russ Girling wrote about to us employees in 2011 are still at play – so how has any of this improved over the years before, during and after my presence at TransCanada? For all the promises, what has PHMSA done to proactively stop substandard pipeline from being buried? Keystone Gulf coast should have been pressure tested a second time, as it is now high risk.

The classic example is the 2010 Bison Wyoming to North Dakota project, where TransCanada directors called us into the pipeline project after the quality management people left the project for unknown reasons. It was a technical disaster and even PHMSA saw what a joke the inspection was as evidenced by the PHMSA inspection reports. There was so much wrong that it was going to be death by a thousand cuts. Essentially the environmental concerns were so overwhelming that the project could not maintain quality control measures. In response, TransCanada simply let the contractor do its own thing. The pipe was installed with dents, gouges, and welds that did not meet the minimum code requirements so they could avoid nesting schedules of owls and other environmental concerns; but PHMSA once again said nothing. During the initial phases of remediation after this pipeline was put into service, I was asked three times to write letters to PHMSA stating that dents were not associated with welds when the evidence in fact showed that dents were associated with welds. There is a strong documented history that the pressure by TransCanada managers to write a favorable report only stopped when the pipeline ruptured.

PHMSA's failure report of this pipeline is a travesty of engineering as it was a failure of inspection under the mandatory quality assurance system that led to the pipe being struck by a large excavator four times in one mile that caused the rupture. There are so many more lethal problems left with the line that a reoccurrence is likely. The report fails to address the adjacent weld that tore out as it was one of the welds with insufficient inspection. It is not relevant that PHMSA report could not conclude the metallurgical mechanism of the gouge that caused the failure. Gouges are lethal defects in any pipeline code. As part of my effort to stop the madness, I had even gone as far as to send TransCanada internal audit committee very clear pictures of Bison code and safety violations that were sanctioned by project management; yet the committee claimed the pictures were of

insufficient resolution. It could not be any clearer that what I saw and photographed, and PHMSA reported on, were all sanctioned by project management personal, who were all promoted after the pipeline ruptured.

All of these and many more problems are forbidden by TransCanada policies, but in reality are sanctioned by managers as low risk problems that benefit project cost and schedule. These sanctioned activities benefited managers before, during, and after my tenure at TransCanada. Many of these decision makers are non-professional or are professionals that have made very unskilled engineering decisions. Regardless of who made the decision, science does not care but rather asks its own questions based on matters of fact. TransCanada loves putting forward information far from the truth, but my story has been confirmed multiple times by both science and the regulators – refuting the position TransCanada takes in public.

As a comparison, you do not have to believe in gravity for it to work. Similarly, TransCanada's "experts" will tell the Commission that my opinion has no relevance. However, this does not change the fact that TransCanada is a corporation with no responsible direction. This is the future South Dakota faces as it makes the decision to permit construction of the Keystone XL Pipeline.

I would be happy to **testify before** the South Dakota Public Utility Commission and to produce evidence to support my claims, as this is a public safety issue that will not be going away anytime soon.

EVAN VOKES

April 2, 2015
Date

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	)	Docket 14-001 **TESTIMONY OF DR. ARDEN D. DAVIS, Ph.D., P.E., ON BEHALF OF DAKOTA RURAL ACTION**

My name is Arden D. Davis, Ph.D., P.E. My address is 1014 Milwaukee Street, Rapid City, South Dakota 57701.

This testimony is submitted regarding Findings of Fact 12(2)-(3), 20, 22, 33-34, 36, 37, 40-41, 43-53, 64, 77, 79, 82, 86, 94-95, 98-99, 101-104, 110, 113, and Amended Conditions: 22, 34-35, 37 of the Amended Final Decision and Order in HP 09-001.

Professional Qualifications and Background

I have been involved in the fields of ground water and environmental contamination since 1978. I hold a B.A. degree in Geology from the University of Minnesota, and M.S. and Ph.D. degrees in Geological Engineering from South Dakota School of Mines and Technology. I am a registered professional engineer in South Dakota (no. 4663). Since 1985, I have taught courses in ground water, ground-water contamination, geological engineering, and environmental pollution at South Dakota School of Mines and Technology. I have also presented expert witness testimony in numerous cases, and have assisted the State of South Dakota in ground-water contamination problems, including the Williams Pipe Line / Hayward Elementary School site in Sioux Falls.

Potential Impact of Keystone XL Pipeline on Water Resources in South Dakota

A crude-oil or diluted bitumen leak could have devastating effects on ground-water supplies, surface water, and environmental resources in South Dakota. The proposed Keystone XL Pipeline would cross the recharge areas of several shallow aquifers in the western part of the State, including the Ogallala aquifer and Sand Hills type material, especially in Tripp County. Other shallow aquifers that would be crossed by the proposed pipeline route are terrace gravel aquifers, eolian (wind-blown) aquifer materials, alluvial aquifers, and the Fox Hills aquifer.

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The proposed pipeline also would have major stream crossings at water courses such as the Little Missouri River, the Grand River and its tributaries, the Moreau River, the Cheyenne River upstream from Oahe Reservoir, the Bad River, and the White River. These drainages have associated alluvial aquifers beneath and adjacent to the rivers, and dissolved hydrocarbon contaminants could be transported downgradient in surface water, in ground water within the aquifers, or both.

The proposed route is shown on Figure 1 (from U.S. Dept. of State, 2014) and would cross the western part of South Dakota in a northwest-to-southeast trend. The South Dakota state geologic map is shown on Figure 2, with the proposed route superimposed.

In Harding County, in the extreme northwestern part of South Dakota, the route would cross the Little Missouri River (Figure 3) and the Grand River (Figure 4). The Hell Creek Formation (shown as K_h on Figure 3 and Figure 4) contains bentonitic shale and is exposed in the river valleys at these crossings. The Little Missouri River flows northward into North Dakota, where it eventually joins the Missouri River. The Grand River flows generally eastward and joins the Missouri River in north-central South Dakota.

In Harding County the proposed route would cross permeable wind-blown deposits, shown as Q_e on Figure 4. These wind-blown deposits of silt and sand recharge from rainfall and snowmelt, and they are capable of supplying water to shallow wells in the area. The proposed route also would cross the Fox Hills aquifer (shown as K_{fh} on Figure 4) in Harding County. This sandstone aquifer is one of the most important ground-water reservoirs in northwestern South Dakota and supplies drinking water to public supplies for the City of Buffalo as well as a standby well for the City of Lemmon.

In Butte County the proposed route would cross the North Fork of the Moreau River (Figure 4), and in Perkins County the route would cross the Moreau River (Figure 4), which flows eastward and joins the Missouri River in north-central South Dakota.

In Meade County the proposed route would cross Cherry Creek and Red Owl Creek, as well as a large expanse of the exposed recharge area of the Fox Hills Formation (see Figure 5). As mentioned above, the Fox Hills aquifer is a major aquifer in northwestern South Dakota.

Near the border of Meade, Haakon, and Pennington counties, the proposed route would cross the Cheyenne River (Figure 6). This part of the Cheyenne River watershed is downstream from the Belle Fourche River, which drains the northern Black Hills, and the main branch of the Cheyenne, which drains the southern and eastern Black Hills. At this site, the Cheyenne River has gathered the surface-water drainage from the entire Black Hills. From here downstream, the Cheyenne River flows into the Oahe Reservoir on the Missouri River. The Pierre Shale (shown as K_p), which contains bentonite, is exposed along steep sides of the Cheyenne River valley and is prone to slope failures in western South Dakota. The proposed route also would cross the Bad River near Midland in Haakon County (Figure 7), where Pierre Shale also is exposed along the valley sides.

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South of the Cheyenne River in Haakon County, the proposed route would cross permeable Quaternary terrace gravels (shown as Q_t on Figure 6) and wind-blown deposits (Q_e on Figure 6). The terrace gravels are stream-bed deposits of former flood plains. Both the terrace gravels and wind-blown deposits are permeable and are recharged by precipitation. In places they are capable of supplying water to wells, springs, and seeps, as well as providing soil moisture for trees and other vegetation.

In Jones and Lyman counties, the proposed pipeline route would cross permeable wind-blown deposits (shown as Q_e on Figure 8) and also would cross Quaternary terrace deposits north of the White River (shown as Q_t on Figure 8). The terrace deposits in this area have a shallow water table and are recharged by rainfall and snowmelt, which provide water for springs and seeps at the heads of streams that drain southward toward the White River. The shallow water table also supports small lakes, ponds, and wetlands in the area.

The proposed pipeline route would cross the White River at the border of Lyman and Tripp counties (Figure 8). The Pierre Shale is exposed in the White River valley at this location and is a concern because of potential slope failures.

In Tripp County, near the southeastern end of the proposed pipeline in South Dakota, the route would cross the Ogallala aquifer (shown as T_o on Figure 9). It also would cross wind-blown Sand Hills type material (shown as Q_e) above the Ogallala aquifer. According to Martin et al. (2004) the wind-blown material shown as Q_e on the South Dakota state geologic map includes the Sand Hills Formation. The hydrologic situation is similar to the Sand Hills of Nebraska, which form a permeable recharge zone above the Ogallala aquifer and therefore deserve consideration for special protection as a high-consequence area. As noted by Stansbury (2011), areas with shallow ground water that are overlain by permeable soils, such as Sand Hills type material, pose risks of special concern because leaks could go undetected for long periods of time

Contaminants and Potential Problems

The proposed Keystone XL pipeline would transport crude oil and diluted bitumen. As noted by Stansbury (2011), diluted bitumen is more corrosive than conventional crude oil transported in existing pipelines. Crude oil and diluted bitumen contain hydrocarbons, including benzene, toluene, ethylbenzene, and xylene. Benzene is of particular note because its maximum contaminant level (MCL) in drinking water is 5 parts per billion. Benzene is known to produce leukemia in humans. It has been identified as a human carcinogen by the Occupational Safety and Health Administration and the National Toxicology Program.

Benzene is soluble in water and can be transported downgradient toward receptors such as public water-supply wells, private wells, and springs or seeps. In certain cases, benzene can be transported more than 500 or 1000 feet downgradient in aquifers,

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according to records of agencies such as the South Dakota Geological Survey, the South Dakota Department of Environment and Natural Resources, and the South Dakota Petroleum Release Compensation Fund. For example, a benzene contaminant plume from a leaking tank at the Williams Pipe Line / Hayward Elementary School site in Sioux Falls, South Dakota, was documented to have traveled about 800 feet downgradient from the tank (Iles et al., 1988). Because of benzene's solubility and its allowable limit of only 5 parts per billion in drinking water, a pipeline leak could contaminate a large volume of surface water or ground water in shallow aquifers of western South Dakota.

Leaks from pipelines have occurred in the past in South Dakota and have threatened ground-water supplies. These include a pipeline spill from Williams Pipe Line Company near water-supply wells for the City of Sioux Falls, and a large spill north of the City of Sioux Falls on glacial till near the Big Sioux aquifer. Reports of these are available in the files of the South Dakota Department of Environment and Natural Resources. A spill of more than 840,000 gallons in 2010 at Marshall, Michigan, caused extensive environmental damage and polluted the Kalamazoo River. The rupture and subsequent investigation resulted in new recommendations for pipeline safety from the National Transportation Safety Board. Two recent pipeline ruptures along the Yellowstone River in Montana were particularly serious and caused serious environmental problems. One, in 2011 near Laurel, Montana, resulted in the discharge of about 63,000 gallons of crude oil. The second, in 2015, released about 30,000 gallons of crude oil and contaminated the public drinking water supply of the City of Glendive, Montana.

A major concern involves the stability of steep slopes where the Pierre Shale or other bentonite-bearing shales are exposed, particularly along the breaks of major rivers, including the Cheyenne River, the White River, the Bad River, the Little Missouri River, the Grand River, and the Moreau River. Expansive clays such as bentonite are a particular concern because they can absorb large amounts of water during wet periods, leading to instability and potential failure. Slope failures are common along these river valleys, and could cause ruptures and serious leaks from the proposed pipeline. Additional safeguards for pipeline integrity should be undertaken in such locations. Leaks in these areas potentially could result in surface-water contamination downstream toward the Missouri River and its reservoirs

A report for TransCanada by DNV Consulting (Appendix A: Frequency-Volume Study of Keystone Pipeline), dated May 1, 2006, indicates on page 19, Table 5-2, that a leak rate of less than 1.5% could go undetected for 90 days for below-ground pipe. Page 20, Figure 5-1, of the same report indicates a leak detection and verification time of 138 min (2.3 hours) for a leak rate of 1.5%. The leak rate for this detection time is approximately 200 barrels per hour (BPH). This potentially could result in a leak of about 19,000 gallons (2.3 hr x 200 barrels/hr x 42 gallons/barrel). It appears, therefore, that larger volumes of oil could leak over a longer time (e.g., 90 days), if the leak rate is less than 1.5%. A leak of 19,000 gallons or greater could contaminate a large volume of ground-water supplies because of the solubility of crude oil components such as benzene and other volatile hydrocarbons.

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The Final Supplemental Environmental Impact Statement for the Keystone XL Project (U.S. Department of State, 2014) stated that spill volumes from larger-diameter pipelines tend to be larger than those from smaller-diameter pipelines. It also stated that the primary releases causes, aside from failure of components such as valves, are outside forces and corrosion. In addition, the spill size and impact, for medium to large spills, are more sensitive to response time than for small spills. In other cases, smaller leaks might not be detected (U.S. Department of State, 2014).

The executive summary of the Final Environmental Impact Statement (U.S. Department of State, 2011) stated, "Although the leak detection system would be in place, some leaks might not be detected by the system. For example, a pinhole leak could be undetected for days or a few weeks if the release volume rate were small and in a remote area." The executive summary also stated, "In spite of the safety measures included in the design, construction, and operation of the proposed Project, spills are likely to occur during operation over the lifetime of the proposed Project. Crude oil could be released from the pipeline, pump stations, or valve stations." In addition, the executive summary mentioned 14 spills since 2010 from the existing Keystone pipeline system, including a spill of 21,000 gallons in North Dakota.

Stansbury (2011) stated concerns about questionable assumptions and calculations by TransCanada of expected frequency of spills from the proposed Keystone XL Pipeline. He noted that the pipeline would operate at higher temperatures and pressures than existing pipelines, and that the crude oil that would be transported in the Keystone XL Pipeline will be more corrosive than conventional crude oil. These factors would tend to increase spill frequency. Stansbury (2011) also stated that worst-case spill volumes from the proposed Keystone XL Pipeline are likely to be significantly larger than those estimated by TransCanada.

The Final Supplemental Environmental Impact Statement (U.S. Department of State, 2014) noted, "For all spills, especially those that reached water resources, the response time between initiation of the spill event and arrival of the response contractors would influence the potential magnitude of impacts to environmental resources." If a pipeline leak goes undetected and a spill of crude oil reaches a major water course such as the Cheyenne River, it could potentially be transported many miles downstream during high-velocity flows at certain times of the year. For example, the Cheyenne River can have a velocity of 7½ to 8 feet per second at times of high discharges (Dawdy, 1961). A river velocity of 8 feet per second is equivalent to about 5½ miles per hour. If a leak is undetected and a spill reaches the river under these conditions, it could potentially be transported about 60 miles downstream in 12 hours. If a leak cannot be controlled or is undetected for 24 hours, it could be transported about 120 miles downstream. This raises concerns about emergency response and mobilization in such a situation. For example, the straight-line distance is about 40 miles from the proposed pipeline route's crossing of the Cheyenne River to the Oahe Reservoir. This is in a remote, sparsely populated area. Assuming a channel sinuosity of about 2 to 2.5 for this reach of the Cheyenne River, the river's actual distance would be about 80 to 100 miles from this crossing to the Missouri River's reservoir. Thus, if a release occurred at this crossing and it could not be

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controlled or went undetected for 12 to 24 hours, petroleum contaminants could reach the Missouri River, potentially affecting water supplies and surface-water users, and causing environmental damage.

Summary

The Keystone XL Pipeline, as currently proposed, would cross shallow aquifers including the Ogallala aquifer, Sand Hills type aquifer material, terrace gravel aquifers, wind-blown aquifer materials, alluvial aquifers along rivers, and the Fox Hills aquifer. Spills in these aquifers could pose serious health risks to ground-water users. The proposed route also would have river crossings at water courses that include the Cheyenne River upstream from Oahe Reservoir, the White River, and the Bad River, and other streams. The sides of these river valleys are vulnerable to large slope failures, especially where bentonite-containing shales are exposed, which potentially could cause pipeline rupture. At these river crossings and downstream, the proposed pipeline poses serious risks and could have devastating effects on surface water and associated environmental resources, potentially affecting water supplies and surface-water users.

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DNV Consulting, 2006, frequency-volume study of Keystone Pipeline: Report No. 70015849-2 for TransCanada Pipelines.

Iles, D.L., Meyer, M.R., Baron, L.R., and Markley, W.E., 1988, Assessment of hydrogeologic and ground water contamination data in the vicinity of the Hayward Elementary School, West 12th Street, Sioux Falls, South Dakota: Open File Report No. 44-UR, South Dakota Department of Water and Natural Resources.

Martin, J.E., Sawyer, J.F., Fahrenbach, M.D., Tomhave, D.W., and Schulz, L.D., 2004, Geologic map of South Dakota: South Dakota Geological Survey, Vermillion, South Dakota, 1 pl.

U.S. Department of State, 2011, Final environmental impact statement for the Keystone XL Project: United States Department of State, Washington, D.C.

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Stansbury, John, 2011, "Analysis of frequency, magnitude, and consequence of worst-case spills from the proposed Keystone XL Pipeline."

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I hereby affirm under penalty of perjury that the above testimony is true and correct.

Arden D. Davis
ARDEN D. DAVIS

April 2, 2015
(date)

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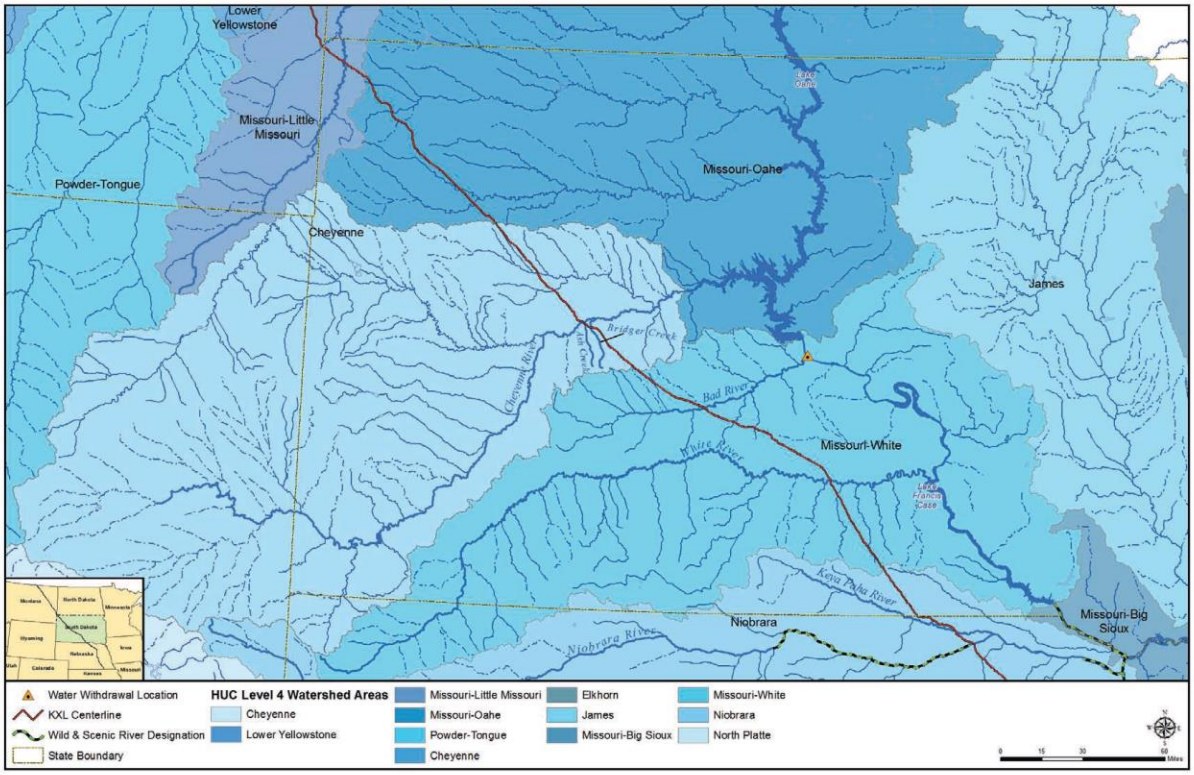

Figure 1. Water crossings of the proposed Keystone XL Pipeline in western South Dakota (from U.S. Dept. of State, 2014, p. 3.3-39.

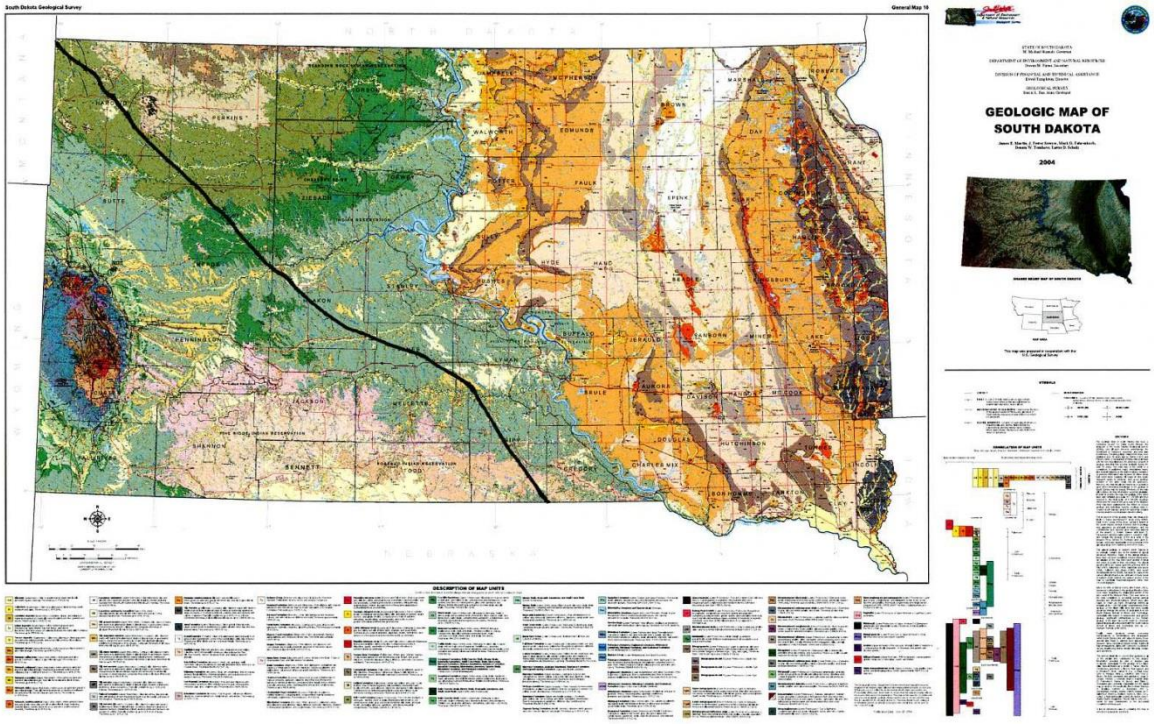

Figure 2. South Dakota geologic map (from Martin et al., 2004) with proposed Keystone XL route superimposed.

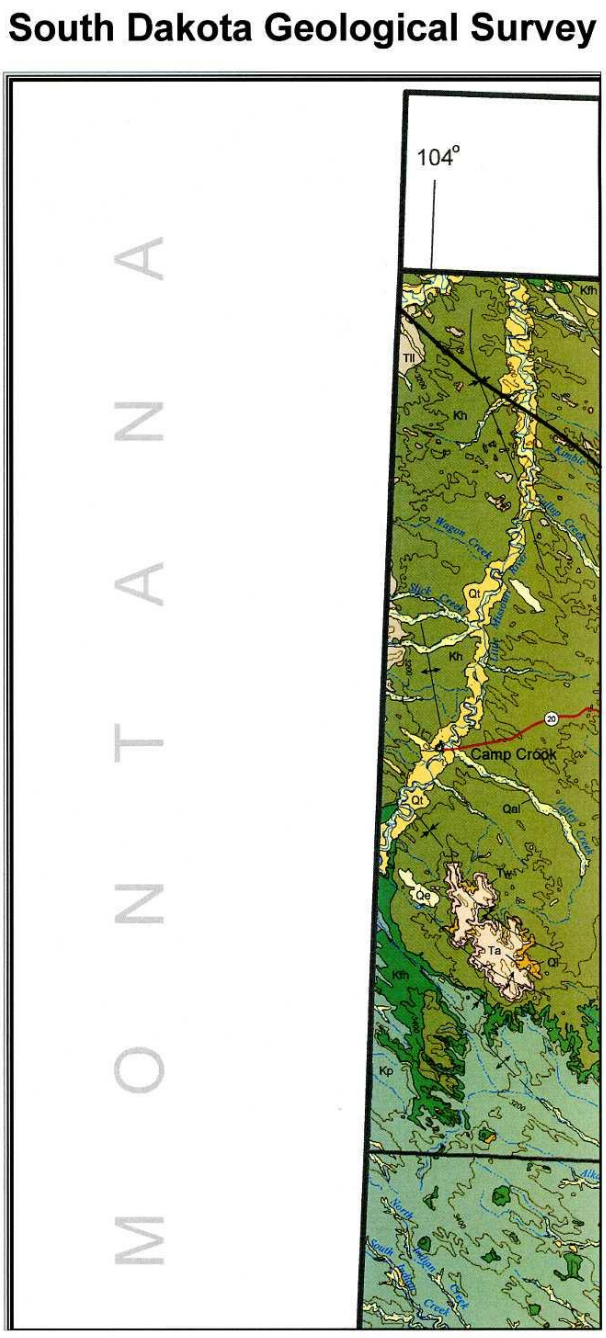

Figure 3. Part of the South Dakota geologic map (from Martin et al., 2004) in the northwestern part of Harding County, with proposed Keystone XL route superimposed.

011003

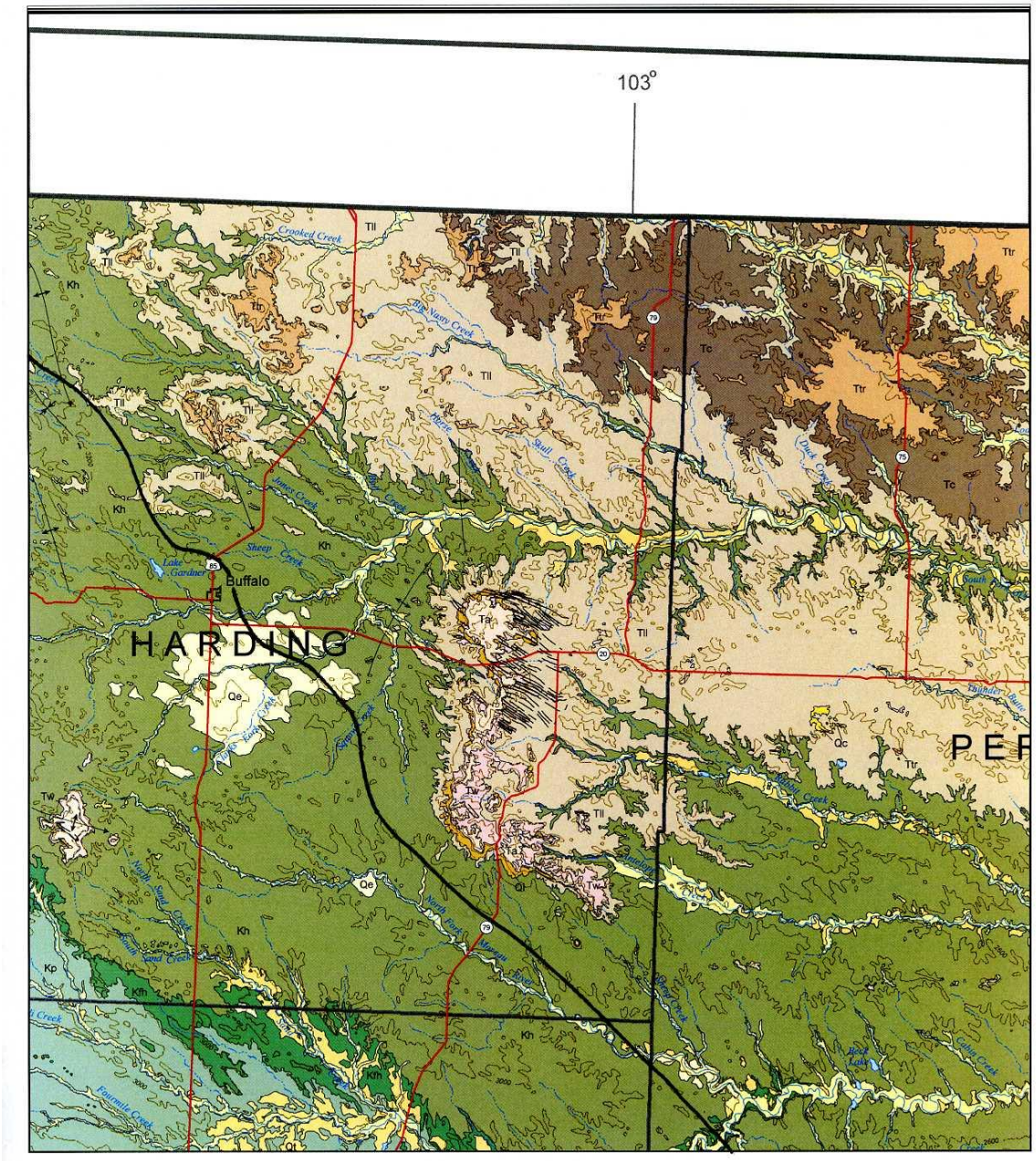

Figure 4. Part of the South Dakota geologic map (from Martin et al., 2004) in Harding and Perkins counties, with proposed Keystone XL route superimposed. The area shown as Q_e south and southeast of Buffalo is mapped as eolian (wind-blown) deposits.

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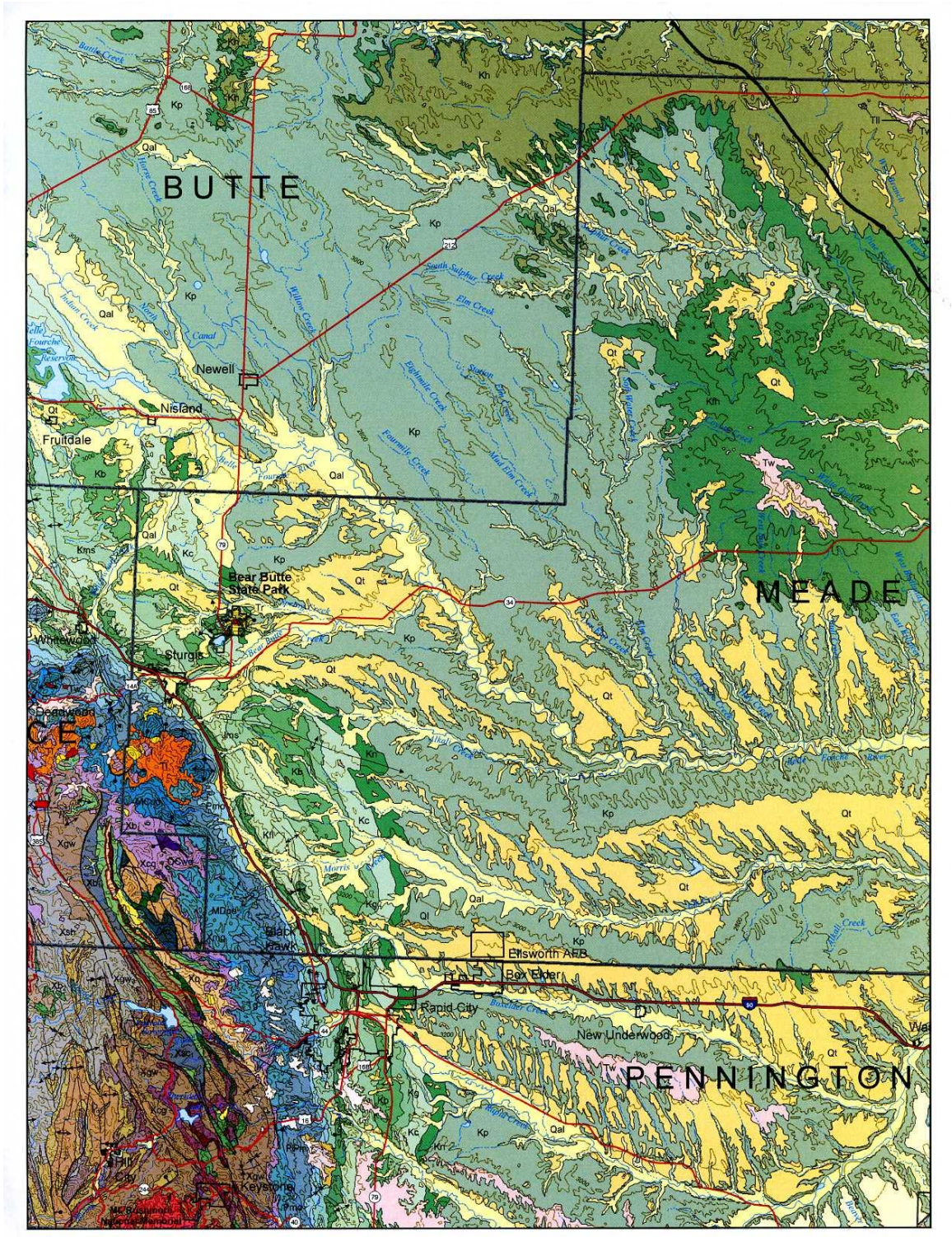

Figure 5. Part of the South Dakota geologic map (from Martin et al., 2004) in Perkins and Meade counties, with proposed Keystone XL route superimposed. The area shown as K_{fh} is mapped as the Fox Hills Formation.

011005

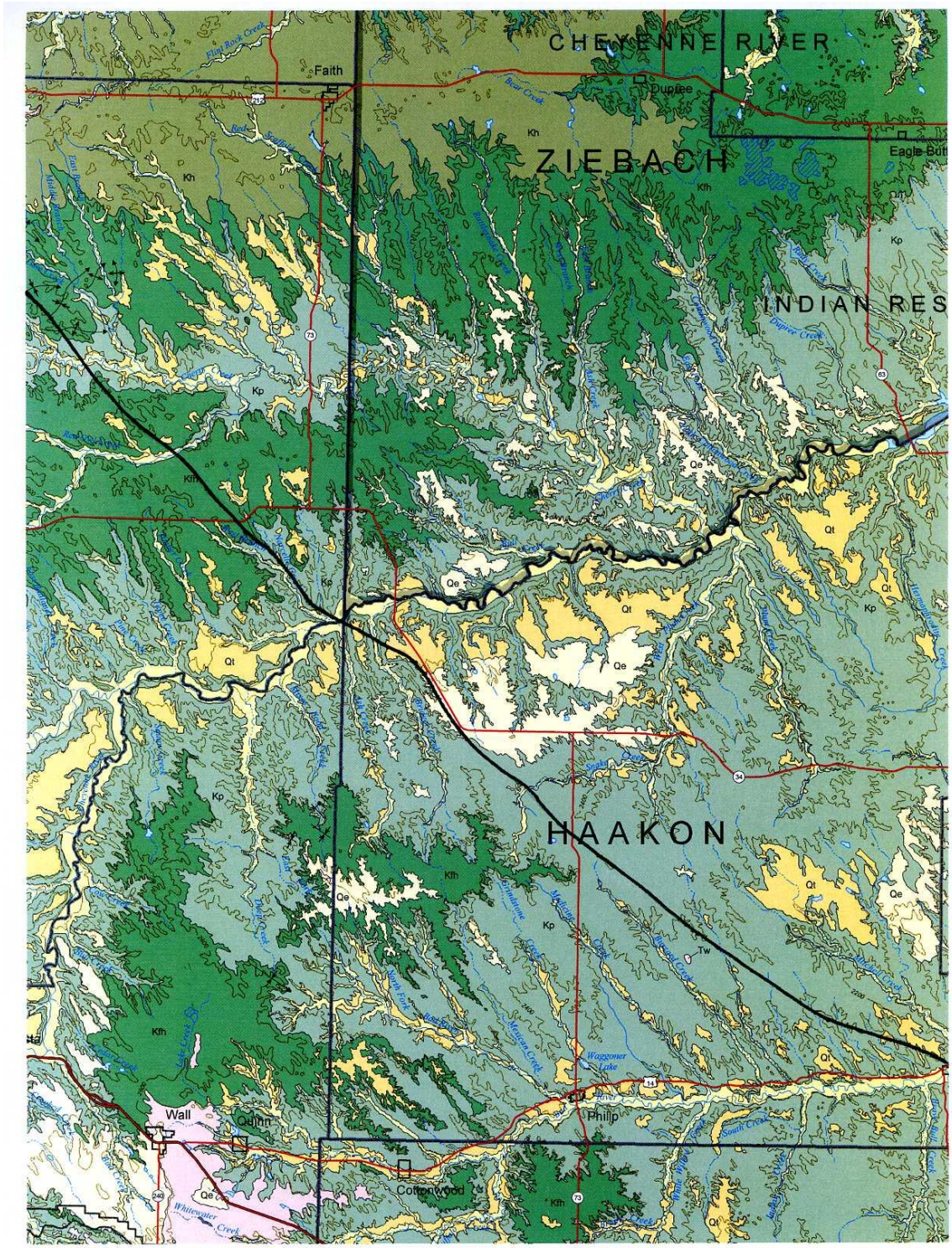

Figure 6. Part of the South Dakota geologic map (from Martin et al., 2004) in Meade and Haakon counties, with proposed Keystone XL route superimposed. The route would cross the Cheyenne River near the border of Meade and Haakon counties. The area mapped as Q_t refers to terrace deposits of streams in former flood plains.

011006

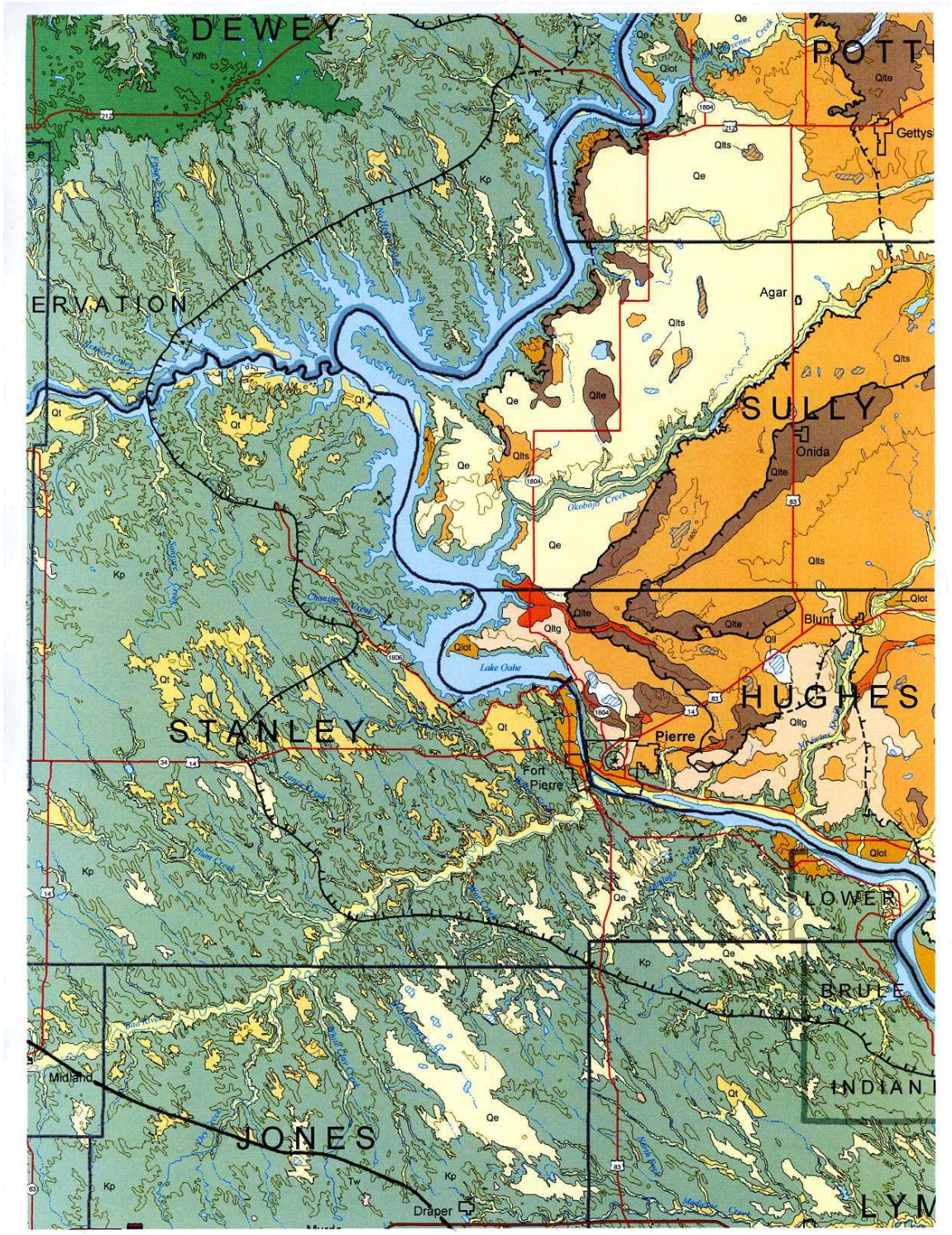

Figure 7. Part of the South Dakota geologic map (from Martin et al., 2004) in Haakon and Jones counties, with proposed Keystone XL route superimposed.

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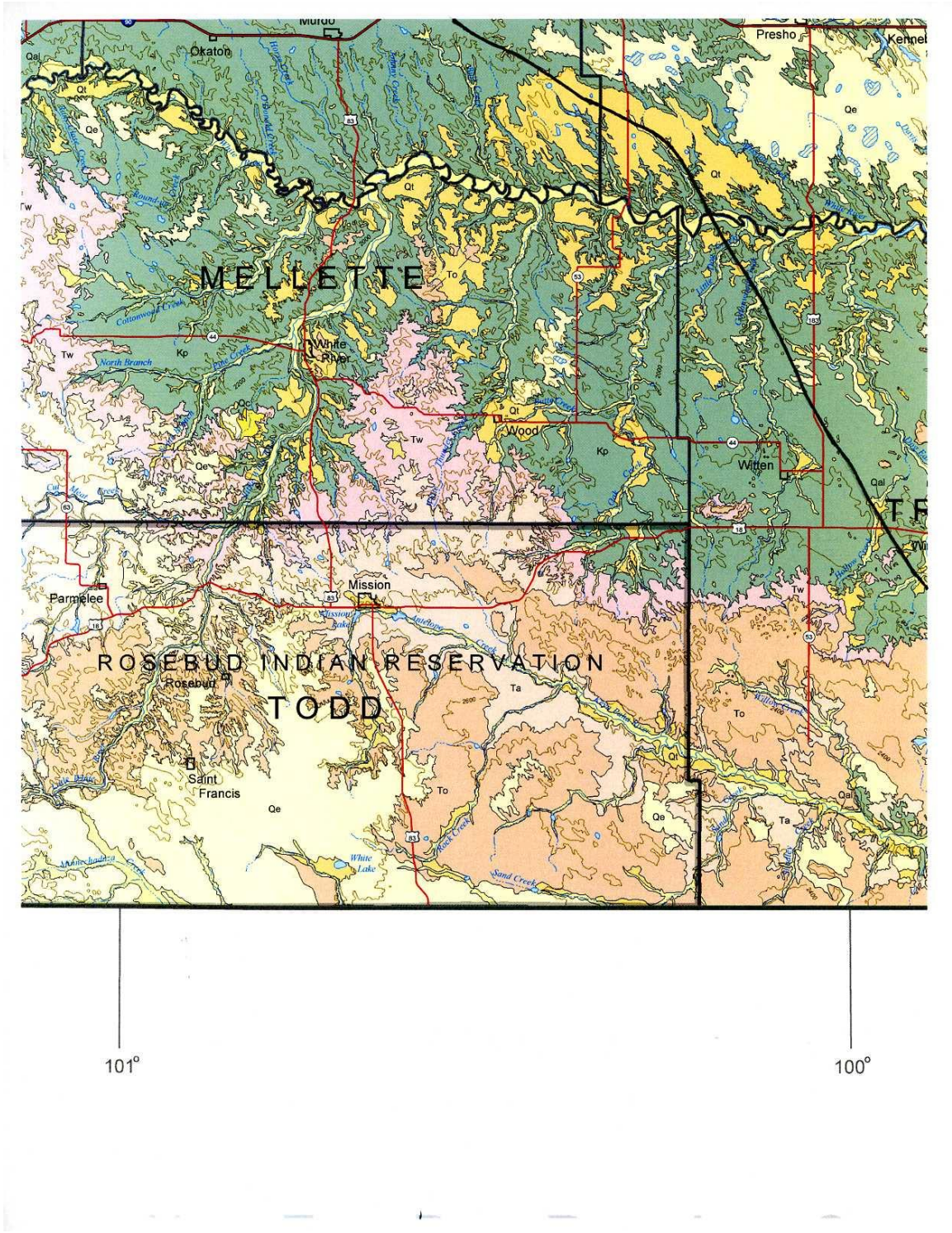

Figure 8. Part of the South Dakota geologic map (from Martin et al., 2004) in Jones, Lyman, and Tripp counties, with proposed Keystone XL route superimposed. The area mapped as Q_t shows terrace deposits of streams in former flood plains.

011008

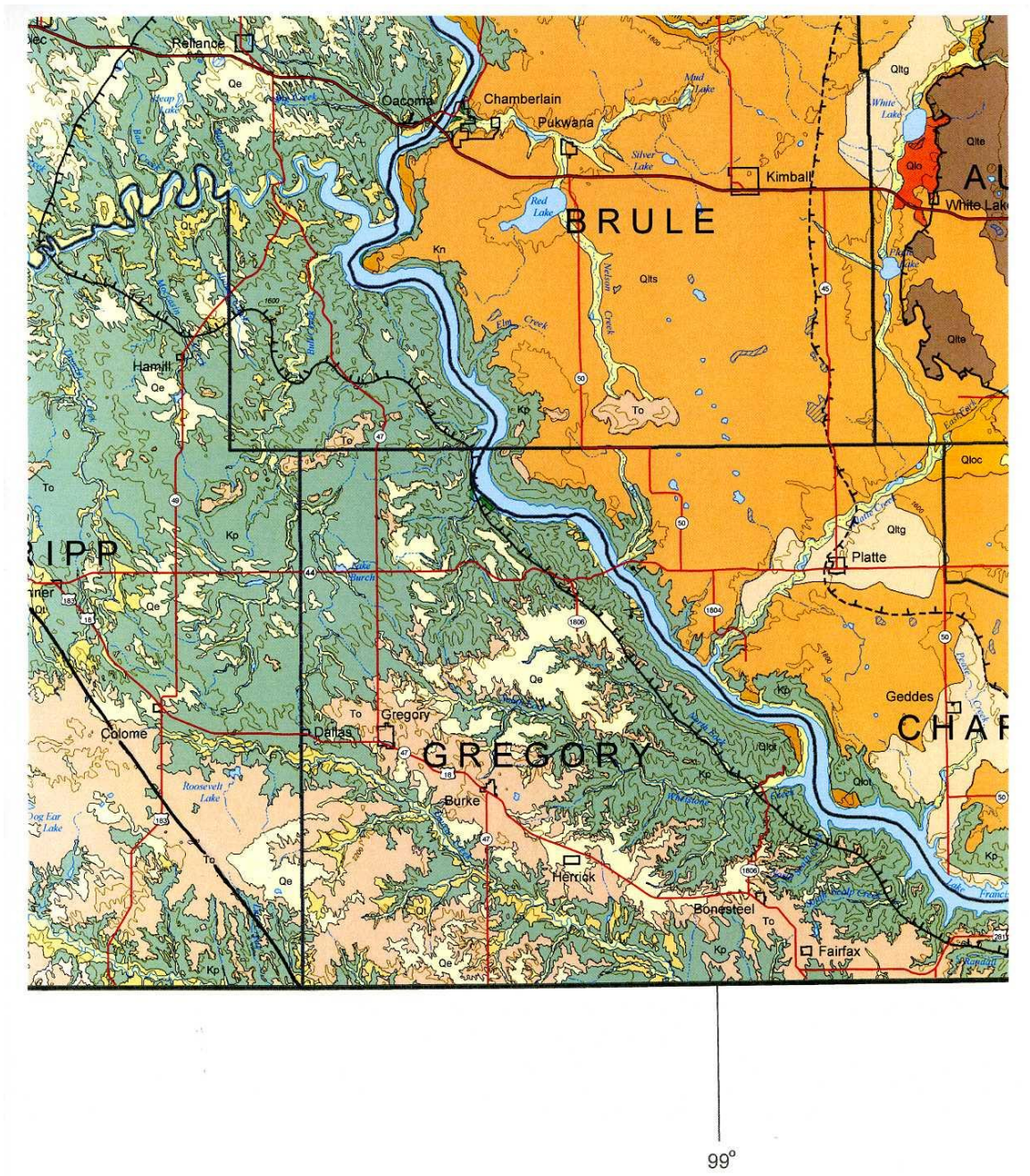

Figure 9. Part of the South Dakota geologic map (from Martin et al., 2004) in Tripp County, with proposed Keystone XL route superimposed. The area mapped as T_o shows the Ogallala aquifer. The areas mapped as Q_e show eolian (wind-blown) deposits, including Sand Hills type material.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	)	Docket 14-001 **TESTIMONY OF SUE SIBSON ON BEHALF OF DAKOTA RURAL ACTION**

Statement for the South Dakota Public Utilities Commission

My name is Sue Sibson. My address is 23782 426th Avenue, Howard, South Dakota 57349.

This testimony is submitted regarding Amended Conditions: 13, 15, 16, 26, and 27 of the Amended Final Decision and Order in HP 09-001.

My husband, Mike Sibson, and I live in Miner County, Roswell Township, and we are lifelong South Dakota residents. My husband's parents purchased the farm where we live in 1972 and we currently raise grain and background feeder cattle. We also allow a lot of wildlife to live on our property.

We opposed TransCanada Corporation's original Keystone-I pipeline, which ultimately crossed our land, including crossing native grassland, farm ground, a wetland area, and a waterway. We were concerned about the effect that the pipeline would have on our land. Those fears have been born out, as TransCanada has not lived up to its promises and the conditions it was required to uphold with respect to reclamation of our land.

Effect of the Pipeline on our Land

In 2009 TransCanada continued construction, digging the trench for the pipeline on our land, even though we had over an inch of rain. Condition #34 that TransCanada was supposed to follow was that "Construction must be suspended when weather conditions are such that construction will cause irreparable damage, unless adequate protection measures approved by the Commission are taken." As of 2015, our land has been irreparably damaged by TransCanada's failure to follow the Commission's conditions.

Additionally, TransCanada failed to comply with the applicable construction mitigation and reclamation plan as to reclamation and re-vegetation. The objectives of the plan were to return the disturbed areas to approximately pre-construction use and capability. TransCanada failed to live up to this commitment and requirement.

For example, TransCanada planted the wrong native grass seed. TransCanada planted thickspike wheatgrass which is not native to our land, and which has resulted in a nightmare for us.

In 2011, after raising questions, TransCanada engaged in reseeding by replanting the thickspike wheat grass again, and they failed to provide us with grass seed tags. This failure on the part of TransCanada revealed itself in 2012, when the thickspike wheat grass was very thick on the areas seeded by TransCanada. Cattle will not eat it, and this grass has also proved to be very hard to get rid of. In 2014 TransCanada's reclamation crew again entered our land and even sprayed the grass with roundup, with little success. Our cattle haven't grazed the easement area TransCanada took from us since 2009.

TransCanada has made many half-hearted attempts to reclaim the land. The condition of the native grass reseeding shows it. TransCanada has failed to follow the conditions set by the Commission.

TransCanada Failed to Comply with other Conditions

Condition #18 established by the Commission was that rock exaction from the trench could be used to backfill the trench only to the top of the existing bedrock profile. All other rocks were to be considered construction debris. TransCanada failed to follow the signed construction agreement when their contractor buried rocks back into the easement area. In 2011, when another TransCanada contractor came on site to yet again engage in reclamation work, approximately 75 tons of rock were hauled away.

Even after pressing TransCanada, construction debris remained on our property. After TransCanada's cleanup crew went through twice, we wound up having to clean the easement area ourselves. We found a lot of debris, and felt that the clean-up crew didn't do their job. We ultimately sent TransCanada a damage bill for the rock and debris they left. We wouldn't have been placed in that position had TransCanada lived up to its obligations.

Finally, Condition #41 sets forth TransCanada's obligation for reclamation and maintenance of the right-of-way, which shall continue throughout the life of the pipeline. As landowners, we have continually had to get after TransCanada to get out to our land and perform the reclamation work they were obligated to do. When TransCanada's reclamation work was not effective and was failing on our land, TransCanada actually then wanted us to take over the reclamation of our land.

We have been asked to sign off on TransCanada's attempts at reclamation of our land by land agents on at least two separate occasions. At this time, we have no intention to ever do that because TransCanada has not lived up to its obligations, nor do we trust them to fulfill the conditions imposed on them by the Commission.

I hereby affirm under penalty of perjury that the above testimony is true and correct.

Susan Sibson

SUE SIBSON

April 2, 2015
(date)

CERTIFICATE OF SERVICE

I hereby certify that on this 2nd day of April 2015, the foregoing document on behalf of Dakota Rural Action in Case Number HP 14-001, was filed on the Public Utilities Commission of the State of South Dakota e-filing website. Also on this day, a true and accurate copy of the foregoing was transmitted via email to the following:

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/s/ Robin S. Martinez
Robin S. Martinez

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	**DOCKET HP 14-001** **DIRECT TESTIMONY OF CARLYLE DUCHENEAUX**

1. **Please state your name and address for the record.**

   Answer: My name is Carlyle Ducheneaux. My office address is P.O. BOX 542 Eagle Butte, SD 57625.

2. **Please state your position with the Cheyenne River Sioux Tribe.**

   Answer: I am currently the Cheyenne River Sioux Tribe's Environmental Protection Department's 106 Coordinator. My prior positions with the Cheyenne River Sioux Tribe include working as the National Pollutant Discharge Elimination System Coordinator and Superfund Site Coordinator.

3. **Please provide a description of your areas of responsibility within the Cheyenne River Sioux Tribe's Department of Environmental and Natural Resources.**

   Answer: I have multiple responsibilities, including the development of water quality standards, review and issuance of National Pollutant Discharge Elimination System permits, review all Environmental Impact Statement/Environmental Assessments affecting the Cheyenne River Sioux Tribe, conducting water, air, and soil testing, and interpreting collected environmental data. In addition, my duties also require me to perform human health risk assessments. I also work with Missouri breaks, BHCAIS and

the University of New Mexico performing scientific tests on humans and the environment.

4. **Please state your professional qualifications and experience.**

Answer: I have eighteen (18) years of work experience with the Cheyenne River Sioux Tribe in the environmental field. During my professional tenure with the Tribe I have worked collaboratively with the Environmental Protection Agency, the United States Geological Survey, the United States Fish and Wildlife Service, the Bureau of Indian Affairs, the Army Corps of Engineers, the Bureau of Reclamation, the Bureau of Land Management and many private sector science and environmental companies.

5. **Are you familiar with the TransCanada Keystone XL Pipeline project?**

Answer: Yes. I have thoroughly reviewed the Keystone XL Pipeline's Environmental Impact Statement.

6. **Have you reviewed the proposed route of the Keystone Pipeline project; with specific regard to the portion of the project near the Cheyenne River Sioux Reservation?**

Answer: Yes, as part of my review of the Environmental Impact Statement I have reviewed and familiarized myself with the proposed pipeline route, especially with regard to that portion of the project that is in close proximity to the Cheyenne River Sioux Reservation.

7. **In your opinion, would construction of the Keystone Pipeline in the vicinity of the Cheyenne River Sioux Reservation affect the Cheyenne River Sioux Tribe?**

Answer: Absolutely yes. It is my professional opinion that construction of the Keystone XL Pipeline in the vicinity of the Cheyenne River Sioux Reservation will affect the

Cheyenne River Sioux Tribe and its Tribal Members living on the Reservation. Moreover, upon completion of the Keystone XL Pipeline's construction, the Project will continue to affect the Cheyenne River Sioux Tribe and its Tribal Members in that a spill incident would pose a serious risk to the health and safety of all people living in Dewey and Ziebach Counties.

8. **Please describe how the Cheyenne River Sioux Tribe would be affected by construction of the Keystone Pipeline in the vicinity of the Cheyenne River Sioux Reservation.**

   Answer: Much of the soil in and around the Cheyenne River and its tributaries contains contaminants from previous polluters. At present these contaminants are largely in a settled state and thus do not pose significant immediate health and safety risks. However, construction of the Keystone XL Pipeline will necessarily involve extensive excavation and disruption of contaminated soils, which in turn will lead to the inevitable re-suspension of contaminated sediment in the Cheyenne River hydrological system. The Tribe and all residents of the Cheyenne River Sioux Reservation depend on the Cheyenne River as the sole source of potable water, making such soil disturbance and re-suspension a massive threat to the Tribe and the Reservation's residents. In essence, I see no positive out come to the construction of the pipeline. Instead, construction of this project will pose a serious threat to the health, safety, and well-being of the Cheyenne River Sioux Tribe, the State of South Dakota, and their respective citizens.

9. **What do you mean by "re-suspension" of contaminants? Could you please explain this particular risk in detail?**

Answer: What I mean by the term "re-suspension" is that the legacy pollutants that are presently in a settled state in the soil will mix into the Cheyenne River's hydrological system; thereby reintroducing old pollutants into the water source that the Cheyenne River Sioux Tribe and reservation residents rely on for potable water. In my opinion, such re-suspension will greatly affect the health and safety of the Cheyenne River Sioux Tribe, its tribal members, and the non-Indian residents who reside within the boundaries of the reservation.

10. Would non-Indian residents on the Cheyenne River Sioux Reservation be similarly affected?

Answer: Yes. All residents living on or near the Cheyenne River Sioux Reservation would be subject to the same negative consequences associated with the construction and operation of the Keystone XL Pipeline in the vicinity of the Cheyenne River Sioux Reservation.

11. In your opinion, would the presence of the Keystone Pipeline, once completed, pose a direct threat to the Cheyenne River Sioux Tribe?

Answer: Yes. Beyond the impacts associated with construction of the Keystone XL Pipeline, the Cheyenne River Sioux Tribe will also be affected by the operation of the Keystone XL Pipeline Project. Specifically, the Cheyenne River Sioux Tribe's water treatment facility, which provides potable water for all residents within the Cheyenne River Sioux Reservation, would be at risk of contamination if a spill were to occur in the Cheyenne River or one of its hydrologically connected tributaries. As such, the Tribe will most definitely affected by the ongoing operation of the Keystone XL Pipeline Project.

12. Please describe how the Cheyenne River Sioux Tribe would be negatively affected by the completed Keystone Pipeline?

Answer: As I have alluded to in my previous answers, the Tribe will be negatively affected by this project because it will initially contaminate and pose an ongoing threat of contamination to the Tribe's water resources. For example, the likelihood of pipeline failure due to sloughing of banks and movement of highly erodible soils is high. Obviously such a failure would be catastrophic for the Cheyenne River Sioux Tribe, its Tribal Members, and everyone else living within the confines of the Cheyenne River Sioux Reservation. In fact, just a moderate spill from the pipeline into any hydrological system connected to the Cheyenne River would jeopardize the Tribe's drinking water. All residents within the Cheyenne River Sioux Reservation, both Indian and non-Indian, rely on water from the Tribe's Mni Waste Water Company. Thus, any contamination of the Cheyenne River's hydrological system would inevitably impact the Tribe itself, as well as all residents residing within the Reservation. Such a contamination incident would force the residents of the Reservation to use bottled water until a spill is completely cleaned up. This in itself creates a major problem for the Tribe and Tribal Members. Namely, bottled water is not acceptable for many cultural activities. Rather, only water from the Cheyenne River itself can be used. Also, much of the Cheyenne River's flora and fauna would be destroyed. In other words, the Keystone XL Pipeline not only threatens the health and safety of the Cheyenne River Sioux Tribe and its Tribal Members, it also threatens the Tribe's access to irreplaceable cultural resources.

13. What do you mean by "sloughing of banks" and "movement of highly erodible materials?" Please explain how these two natural phenomena could cause the Keystone XL Pipeline to leak?

Answer: By sloughing of banks I mean that the banks bordering waterways such as the Cheyenne River and its tributaries are highly susceptible to collapse. This is because the soil in western South Dakota is highly erodible, meaning it is particularly susceptible to water erosion.

14. Are events such as these common in the vicinity of the Cheyenne River Sioux Reservation?

Answer: Yes, sloughing and movement of highly erodible materials is a very common natural phenomena throughout western South Dakota.

15. Would non-Indian residents on the Cheyenne River Sioux Reservation be similarly affected?

Answer: Yes. All residents who rely on the Tribe's Mni Waste water treatment facility would be impacted, including non-Tribal members. In other words, the threat posed by the portion of the Keystone XL Pipeline in the vicinity of the Cheyenne River Sioux Reservation will equally affect citizens of the Cheyenne River Sioux Tribe and all other citizens of South Dakota residing within the boundaries of the Reservation.

16. In your professional capacity, has TransCanada Keystone XL Pipeline, LP contacted you or your office with regard to emergency response and/or cleanup issues?

Answer: No. To the best of my knowledge TransCanada has not made any attempt to contact me or anyone else in my office whatsoever. My office would be heavily involved

in any cleanup effort on the Cheyenne River Sioux Reservation, making their lack of contact with us especially disconcerting.

17. In your professional opinion, are the Cheyenne River Sioux Tribe and the local non-Indian governments within the Reservation, such as municipalities and counties, adequately trained and equipped to respond to a Pipeline spill into the Reservation's water?

Answer: No. In my opinion, the Cheyenne River Sioux Tribe, nor any other local government on the Reservation, has the capacity to adequately respond to a spill incident, making such an incident all the more decimating to the Tribe, Tribal Members, and non-Tribal Members living on the Reservation.

18. Does this conclude your prefiled testimony?

Answer: Yes it does.

Dated this 2 day of April, 2015.

/S/ Carlyle Ducheneaux

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CERTIFICATE OF SERVICE

I certify that on this 2nd day of April, 2015, the original of this **PRE-FILED TESTIMONY OF MR. CARLYLE DUCHENEAUX** on behalf of the Cheyenne River Sioux Tribe in Case Number HP 14-001, was filed on the Public Utilities Commission of the State of South Dakota e-filing website. Also on this day, a true and accurate copy of the above was sent to the following:

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/S/ Kaitlin Cramer
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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE	**DOCKET HP 14-001** **DIRECT TESTIMONY OF STEVE VANCE**

1. **Please state your name and address for the record.**

   Answer: My name is Steven Vance. My work address is PO Box 590

   Eagle Butte, SD 57625

2. **Please state your position with the Cheyenne River Sioux Tribe.**

   Answer: I am the Tribal Historic Preservation Officer (THPO) for the Cheyenne River Sioux Tribe's Preservation Office.

3. **Please provide a description of your areas of responsibility within the Cheyenne River Sioux Tribe's Preservation Office.**

   Answer: The Cheyenne River Sioux Tribe has assumed all previous duties of the South Dakota State Historic Preservation Officer (SHPO) on all lands within the exterior boundaries of the CRST reservation. In other words, as a Tribal Historic Preservation Officer I serve in an essentially identical capacity as a State Historic Preservation Officer.

4. **Please state your professional qualifications and experience.**

   Answer: Previous to my position with the Cheyenne River Sioux Tribe's Preservation Office as a Tribal Historic Preservation Officer, I was employed for sixteen (16) years by the Cheyenne River Sioux Tribe as a Certified Law Enforcement Officer. Following my

career in law enforcement, I was employed by the Cheyenne River Sioux Tribe as a Certified Lakota Studies Instructor for the instruction of Lakota language, culture, history, and government for seven (7) years. Following my time as a Lakota Studies Instructor, I was hired by the Cheyenne River Sioux Tribe as a Tribal Historic Preservation Officer. I have served the Tribe in this capacity for the past five to six (5-6) years.

5. **Are you familiar with the TransCanada Keystone XL Pipeline project?**

   Answer: Yes.

6. **Have you reviewed the proposed route of the Keystone Pipeline project; with specific regard to the portion of the project near the Cheyenne River Sioux Reservation?**

   Answer: Yes.

7. **In your opinion, would construction of the Keystone Pipeline in the vicinity of the Cheyenne River Sioux Reservation affect the Cheyenne River Sioux Tribe's access to cultural and historical resources?**

   Answer: Yes. The proposed route of the Keystone XL Pipeline falls within view shed of significant spiritual landforms, such as Slim Buttes, North Cave Hills, South Cave Hills, Woman Who Lived with the Wolves, Touch the Cloud Camp, and Spotted Elk Camp. This is a non-exhaustive list of affected cultural and historic sites. For instance, numerous trails which access these sites, as well as sites beyond the proposed route, such as the Sacred Black Hills, will also be affected by the proposed pipeline project.

8. **Please describe how access to such resources would be hindered by construction of the Keystone Pipeline.**

Answer: The actual construction phases will greatly hinder the Tribe's and Tribal Member's access to numerous cultural and historic sites. After all, people cannot simply walk through active construction zones to get to these sites. In all likelihood alternate routes, if there are any, would probably have to be selected by travelers to these cultural and historic sites.

9. **In your opinion, would the presence of the Keystone Pipeline, once completed, pose any ongoing problems with regard to cultural or historical resources?**

Answer: Yes. Once construction of the pipeline is complete there will undoubtedly be an ongoing need for general inspection and maintenance of the completed pipeline. This, in turn, would place pipeline workers within the vicinity of many sacred places. Traditional practitioners seeking solitude while performing traditional worship practices would almost certainly be interrupted by pipeline workers. Solitude is an essential element of many traditional worship practices, which require that outsiders not observe or otherwise disturb the practitioner during the traditional worship practice. As such, any disturbance by pipeline workers will necessarily have an immense negative impact on the ability of Tribal Members to perform traditional practices at these affected cultural and historical sites.

10. **In your opinion, would the Cheyenne River Sioux Tribe's cultural and historical resources be irreparably harmed by the construction and presence of the Keystone Pipeline?**

Answer: Yes. Comparing this to what happened to the mining of resources in the Sacred Black Hills, this proposed project will have long term negative effects emotionally and spiritually on many Tribal Members. In essence, the presence of the Keystone XL

Pipeline will cause irreparable harm to the Cheyenne River Sioux Tribe, its Tribal Members, and traditional cultural and religious practices.

11. In your professional capacity, has TransCanada Keystone XL Pipeline, LP contacted you or your office with regard to construction of the Pipeline project?

Answer: Yes. Keystone held one teleconference about four (4) years ago and one (1) visit to the Chairman's office by two Native Keystone XL employees one year ago.

12. To the extent of your knowledge, was the Keystone Pipeline's impact on cultural and historic resources discussed during these meetings?

Answer: The impacts to cultural resources could not be discussed during these preliminary meetings because the resources were not sufficiently identified at the time.

13. To the extent of your knowledge, did Keystone propose or otherwise agree to any mitigating measures in order to reduce the pipeline's impact on cultural and historic resources?

Answer: To my knowledge, avoidance and mitigation measures should have been addressed during the development of the PA. However, the Cheyenne River Sioux Tribe was not involved in the development of the PA.

14. Does this conclude your prefiled testimony?

Answer: Yes it does.

Dated this 2 day of April, 2015.

/S/ Steve Vance

Steve Vance
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CERTIFICATE OF SERVICE

I certify that on this 2nd day of April, 2015, the original of this **PRE-FILED TESTIMONY OF MR. STEVE VANCE** on behalf of the Cheyenne River Sioux Tribe in Case Number HP 14-001, was filed on the Public Utilities Commission of the State of South Dakota e-filing website. Also on this day, a true and accurate copy of the above was sent to the following:

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/S/ Kaitlin Cramer
Kaitlin Cramer
FREDERICKS PEEBLES & MORGAN LLP

PREFILED TESTIMONY

OF

FAITH SPOTTED EAGLE

Docket No. HP14-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

011047

1. Please state your name and you home address.

A. My name is Faith Spotted Eagle. My home address is Box 667, Lake Andes, SD, 57356.

2. Are you a member of the Yankton Sioux Tribe or any other tribe?

A. I am an enrolled member of the Yankton Sioux Tribe.

3. What is your occupation or what kinds of work do you do?

A. Private consultant in PTSD Counseling for veterans and veteran's organization; Trainer/facilitator in Historical Trauma for all populations; school certified counselor work in schools, Dakota Language teacher, Manager of Brave Heart Lodge in Lake Andes.

4. Please describe your educational background and professional experience.

A. I have an MA in Educational Psychology and Counseling from USD, Vermillion, SD. I have held professional positions as a teacher, counselor, principal, manager of Human Service Programs, Family and Individual therapist, Grantwriter and currently am Chair of the Ihanktonwan Treaty Committee.

5. Did you provide a copy of your resume?

A. I have attached a biography, it is Attachment A.

6. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Yankton Sioux Tribe.

7. Do you currently hold any positions with the Yankton Sioux Tribe?

A. I am an elected official by the General Council to be on the Ihanktonwan Treaty Committee and serve as the Chair for that body.

8. Please state the purpose of your testimony in this proceeding.

A. The main objective of the Yankton Sioux Tribe through this testimony is to provide information to the South Dakota Public Utilities Commission that the Applicant does not continue to meet all conditions upon which the permit was issued including violations of treaties, socio-cultural threats, and threats to safe drinking water, in particular reference to the potential coming of man camps which presents a safety conference of an at risk population already threatened by violence.

9. Please describe the professional work you conduct in the areas of historic trauma, cultural violence, socio-cultural violence.

A. I am a facilitator/trainer for the Tucson, VA for the purpose of assisting staff and veterans recover from Post-Traumatic Stress Disorder; along with serving as a consultant recovering from historical trauma and oppression all across the US and Canada. Some of these communities are Ponca Nation in NE; Spirit Lake Community in ND; Crow Creek Community in SD; Eepay Band/Rancheria in California; Tsu tina Nation near Calgary, Canada, among many others. I work with communities in developing strategies to stop "girl on girl" aggression, relationship violence and sexual and physical violence. As a grandmother of Brave Heart

Society we are responsible for the safekeeping of the environment, the water, safe communities and sacred sites.

10. Through you work in these areas, have you specifically organized gatherings to discuss concerns related of "man camps" or "construction camps" and their effect on the well-being of the communities surrounding these camps?

A. Yes. In August of 2013, the Brave Heart Society and the Treaty Committee organized and hosted the only conference that I know of to mobilize allies against the coming of man camps via KXL PIPELINE. Out of this gathering, strategic directions were developed to stop this threat in order to keep our communities safe.

11. Would you describe who attending those gatherings?

A. Our conference was attended by the US Attorney's Office out of Sioux Falls, SD. In fact Brendan Johnson was one of our speakers. Other attendees were women's shelters combatting sexual and physical violence from SD and ND. Also attending were recovering persons from sex trafficking situations. Treaty Councils, Tribal Council Members, Nebraska Bold and NEAT also attended, which are comprised of landowners and farmers. Many grassroots organizations like Dakota Rural Action and many others attended.

12. What information would you like to convey to the South Dakota PUC as a result of those gatherings?

A. It is frightening to think that no fore planning has been done to even recognize what happens when man camps are plopped into rural communities where wide gaps exist in law enforcement further impinged upon by cross-jurisdictional problems between reservation and state areas which are long standing issues. The Bakken experience proves that even non Natives are at risk. Many tribes do not have tribal/state agreements in order to handle cross jurisdictional major crimes. Mr. Johnson stated he could do nothing in the way of prevention until a crime occurred. We will not sit and wait for crimes to occur with close to 1800 men coming to treaty and unceded territory.

13. What specific information did you learn about the increase in police resources needed to address the increased crime that results from the placement of man damps near communities?

A. At our conference we had speakers and specialists who spoke of the impact of man camps near rural communities, in addition to the Bakken Range. Some of the speakers were from the Williston area. We also work with recovering sex workers who have first-hand knowledge.

14. What would you like the South Dakota Public Utilities Commission to know regarding anticipated increase in crime?

A. The Commission should anticipate a surge in crime, especially violent crime, in the communities near the man camps and not deny the fact that the current national statistics regarding Native people indicate that 3 out of 5 Native women will be raped in their lifetimes. I myself am a sexual abuse survivor and know that story well. As members of border towns, we are no strangers to violence. I can give details of an attack.

15. Have you reviewed Figure 2.1.5-1 entitled "Proposed Temporary Construction Camps", attached hereto as Attachment B?

A. Yes.

16. What does this document depict?

A. From my understanding, it depicts the proposed locations of the Applicant's man camps in South Dakota and Montana.

17. Are there any proposed man camp location(s) near the Yankton Sioux Reservation?

A. Yes, according to Attachment B, there is one proposed man camp to be located in Southeastern Tripp County. This location is equi-distant between the Rosebud Sioux Reservation and the Yankton Sioux Reservation, however, it is closer to the Yankton Sioux Reservation when traveling by vehicle.

18. What is your specific experience with the inhabitants of these man camps?

A. Man camps are inhabited by young and single men who are suddenly away from their families, spouses, and have the financial means to use and abuse illicit drugs. The result is easy to predict and does not require any scientific analysis – these young men, unfortunately, increase the crime rates including violent crimes, sexual crimes, and drug-related crimes. It is common sense that these men will need recreational outlets and will seek these at nearby casinos, including ours.

19. Why does this scenario especially troublesome for you and the Yankton Sioux Reservation?

A. Because the Yankton Sioux Tribe's Fort Randall Casino and Hotel will be the closest large-scale entertainment center that offers a large selection of gaming, evening entertainment, bar and restaurant, and hotel in one place. I strongly believe that there will be undesired consequences that negatively and directly impact the Tribe's socio-cultural as well as surge violent crime rates on an already overburdened police force.

20. Do you have jurisdictional concerns related to this point?

A. Yes, the nature of a tribe's criminal jurisdiction is that it does not have criminal jurisdiction over crimes committed by non-Indians against Indians on the reservation. Even with the Congress' passage of the Violence Against Women Reauthorization that allowed for expanded jurisdiction in certain circumstances, the reality is that the Yankton Sioux Tribe has not implemented VAWA. Even assuming it had, VAWA still requires the non-Indian perpetrator to be in a domestic relationship and have a tie to the reservation for the tribe to exert jurisdiction over the non-Indian.

21. What is the source or sources of your drinking water?

A. Lake Andes is a community that gets our water from the Missouri River.

22. Do you participate in ceremonies that involve the use of water?

A. All of our ceremonies are partaken with the existence of water presence. Our community sundances and other ceremonies are adjacent to the Missouri River.

23. What is the source or sources of water for those ceremonies?

A. The Missouri River.

24. In addition to the work you have already described, what other work do you do?

A. I am a member of the Tribe's governing body, its General Council, which consists of all adult members of voting age. I am also the Chairperson of the Ihanktonwan Treaty Steering Committee, which is appointed by the General Council. I am also a member of the Elder group and the Head of a revived Traditional Society, the Brave Heart Society which watches over sacred sites and burial sites.

25. Can you please explain the nature and purpose of the Ihanktonwan Treaty Steering Committee?

A. To oversee the protection of all treaty lands from depredation, exploitation and enforce the reason for the treaty.

26. Please describe the treaty you are referencing.

A. The 1851 Treaty of Fort Laramie is a binding peace treaty signed among the Dakota, Nakota, and Lakota and the United States to establish peace and identify boundaries for land to be used exclusively by the tribes who are signatories to that treaty

27. Please take a look at this document (Attachment C). Can you identify this document?

A. Yes, that is a copy of the 1851 Fort Laramie Treaty.

28. I'd like to show you A MAP that was provided by Keystone (Figure 2.1.1-2, FSEIS) (Attachment D). This is a map from Keystone that shows the planned route of the proposed pipeline project. What can you tell me about this map (Attachment D), of the pipeline route, compared with the Ihanktonwan Treaty Territory as defined by the 1851 Fort Laramie Treaty?

A. The proposed pipeline route clearly cuts corner-to-corner through our Treaty Territory.

29. Has the Ihanktonwan Treaty Steering Committee ever addressed the possibility of this proposed project being constructed?

A. Yes, this project has been of great concern to us as a Treaty Committee.

30. Why was this a concern to the Treaty Committee?

A. Because as that map demonstrates, the pipeline would trespass right through Treaty Territory guaranteed by the Fort Laramie Treaty as well as additional lands beyond that area that are unceded lands, and we still retain a multitude of rights on those lands based on the treaty that are protected by federal law and that are vital to our cultural, spiritual, and physical survival.

31. Can you describe some of these rights for us?

A. Hunting, fishing, gather medicinal plants, use of the water, burial responsibilities, oversight of sacred sites based on five historical preservation laws of the US that recognize our aboriginal right to protect these pre historical properties.

32. To your knowledge, has the Ihanktonwan Treaty Steering Committee ever given its approval for the construction of the proposed project?

A. No, never.

33. To your knowledge, has the governing body of the Yankton Sioux Tribe ever consented to construction of the proposed project through Ihanktonwan Treaty Territory?

A. No, never.

34. Does this conclude your prefiled testimony?

A. I reserve the right to supplement my prefiled testimony as well as offer additional testimony during the hearing in this case.

Attachment A

BIO FOR FAITH SPOTTED EAGLE

English Name: Faith Spotted Eagle
Dakota Name: Tunkan Inajin Win , Standing Stone
Residence address: Box 667, Lake Andes, SD 57356
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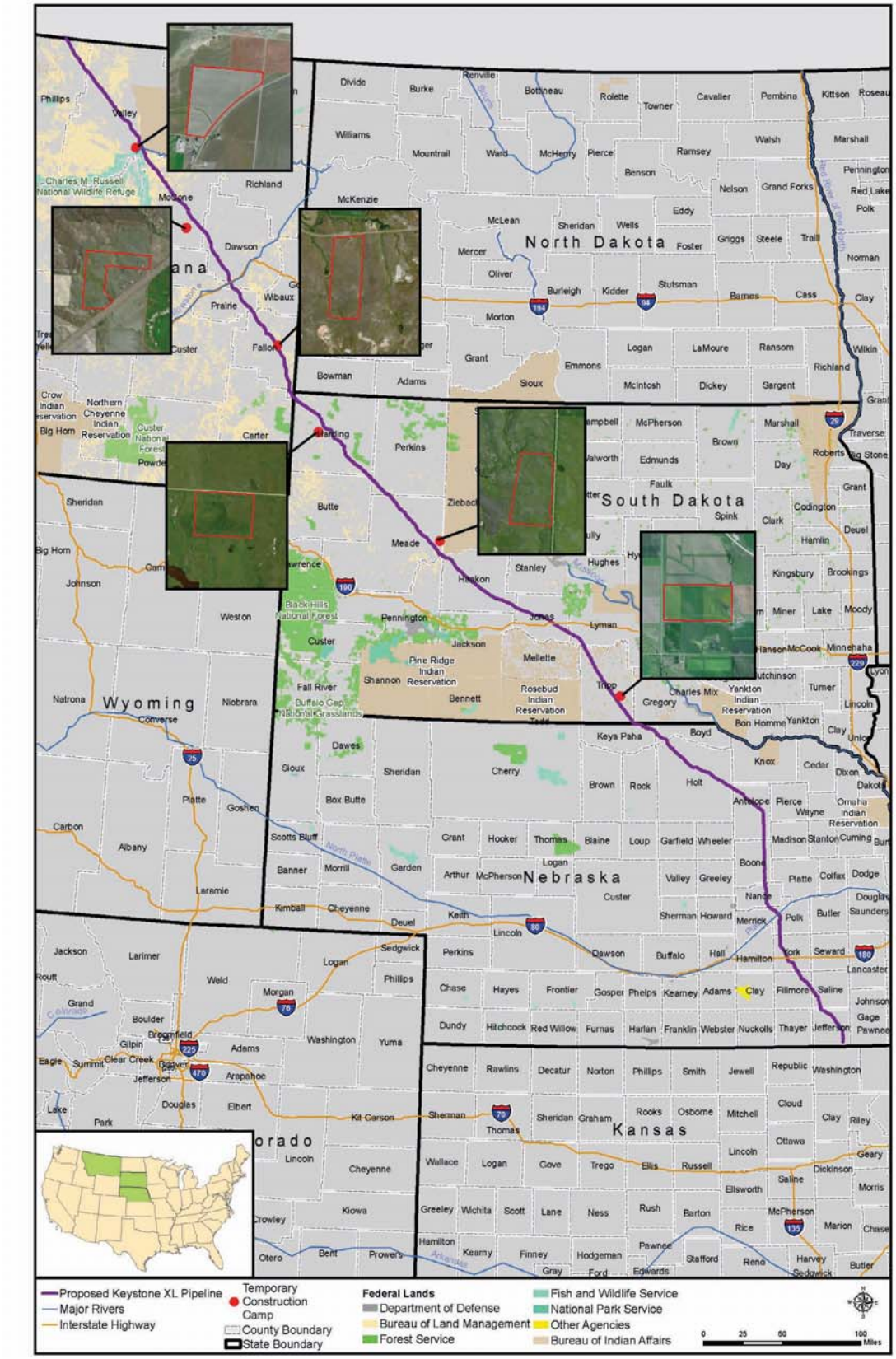
Faith Spotted Eagle is a 65 year old grandmother who lives on Ihanktonwan Dakota Territory (Yankton Sioux) in Southeastern South Dakota. She is a fluent speaker of the Dakota Language and a member of the Ihanktonwan, although she descends from the Sicangu, Hunpati, Hunkpapa and Mdewakantonwan and has French/Irish blood through her grandmother Julia Deloria and John McBride. She has two children. Kip Spotted Eagle is a Dakota Language Instructor and Brook Spotted Eagle is a Ph.D candidate at the University of Washington in Cultural Anthropology. Her new grandson is Tokana Ikpanajin Spotted Eagle.

In the western world, Faith earned a Master's in Guidance and Counseling in her early twenties at the University of South Dakota, although she attended college at American University in Washington, DC and Black Hills State College, Spearfish, SD., also. Throughout her long career she has been a high school counselor/teacher/principal; manager of Human Services Programs and Youth Programs; Indian Child Welfare Worker; Organizational Development Consultant; Teacher in a Psychiatric setting; Peacemaker/mediator; Community College Instructor; PTSD therapist and Community Activist. She was also a women's basketball coach in Idaho. As a young student she was an intern in the office of Sen. Geo McGovern; served as an intern with the National Park Service in Glacier Park, Montana; provided student input to the early development of Talent Search Programs in Chicago, Illinois. She worked with the groundbreaking Coalition of Indian Controlled Schoolboards in Denver, Colorado, the organization which played an important role in returning Native control of schools. She was one of the early instructors at Sinte Gleska College in Rosebud. She did the early work of repatriation and cultural resources work at White Swan in her homeland at Ihanktonwan in a historical Section 106 foreclosure on the Corps of Engineers for disrupting a burial grounds. She works in Native communities with her model Healing from Red Rage, which has been widely used in Native Communities in the US and Canada. She also contracts with the Veteran's Administration utilizing this model. She is a trained mediator/peacemaker and incorporates traditional peacemaking with western approaches of peacemaking Her priority is the preserve the good medicine of the Dakota Culture for the future.

In the Dakota/Native world, she has been active in teaching the Dakota language in language nest settings; been a 20-year member of a revived traditional Brave Heart Society; comes from a Sundance family; and has helped revive the Isnati Awicadowanpi (Coming of Age Ceremony) for the last 18 years across the Seven Council Fires. Her Red Rage Model has been utilized in the Brave Heart work. She has been active in leading resistance against Tar Sands Development and the KXL Pipeline. As the Chair of the Ihanktonwan Treaty Committee and Brave Heart

Society Grandmother , she helped bring forth the International Treaty to Protect the Sacred against the KXL Pipeline and the Tar Sands. She is the volunteer Manager of the Brave Heart Lodge on the Ihanktonwan Reservation, which seeks to preserve Dakota cultural beliefs for the future. Brave Heart recently cooperated with other entities to revive Lacrosse/shinny in the Ihanktonwan homelands. She has been a delegate of the Treaty Committee NGO at the United Nations. She is the current Chair of the Ihanktonwan Treaty Steering Committee. She helped create an important cultural survey of Ihanktonwan lands along the Missouri River in South Dakota and other Treaty lands. Her priority has been to battle for the preservation of Sacred Sites through Brave Heart Society support of the World Peace and Prayer Day, represented by Bundlekeeper, Arvol Looking Horse. She will be a featured speaker at World Peace and Prayer Day in June of 2014 in New York.

Attachment B



Source: Esri 2013, exp Energy Services, Inc. 2012b

Figure 2.1.5-1 Proposed Temporary Construction Camps

011057

Attachment C

TREATY OF FORT LARAMIE

September 17, 1851

Articles of a treaty made and concluded at Fort Laramie, in the Indian Territory, between D. D. Mitchell, superintendent of Indian affairs, and Thomas Fitzpatrick, Indian agent, commissioners specially appointed and authorized by the President of the United States, of the first part, and the chiefs, headmen, and braves of the following Indian nations, residing south of the Missouri River, east of the Rocky Mountains, and north of the lines of Texas and New Mexico, viz, the Sioux or Dahcotahs, Cheyennes, Arrapahoes, Crows, Assinaboines, Gros-Ventre Mandans, and Arrickaras, parties of the second part, on the seventeenth day of September, A.D. one thousand eight hundred and fifty-one. (a)

ARTICLE 1. The aforesaid nations, parties to this treaty, having assembled for the purpose of establishing and confirming peaceful relations amongst themselves, do hereby covenant and agree to abstain in future from all hostilities whatever against each other, to maintain good faith and friendship in all their mutual intercourse, and to make an effective and lasting peace.

ARTICLE 2. The aforesaid nations do hereby recognize the right of the United States Government to establish roads, military and other posts, within their respective territories.

ARTICLE 3. In consideration of the rights and privileges acknowledged in the preceding article, the United States bind themselves to protect the aforesaid Indian nations against the commission of all depredations by the people of the said United States, after the ratification of this treaty.

ARTICLE 4. The aforesaid Indian nations do hereby agree and bind themselves to make restitution or satisfaction for any wrongs committed, after the ratification of this treaty, by any band or individual of their people, on the people of the United States, whilst lawfully residing in or passing through their respective territories.

ARTICLE 5. The aforesaid Indian nations do hereby recognize and acknowledge the following tracts of country, included within the metes and boundaries hereinafter designated, as their respective territories, viz;

The territory of the Sioux or Dahcotah Nation, commencing the mouth of the White Earth River, on the Missouri River; thence in a southwesterly direction to the forks of the Platte River; thence up the north fork of the Platte River to a point known as the Red Buts, or where the road leaves the river; thence along the range of mountains known as the Black Hills, to the head-waters of Heart River; thence down Heart River to its mouth; and thence down the Missouri River to the place of beginning.

The territory of the Gros Ventre, Mandans, and Arrickaras Nations, commencing at the month of Heart River; thence up the Missouri River to the mouth of the Yellowstone River; thence up the Yellowstone River to the mouth of Powder River in a southeasterly direction, to the head-waters of the Little Missouri River; thence along the Black Hills to the head of Heart River, and thence down Heart River to the place of beginning.

The territory of the Assinaboin Nation, commencing at the mouth of Yellowstone River; thence up the Missouri River to the mouth of the Muscle-shell River; thence from the mouth of the Muscle-shell River in a southeasterly direction until it strikes the head-waters of Big Dry Creek; thence down that creek to where it empties into the Yellowstone River, nearly opposite the mouth of Powder River, and thence down the Yellowstone River to the place of beginning.

The territory of the Blackfoot Nation, commencing at the mouth of Muscle-shell River; thence up the Missouri River to its source; thence along the main range of the Rocky Mountains, in a southerly direction, to the head-waters of the northern source of the Yellowstone River; thence down the Yellowstone River to the mouth of Twenty-five Yard Creek; thence across to the head-waters of the Muscle-shell River, and thence down the Muscle-shell River to the place of beginning.

The territory of the Crow Nation, commencing at the mouth of Powder River on the Yellowstone; thence up Powder River to its source; thence along the main range of the Black Hills and Wind River Mountains to the head-waters of the Yellowstone River; thence down the Yellowstone River to the mouth of Twenty-five Yard Creek; thence to the head waters of the Muscle-shell River; thence down the Muscle-shell River to its mouth; thence to the head-waters of Big Dry Creek, and thence to its mouth.

The territory of the Cheyennes and Arrapahoes, commencing at the Red Bute, or the place where the road leaves the north fork of the Platte River; thence up the north fork of the Platte River to its source; thence along the main range of the Rocky Mountains to the head-waters of the Arkansas River; thence down the Arkansas River to the crossing of the Santa Fe' road; thence in a northwesterly direction to the forks of the Platte River, and thence up the Platte River to the place of beginning.

It is, however, understood that, in making this recognition and acknowledgement, the aforesaid Indian nations do not hereby abandon or prejudice any rights or claims they may have to other lands; and further, that they do not surrender the privilege of hunting, fishing, or passing over any of the tracts of country heretofore described.

ARTICLE 6. The parties to the second part of this treaty having selected principals or head-chiefs for their respective nations, through whom all national business will hereafter be conducted, do hereby bind themselves to sustain said chiefs and their successors during good behavior.

ARTICLE 7. In consideration of the treaty stipulations, and for the damages which have or may occur by reason thereof to the Indian nations, parties hereto, and for their maintenance and the improvement of their moral and social customs, the United States bind themselves to deliver to the said Indian nations the sum of fifty thousand dollars per annum for the term of ten years, with the right to continue the same at the discretion of the President of the United States for a period not exceeding five years thereafter, in provisions merchandise, domestic animals, and agricultural implements, in such proportions as may be deemed best adapted to their condition by the President of the United States, to be distributed in proportion to the population of the aforesaid Indian nations.

ARTICLE 8. It is understood and agreed that should any of the Indian nations, parties to this treaty, violate any of the provisions thereof, the United States may withhold the whole or a portion of the annuities mentioned in the preceding article from the nation so offending, until, in the opinion of the President of the United States, proper satisfaction shall have been made.

In testimony whereof the said D. D. Mitchell and Thomas Fitzpatrick commissioners as aforesaid, and the chiefs, headmen, and braves, parties hereto, have set their hands and affixed their marks, on the day and at the place first above written.

D. D. Mitchell
Thomas Fitzpatrick
Commissioners.

Sioux:
Mah-toe-wha-you-whey, his x mark,
Mah-kah-toe-zah-zah, his x mark,
Bel-o-ton-kah-tan-ga, his x mark,
Nah-ka-pah-gi-gi, his x mark,
Mak-toe-sah-bi-chis, his x mark,
Meh-wha-tah-ni-hans-kah, his x mark,

Cheyennes:
Wah-ha-nis-satta, his x mark,
Voist-ti-toe-vetz, his x mark,
Nahk-ko-me-ien, his x mark,
Koh-kah-y-wh-cum-est, his x mark,

Arrapahoes:
Be-ah-te,-a-qui-sah, his x mark,
Neb-ni-bah-seh-it, his x mark,
Beh-kah-jay-beth-sah-es, his x mark,

Crows:
Arra-tu-ri-sash, his x mark,
Doh-chepit-seh-chi-es, his x mark,

Assinaboines:
Mah-toe-wit-ko, his x mark,
Toe-tah-ki-eh-nan, his x mark,

Mandans and Gros Ventres:
Nochk-pit-shi-toe-pish, his x mark,
She-oh-mant-ho, his x mark,

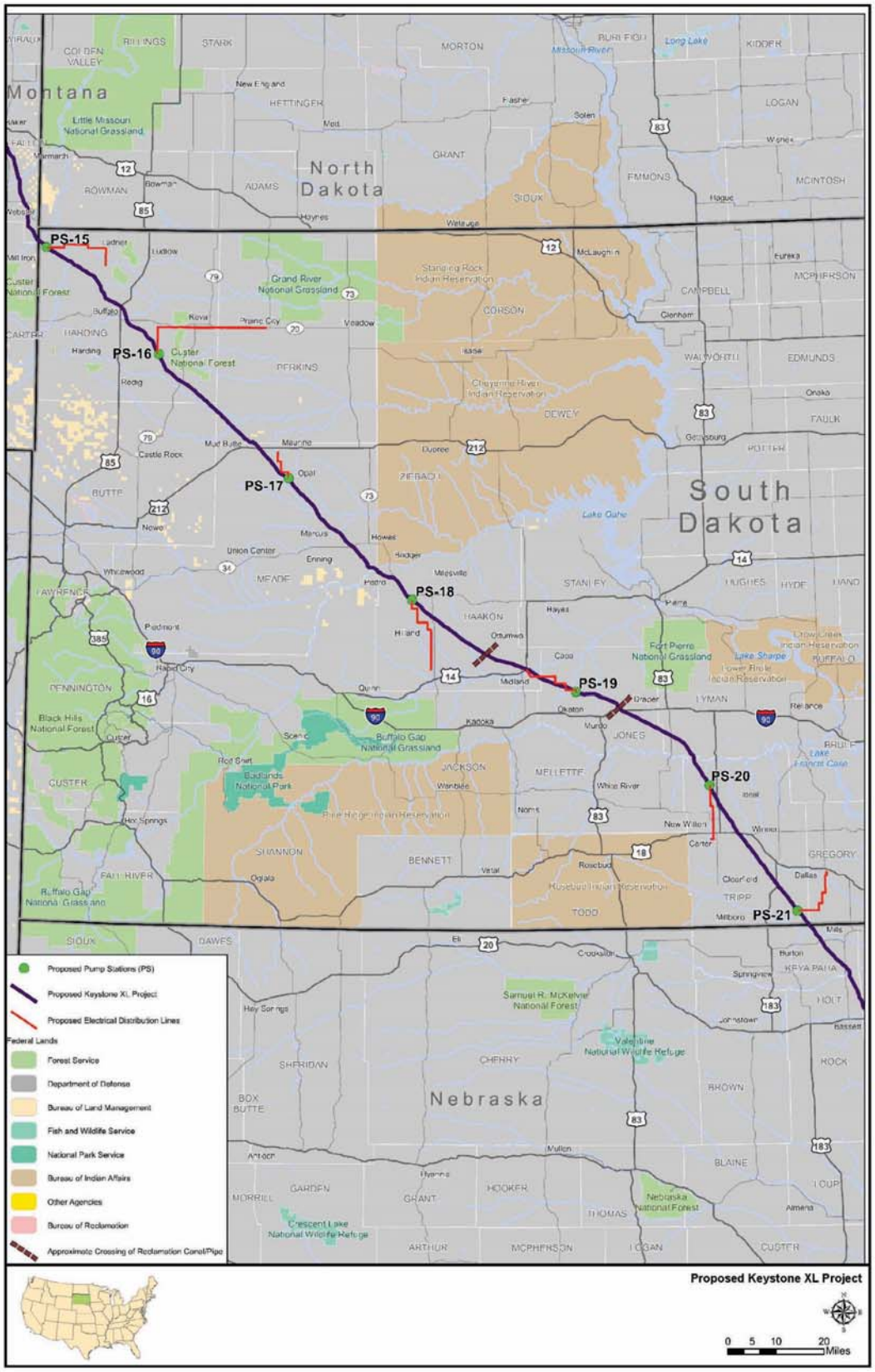
Arickarees:
Koun-hei-ti-shan, his x mark,
Bi-atch-tah-wetch, his x mark,

In the presence of---

A. B. Chambers, secretary.
S. Cooper, colonel, U. S. Army.
R. H. Chilton, captain, First Drags.
Thomas Duncan, captain, Mounted Rifiemen.
Thos. G. Rhett, brevet captain R. M. R.
W. L. Elliott, first lieutenant R. M. R.
C. Campbell, interpreter for Sioux.
John S. Smith, interpreter for Cheyennes.
Robert Meldrum, interpreter for the Crows.
H. Culbertson, interpreter for Assiniboines and Gros Ventres.
Francois L'Etalie, interpreter for Arickarees.
John Pizelle, interpreter for the Arrapahoes.
B. Gratz Brown.
Robert Campbell.
Edmond F. Chouteau.

(a) This treaty as signed was ratified by the Senate with an amendment changing the annuity in Article 7 from fifty to ten years, subject to acceptance by the tribes. Assent of all tribes except the Crows was procured (see Upper Platte C., 570, 1853, Indian Office) and in subsequent agreements this treaty has been recognized as in force (see post p. 776).

Attachment D



Source: Esri 2013, exp Energy Services, Inc. 2012b

Figure 2.1.1-2 Proposed Project Overview—South Dakota

011063

Attachment E

Table 2.1-13 Pipeline Construction Spreads Associated with the Proposed Project

State	Approximate Miles by State	County	Spread Number	Approximate Location (Milepost)	Approximate Length of Construction Spread (Miles)
Montana	285	Phillips, Valley	Spread 1	0-90	90
		Valley, McCone	Spread 2	90-152	61.5
		McCone, Dawson	Spread 3	152-198	46.2
		Dawson, Prairie, Fallon	Spread 4	198-289	91
South Dakota	316	Harding	Spread 5	289-411	122.1
		Harding, Butte, Perkins, Meade	Spread 6	411-500	89.7
		Meade, Pennington	Spread 7	500-599	98.4
		Haakon, Jones	Spread 8	599-692	92.9
		Jones, Lyman, Tripp	Spread 9	692-776	83.9
		Tripp	Spread 10	776-875	99.7
Nebraska	274	Keya Paha, Boyd, Holt, Antelope			
		Antelope, Boone, Nance, Merrick, Polk			
		Polk, York, Fillmore, Saline, Jefferson			

Source: exp Energy Services, Inc. 2012a

\CERTIFICATE OF SERVICE

I certify that on this 2nd day of April 2015, a true and correct copy of the Prefiled Testimony of Faith Spotted Eagle on behalf of Yankton Sioux Tribe was filed on the Public Utilities Commission of the State of South Dakota e-filing website. And also on this day, a true and accurate copy was sent via email to the following:

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kimecraven@gmail.com

/s/Patricia Krakowski
Patricia Krakowski

SUPPLEMENT TO PREFILED TESTIMONY

OF

FAITH SPOTTED EAGLE

Docket No. HP14-001

IN THE MATTER OF THE APPLICATION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

011075

35. You listed a number of tribal resolutions that were passed in response to the threat of the proposed pipeline. Do you know of any other tribal governing documents or agreements that have been adopted in response to the proposed project?

A. Yes, there is the International Treaty to Protect the Sacred which was signed January of 2013. There is also the Mother Earth Accord, which several tribes have adopted including the Oglala Sioux Tribe. Both of these documents express tribal opposition to the Keystone XL pipeline and development of the tar sands because of the threat to Mother Earth.

011076

INTERNATIONAL TREATY TO PROTECT THE SACRED FROM TAR SANDS PROJECTS

The representatives from sovereign Indigenous Nations, tribes, and governments, participating in the Gathering to Protect the Sacred on January 23 – 25, 2013, on the 150 year anniversary of the *Treaty Between the Pawnee and Yankton Sioux*, have gathered on the Ihanktonwan homelands, and have resolved by our free, prior, and informed consent to enter into a treaty to be forever respected and protected. We agreed upon the following articles:

ARTICLE I

The undersigned Indigenous Peoples have inhabited and governed our respective territories according to our laws and traditions since time immemorial.

ARTICLE II

As sovereign nations, we have entered into bi-lateral and multi-lateral agreements with other nations including the *Treaty Between the Pawnee and Yankton Sioux*, *Mother Earth Accord*, the *Spiritual Leaders Declaration*, the *Agreement to Unite to use 16 Guiding Principles*, and the *Black Hills Sioux Nation Treaty Council Declaration*, and all the inter-tribal treaties in the Western hemisphere, among others, which promise peace, friendship, and mutual opposition to tar sands projects and energy development that threaten the lands, the waters, the air, our sacred sites, and our ways of life, and acknowledge other Indigenous Peoples such as the Yinka Dene, the People of the Earth' who have exercised their lawful authority to ban tar sands projects from their territories through Indigenous legal instruments such as the *Save the Fraser Declaration* and the *Coastal First Nations Declaration.*

ARTICLE III

We act with inherent, lawful, and sovereign authority over our lands, waters, and air, as recognized by Article 32 of the United Nations Declaration on the Rights of Indigenous Peoples which provides:

> States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

011077

ARTICLE IV

We mutually agree that tar sands projects present unacceptable risks to the soil, the waters, the air, sacred sites, and our ways of life including:

- The destruction of rivers, lakes, boreal forests, homelands and health of the Cree, Dene, and Métis peoples in the Northern Alberta tar sands region and downstream Dene communities of Northwest Territories
- The threat of pipeline and tanker oil spills into major river systems, aquifers and water bodies such as the Salish Sea, the North Pacific coast, and the Ogallala Aquifer.
- The negative cumulative health and ecological impacts of tar sands projects on Indigenous Communities.
- The irreparable harm to irreplaceable cultural resources, burial grounds, sacred and historic places, natural resources, and environmental resources of the central plains region which is the aboriginal homelands of many Indigenous Nations.
- Greenhouse gas pollution that could lock the planet onto a path of catastrophic climate change.

ARTICLE V

We affirm that our laws define our solemn duty and responsibility to our ancestors, to ourselves, and to future generations, to protect the lands and waters of our homelands and we agree to mutually and collectively oppose tar sands projects which would impact our territories, including but not limited to the TransCanada Keystone XL pipeline, the Enbridge Northern Gateway, Enbridge lines nine (9) and sixty-seven (67), or the Kinder Morgan Trans Mountain pipeline and tanker projects.

ARTICLE VI

We agree to mutually and collectively, as sovereign nations, call upon the Canadian and United States governments to respect our decision to reject tar sands projects that impact our sacred sites and homelands; to call upon the Canadian and United States governments to immediately halt and deny approval for pending tar sands projects because they threaten the soil, water, air, sacred sites, and our ways of life; and, confirm that any such approval would violate our ancestral laws, rights and responsibilities.

ARTICLE VII

We agree to the mutual, collective, and lawful enforcement of our responsibilities to protect our lands, waters, and air by all means necessary, and if called on to do so, we will exercise our peace and friendship by lawfully defending one another's lands, waters, air, and sacred sites from the threat of tar sands projects, provided that each signatory Indigenous Nation reserves and

011078

does not cede their rights to act independently as the tribal governments see fit to protect their respective tribal interests, further provided that each signatory Indigenous Nation reserves its inherent sovereign right to take whatever governmental action and strategy that its governing body sees fit to best protect and advance tribal interests affected by the pipeline project consistent with the agreements made herein and subject to the laws and available resources of each respective nation.

This Treaty of mutual defense and support is made on the occasion of the 150 year anniversary of the *Treaty Between the Pawnee and Yankton Sioux* concluded between the Pawnee Nation and the Ihanktonwan Oyate/Yankton Sioux Tribe on January 23rd, 1863, and the parties thereto hereby commemorate the signing of that historic treaty that has endured without violation for 150 years.

This Treaty goes into effect once ratified by the governing bodies of the signatory nations.

IN WITNESS WHEREOF, the undersigned dually authorized representatives, after having deposited their full powers found to be in due and proper form, sign this treaty on behalf of their respective governments, on the date appearing opposite their signatures.

SIGNED:

Name of Representative	Representing	Signature	Date

011079

nt sovereign right to take whatever governmental action and strategy that its governin sees fit to best protect and advance tribal interests affected by the pipeline projec tent with the agreements made herein and subject to the laws and available resources o espective nation.

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reaty goes into effect once ratified by the governing bodies of the signatory nations.

ITNESS WHEREOF, the undersigned dually authorized representatives, after having ted their full powers found to be in due and proper form, sign this treaty on behalf of thei tive governments, on the date appearing opposite their signatures.

ED:

of Representative	Representing	Signature	Date
Tom Pawnee	Oglala Lakota Nation	Tom Pawnee	1-25-13
		Ruben George	1-25-

Tom Poor Bear

Tantoo Cardinal [illegible]

Reuben George [illegible]

Tom Goldtooth [illegible]

CASEY CAMP Horinek - PONCA Casey Camp-Horinek

RoBert BrownBear SR.

Tegheya Kte Fire Lightning Tiospaye

Wanbdi Ob Kinyan - Narcisa Shields Horse Tiospaye

Philip M. Lane Jr Deloria Tiospaye

[illegible]

[illegible] Strong SMOKEY BEAR

[illegible] Arrow

Faith Spotted Eagle BraveHeart Society
Tunkan Inajin Win Cokate Uni Tika

Paula Horne-Miller Sisseton Wahpeton Oyate Witness

Iwila Zephier Ihanktonwan Oyate Witness

Marie Randall Oyate I Ki Ti Pi Win

Adele Zephier Ihanktonwan Oyate Witness

Phoebe Little Thunder Wakinyan Cik'ala Tiospaye

PLEDGE OF SUPPORT to the
INTERNATIONAL TREATY TO PROTECT THE SACRED
FROM TAR SANDS PROJECTS

January 2013

We the undersigned Indigenous Peoples Organizations, levels of government, businesses, unions, non-governmental organizations, and citizens hereby recognize and commit ourselves to upholding the January 2013 *International Treaty to Protect the Sacred from Tar Sands Projects*:

Name of Representative	Representing	Signature	Date
Tanya Cardinal	The people		Jan 25/13
Tara Colthurst	Indigenous Environmental Network		1/25/13

PLEDGE OF SUPPORT to the
INTERNATIONAL TREATY TO PROTECT THE SACRED
FROM TAR SANDS PROJECTS

January 2013

We the undersigned Indigenous Peoples Organizations, levels of government, businesses, unions, non-governmental organizations, and citizens hereby recognize and commit ourselves to upholding the January 2013 *International Treaty to Protect the Sacred from Tar Sands Projects*:

Name of Representative	Representing	Signature	Date
Bob Gough	InterTribal COUP	[signature]	1/25/13
Bill Schumacher	InterTribal COUP	[signature]	1/25/13
Phyllis Cole-Dai	Fast for the Earth	[signature]	1/25/2013
Elizabeth Catlin	Tar Sands Blockade	[signature]	1/25/2013
Philip Strickland	Earth First!	[signature]	1/25/2013
Andrea Wilson		[signature]	1/25/2013
Matthew West	Earth First!	[signature]	1/25/2013
Crystal Tejeda Moriya	Earth First!	[signature]	1/25/2012
Byron Steskal	Farmer	[signature]	1/25/2013
TERRY FRISCH	FARMER	[signature]	1/25/13
JASON SPARKS	global Revolution	[signature]	1/25/2013
George Vest	Earth First!	[signature]	1/25/2013
Tom Genung	Nebraska Landowner	[signature]	1/25/2013
Lauren Zygmont	Earth First!	[signature]	1/25/2013
Bruce Boettcher	Rancher	[signature]	1/25/2013
Craig Neef	Chicago Indymedia	[signature]	1/25/2013
Ashley Young	THE FEATHER PROJECT / UN CSD EDUCATION CAUCUS / INT'L ASSN FOR THE ADVANCEMENT OF INNOVATIVE SOLUTIONS TO GLOBAL CHALLENGES	[signature]	1/25/2013
Kathleen McLeod	a friend of all people	[signature]	1/25/2013
Lorenzo Serna	The Movement	[signature]	1/25/2013
ELIZABETH ARCE	THE MOVEMENTS	[signature]	1/25/2013
Shivani Laura St. George		[signature]	1/25/2013
Happy Waters-Caton	The Movement	[signature]	1/25/2013
Gillette West	North Star Energy Coalition	[signature]	1-25-2013

Mother Earth Accord

September 2011

Tribal Government Chairs and Presidents, Traditional Treaty Councils, and US property owners, with First Nation Chiefs of Canada, impacted by TransCanada's proposed Keystone XL tar sands pipeline and tar sands development present at the Rosebud Sioux Tribe Emergency Summit, September 15-16, 2011, on the protection of Mother Earth and Treaty Territories:

Recognizing that TransCanada's proposed Keystone XL pipeline would stretch 1,980 miles, from Hardisty, Alberta, Canada to Nederland, Texas, carrying up to 900,000 barrels per day of tar sands crude oil, which would drive additional tar sands production;

Recognizing the existing resolutions and letters in opposition to the Keystone XL pipeline;

Guided by the principles of traditional indigenous knowledge, spiritual values, and respectful use of the land;

Affirming our responsibility to protect and preserve for our descendants, the inherent sovereign rights of our Indigenous Nations, the rights of property owners, and all inherent human rights;

Affirming our Indigenous view that the Earth is our true mother, our grandmother who gives birth to us and maintains all life;

Recognizing that the tar sands in northern Alberta, Canada is one of the largest remaining deposits of unconventional oil in the world, containing approximately 2 trillion barrels, and there are plans for a massive expansion of development that would ultimately destroy an area larger than the state of Florida;

Recognizing that tar sand development has devastating impacts to Mother Earth and her inhabitants and perpetuates the crippling addiction to oil of the United States and Canada;

Recalling in September 2010, the Assembly of First Nations of Canada called on the United States government to take into account the environmental impacts of tar sands production on First Nations in its energy policy, citing the high rates of cancer in the downstream Fort Chipewyan community, which prominent scientists say are potentially linked to petroleum products;

Recognizing the findings published in the Proceedings of the National Academy of Sciences that tar sands production releases 13 elements considered priority pollutants under the U.S. Clean Water Act, including lead, mercury, and arsenic into the Athabasca River in northern Alberta, which flows 3,000 miles downstream to the Arctic Ocean;

011084

Recognizing that tar sands production produces three times the greenhouse gas emissions of conventional oil and NASA climate scientist James Hansen has said that if the tar sands are fully developed, it will be "essentially game over" for the climate;

Recognizing that Canada's greenhouse gas emissions from tar sands development have more than doubled since 1990, which is the main reason Canada is failing to meet its greenhouse gas emissions reduction targets under the Kyoto Protocol;

Concerned that Indigenous people are most vulnerable to the social, cultural, spiritual, and environmental impacts of climate change;

Recognizing that Exxon-Imperial and ConocoPhillips Heavy Haul shipments are attempting to haul more than 200 oversized loads of heavy oil machinery from the Port of Lewiston, Idaho along Highway 12 into Montana, then north to the tar sands project in Alberta, Canada;

Concerned that tar sands crude oil is more toxic, corrosive, and abrasive than conventional crude oil and poses additional pipeline safety risks that have not been fully assessed by the U.S. Department of State in its final Environmental Impact Statement for the Keystone XL pipeline, issued August 26, 2011;

Recalling that TransCanada's year-old Keystone pipeline, from Manitoba, Canada to Patoka, Illinois and Cushing Oklahoma, has had 14 spills in the U.S. portion since it started operation in June 2010, and was temporarily shut down by regulators in late May, 2011;

Recognizing TransCanada's extremely poor safety record for the Keystone pipeline, it is probable that the Keystone XL pipeline will have frequent spills because it will have similar design specifications;

Concerned that oil spills from the Keystone XL pipeline would destroy live-sustaining water resources, including the Ogallala Aquifer, which provides drinking water for millions of people and farmland irrigation throughout the Midwestern United States;

Concerned that construction of the Keystone XL pipeline will impact sacred sites and ancestral burial grounds, and treaty rights throughout traditional territories, without adequate consultation on these impacts;

Concerned that the Keystone XL pipeline would increase air pollution in the communities surrounding the refineries that the pipeline would service where people of color, Indigenous peoples, and poor people are already experiencing high rates of cancer and respiratory illness;

Recalling that TransCanada's permit application to the Canadian government for the Keystone XL pipeline said it will increase oil prices in the United States by $4 billion per year;

Acknowledging that the Keystone XL pipeline is not designed to provide the United States with energy security and that industry documents indicate Gulf Coast refineries operate in a free trade

011085

zone and plan to refine tar sands oil into petroleum products that are intended for export overseas;

Therefore, we are united on this Mother Earth Accord, which is effective immediately, that it be resolved as follows:

We support and encourage a moratorium on tar sands development;

We insist on full consultation under the principles of "free, prior and informed consent," from the United Nations Declaration on the Rights of Indigenous Peoples both in the United States and Canada;

We urge regional authorities to halt the Exxon-Imperial and ConocoPhillips Heavy Haul shipments of tar sands equipment through the United States and Canada;

We urge the United States and Canada to reduce their reliance on oil, including tar sands, and invest in the research and development of cleaner, safer forms of sustainable energy and transportation solutions, including smart growth, fuel efficiency, next-generation biofuels and electric vehicles powered by solar and wind energy.

We strongly believe that the proposed Keystone XL tar sands pipeline is not in the national interest of the United States or Canada; and

We urge President Obama and Secretary of State Clinton to reject the Presidential Permit for the Keystone XL pipeline.

Signed by:

CERTIFICATE OF SERVICE

I certify that on this 7th day of August, 2015, a true and correct copy of **SUPPLEMENT TO PREFILED TESTIMONY OF FAITH SPOTTED EAGLE** was filed on the Public Utilities Commission of the State of South Dakota e-filing website. And also on this day, a true and accurate copy was sent via email to the following (or US Mail first-class postage prepaid where no email is given):

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/s/ J. Wagner
Jessica Wagner
Legal Secretary

BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN RE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP
FOR A PERMIT TO CONSTRUCT KEYSTONE XL PIPELINE

DOCKET NO. HP 001

PREFILED TESTIMONY BY WASTE' WIN YOUNG
TRIBAL HISTORIC PRESERVATION OFFICER
STANDING ROCK SIOUX TRIBE

APRIL 2, 2015

Q. State your name and address for the record.

A. My name is Waste' Win Young. I reside at 950 Meadowlark Street in Fort Yates, North Dakota.

Q. What is your occupation?

A. I am the Tribal Historic Preservation Officer for the Standing Rock Sioux Tribe.

Q. Summarize your education and professional background.

A. I graduated from the University of North Dakota in 2001. I have a Bachelor's of Arts in English Language and Literature. I have a Bachelor's of Arts in American Indian Studies as well as a minor in psychology. I have worked in the Tribal Historic Preservation Office for the Standing Rock Sioux Tribe since 2003.

Q. Describe your duties as Director of the Tribal Historic Preservation Officer?

A. As the Tribal Historic Preservation Officer I review archeological and cultural resource surveys for projects within the exterior boundaries of the SRST. After reviewing the report I base my decision on the "determination of effect", whether a project will have an adverse effect or not on the resources. I also consult with agencies on projects off the reservation.

The National Historic Preservation Act ("NHPA") was passed in 1966, was an act to "Establish a Program for the Preservation of Additional Historic Properties throughout the Nation." In 1992 it was amended to include Tribal Nations. Subsequently it recognized the authority of tribes to establish "tribal historic preservation offices" and make determinations on projects that would impact their land, as well as cultural resources which may be located off reservation lands pursuant to section 101(d)(6)(B) of the National Historic Preservation Act.

Q. Is it challenging to protect cultural resources on and near the Standing Rock Reservation? Explain.

A. Yes. The National Historic Preservation Act and its implementing regulations require all agencies involved with federal approvals of projects to "gather information from any Indian tribe… to assist in identifying properties, including those located off tribal lands which may be of religious and cultural significance." 36 CFR §800.4(a)(4). The regulations provide a process for resolving conflicts over the evaluation of identified sites and for resolving adverse impacts to them. 36 CFR §800.4(d); 800.5(c)(2); 800.6(b). The resolution to these issues, especially when they involve off-Reservation development projects sponsored by large corporations such as TransCanada, is complicated by the inordinate amount of political influence that the project beneficiaries exercise with federal and state agencies. Our cultural sites are vulnerable to impacts caused by development projects that promise jobs and profits for non-Indians. This is precisely the situation with the Keystone XL Pipeline.

Q. Describe the process that agencies normally follow under section 106 of the National Historic Preservation Act?

A. Agencies are required to initiate the consultation process early on, and to fully include all eligible parties in the identification and evaluation of historic properties, as well as the determination of effects and proposed mitigation. The process should be straightforward and transparent.

Q. Describe the process that State Department used under section 106 of the National Historic Preservation Act for the Keystone XL Pipeline?

A. The State Department sent a boilerplate letter to our office that did not establish a meaningful process for the participation of my office in the NHPA Section 106 process. The agency attempted to combine historic preservation consultation (SHPO's and THPO's) required under Section 106 of the NHPA with Tribal government consultation required under Executive Order 13175 and SDCL §1-54-5. Consequently, my office was not given the opportunity to participate in a well-defined process for identifying and evaluating historic properties. The

process established for the requisite consultation was akin to getting one's flu shots at the DMV – different functions were combined and as a result neither consultation process was properly conducted. The consultation process has been exaggerated and mischaracterized by the State Department and by TransCanada – in violation of both federal and state law.

The SRST was not afforded a meaningful opportunity to participate in identification efforts for historic properties along the Keystone XL Pipeline route. Keystone XL and other pipelines have the potential to damage (through construction or failure of equipment) and destroy cultural resources that have not been identified through pedestrian surveys.

This has real world consequences. The limited number of historic properties identified in current surveys illustrates the failure of TransCanada's archaeologists to conduct proper identification in accordance with the NHPA. The State Department Final Supplemental Environmental Impact Statement was not available when the Final Order was entered granting TransCanada a permit on June 29, 2010. Now that this information has been released, it is apparent that there have not been adequate surveys with proper Tribal involvement.

In fact, my office requested additional information on sites 24MC0480; 24VL1900; 24VL1905; 24VL1911 and VL1928 – the status of which remains unresolved at this late date.

Many historic properties of Lakota and Dakota origin are difficult for untrained persons to evaluate – the location of rocks, certain striations in rocks or rock formations – may point to ceremonial uses of sites that non-Lakotas and non-Dakotas may not understand. Moreover, TransCanada's role in the consultation and identification process has been unclear from the beginning. The level of expertise invoked in the 106 process has not been established even now.

There are no specific mitigation provisions. The provisions of the Programmatic Agreement ("PA") are too general. I have not signed it on behalf of the Standing Rock Sioux Tribe. Accordingly, an alternative process of resolving disputes over adverse effects and undiscovered historic properties must be put in place. But it has not been. In the absence of a process involving my office as an alternative to the PA, the project remains out of compliance with the NHPA.

For these reasons, the required processes for consultation and evaluation under NHPA Section 106 have not been followed by the State Department or TransCanada. As a result, the 2014 Final Supplemental Impact Statement fails to provide a sufficient basis for approval of a Presidential Permit for the Keystone XL Pipeline.

Q. Did TransCanada cooperate with your office on cultural resources issues related to the Keystone XL Pipeline?

A. No.

Q. Is there anything else you would like to say to the Public Utilities Commission?

A. The Keystone XL pipeline (and other pipelines) will cross aboriginal and treaty territory that was exclusively set aside by the U S government for the Sioux Nation (Ft Laramie Treaties of 1851and 1868). The Sioux people were nomadic people and followed the buffalo. Our valuable cultural resources are located throughout the path of the Keystone XL Pipeline. Yet the proper procedures to make the requisite determinations have not been followed. The Keystone XL Pipeline is unable to continue to comply with Amended Condition number 43 in the Amended Conditions to the Final Order in HP 09-001. The petition to certify should be denied.

Waste' Win Young

SUBSCRIBED and SWORN
to before me this ___ day of
April, 2015.

TAMERA ALKIRE
Notary Public
State of North Dakota
My Commission Expires Feb. 4, 2021

NOTARY PUBLIC

BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN RE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE,
LP FOR A PERMIT TO CONSTRUCT KEYSTONE XL PIPELINE

DOCKET NO. HP 001

PREFILED TESTIMONY BY PHYLLIS YOUNG
TRIBAL COUNCIL REPRESENTATIVE
STANDING ROCK SIOUX TRIBE

APRIL 2, 2015

Q. State your name and address for the record.

A. My name is Phyllis Young. I reside in Fort Yates, North Dakota on the Standing Rock Indian Reservation

Q. What is your occupation?

A. I serve as a Tribal Council representative on the Standing Rock Sioux Tribal Council. I have spent my career addressing housing needs on the Reservation as a longtime commissioner of the Standing Rock Housing Authority, and working for the protection of our natural resources, both within our Reservation and in the sacred Black Hills.

Q. Did you grow up on the Standing Rock Reservation?

A. Yes, as a child, I lived in the most beautiful place in the world, in the river bottom of the Missouri River, for my first ten years. I was free. I ate a healthy diet from the gardens we planted and the natural foods growing on the land. We drank water right from the Missouri River. It was pure then.

Q. Tell us a little bit about your childhood.

A. I am a child of Oahe. When I turned 10, the Oahe Dam inundated our homeland. One hundred and ninety-seven families on our Reservation were forced to move, in the middle of the winter in January, 1960. Our homes were never re-built or compensated for. For the first time, we knew hunger, and I experienced homelessness due to the development of the dams, in the national interest. Our lives were totally disrupted. The dam created welfare and took away our Tribal self-sufficiency. It created all of the social pathologies that result from removal from one's homeland.

Q. The Oahe Dam is a big energy project, but it is approximately 100 miles from the Standing Rock Reservation. Can an off-Reservation project have that much impact on the reservation?

A. The Oahe Dam is a federal project, and the government took 56,000 acres of our Reservation land pursuant to the Act of September 2, 1958 (Public Law 85-915), and

subsequently the Act of October 30, 1992 (Public Law 102-575). The Standing Rock Sioux Tribe was forced to sue the Corps of Engineers from illegally condemning Treaty-protected land, under the Fifth Amendment of the United States constitution. Our Tribe has always defended our Treaty rights, and we shall do so in light of the Treaty violations poised by the Keystone Pipeline.

The Standing Rock Sioux Tribe possesses Treaty rights that cannot be delegated to a corporation such as TransCanada. We also have aboriginal rights, and as a result all development projects must comply with the National Historic Preservation Act. We areconcerned with the environment throughout what is now Western South Dakota, but which is our Treaty-protected land. The environment is not defined by artificial boundaries.

Q. Explain the Treaty rights of the Standing Rock Sioux Tribe.

A. The Standing Rock Sioux Tribe is comprised of constituent bands of the Great Sioux Nation. The Great Sioux Reservation was established in the Treaty of Fort Laramie of April 29, 1868, comprising the Missouri River and all of present-day South Dakota west of the Missouri. (15 Stat. 635). The pipeline route runs directly through our Treaty-protected lands. Consequently, I am also concerned with the potential environmental impacts in our Treaty territory and the effect on our Treaty rights.

Article 12 of the 1868 Fort Laramie Treaty prohibits any cession of Sioux Nation Treaty lands without % majority consent of the Sioux. (15 Stat. 638). Nevertheless, the clamor for gold in the Black Hills led Congress to enact the Act of February 28, 1877 (19 Stat. 254), which was an unconstitutional taking of over 7 million acres in the sacred Black Hills, from the Great Sioux Reservation. In response to land pressure for homesteaders, Congress subsequently passed the Act of March 2, 1889 (25 Stat. 888), which further reduced our land base and divided the Great Sioux Reservation into our present-day Reservation lands.

The Standing Rock Sioux Tribe and Great Sioux Nation have continuously asserted our Treaty rights to the Black Hills and 1868 Fort Laramie Treaty lands.. In 1975, the United States Court of Claims awarded the Sioux Nation $108 million, including interest, for the unconstitutional taking of this land. (*United States* v. *Sioux Nation of Indians,* 518 F.2d 1298 (Ct. Cl. 1975)). The court declared that, "A more ripe and rank case of dishonorable dealings will never, in all probability, be found in our history." (*Id* at 1302). The Supreme Court

affirmed the Court of Claims ruling, but the Great Sioux Nation and Standing Rock Sioux Tribe have not accepted the monetary damages. *(United States v. Sioux Nation of Indians,* 448 U.S. 371 (1980). Accordingly, we retain our claim to this land under the Fort Laramie Treaty.

There have been various proposals in Congress to resolve the Sioux Nation land claim. (E.g. 99th Cong., S. 1453, *Sioux Nation Black Hills Act).* We continue to pursue a just and honorable resolution to the Treaty violations of the United States. In fact, on May 4, 2012, the United Nations Special Rapporteur for the Rights of Indigenous Peoples, S. James Anaya, issued the following statement about the claim of the Great Sioux Nation and the Standing Rock Sioux Tribe, under the 1868 Fort Laramie Treaty:

> The Black Hills in South Dakota... hold profound religious and cultural significance to the (Sioux Nation). During my visit, indigenous people reported to me that they have too little control over what happens in these places, and that activities carried out around them at times affront their values. It is important to note, in this regard, that securing the rights of indigenous people to their lands is of central importance to indigenous people's socio-economic development, self determination and cultural integrity.

Our land claim under the 1868 Fort Laramie Treaty is acknowledged at the United Nations. Our Treaty rights are the basis of our existence as a Tribal Nation. They are not a historical anomaly; they are valid existing legal claims under federal and international law. As the U.S. Supreme Court stated,

> The Indian nations had always been considered as distinct, independent political communities, retaining their original rights, as the undisputed possessors of the soil, from time immemorial... The very term "nation" so generally applied to them, means "a people distinct from others." The constitution, by declaring treaties already made, as well as those to be made, the supreme law of the land, has adopted and sanctioned the previous treaties with the Indian nations, and consequently admits their rank among those powers who are capable of making treaties. The words "treaty" and "nation" are words of our language, selected in our diplomatic and legislative proceedings, by ourselves, having each a definite and well understood meaning. We have applied them to Indians, as we have applied them to other nations of the earth. They are applied to all in the same sense.

(Worcester v. Georgia, 31 U.S. (6 Pet.) 515, 559-560 (1832)).

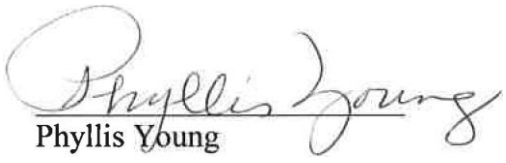
Under the Fort Laramie Treaty, we have the right to a healthy environment. Article 2 of the Treaty describes our ownership interest to the lands of the Great Sioux Reservation, as "set apart for the absolute and undisturbed use and occupation..." of the Great Sioux Nation. (15 Stat. 635). The revised route of the Keystone XL Pipeline would cross this land, for hundreds of miles. Under Article 11 of the Fort Laramie Treaty, "Should such roads or other works be constructed on the lands of their reservation, the Government will pay the tribe whatever amount of damage may be assessed by three disinterested commissioners to be appointed by the President for that purpose, one of said commissioners to be a chief or head man of the Tribe." (15 Stat. 638). Thus, under Article 11 of the Fort Laramie Treaty, we are entitled to have a seat at the table on decisions involving projects such as the Keystone XL Pipeline.

Q. Did the State Department consult with the Standing Rock Sioux Tribal government on the Keystone XL Pipeline?

A. No.

Q. Did TransCanada consult with the Standing Rock Sioux Tribal government on the Keystone XL Pipeline?

A. No. Instead, there were efforts to co-opt certain Tribal communities. I reference the TransCanada memorandum dated November 13, 2013, exhibiting disrespect to Tribal members of the Cheyenne River Sioux Tribe; and the TransCanada letter dated July 18, 2012, attempting to bribe the Ideal community on the Rosebud Reservation. TransCanada has never demonstrated any respect for the Indian Nations. That is why the PUC should deny certification of the permit for the Keystone XL Pipeline Project.



Phyllis Young

STATE OF NORTH DAKOTA)

SIOUX COUNTY)

SUBSCRIBED and SWORN to before me this ....._. .....,--

TAMERA ALKIRE
Notary Public
State of North Dakota
My Commleelon Expire& Feb. 4, 2021

_____

NOTARY PUBLIC

My Commission Expires_____

BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN RE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE,
LP FOR A PERMIT TO CONSTRUCT KEYSTONE XL PIPELINE

DOCKET NO. HP 001

PREFILED TESTIMONY BY DOUG CROW GHOST
DIRECTOR, DEPARTMENT OF WATER RESOURCES
STANDING ROCK SIOUX TRIBE

APRIL 2, 2015

Q. State your name and address for the record.

A. Errol D Crow Ghost Jr., 207 1st Avenue W, McLaughlin, South Dakota.

Q. What is your occupation?

A. Director / Administrator of the Standing Rock Sioux Tribe Department of Water Resources.

Q. Summarize your education and professional background.

A. I earned a Bachelor's Science Degree in Restoration Ecology, from the Salish-Kootenai College in 2002. I have worked as a professional Fire Fighter for Chief Mountain Hotshots in the U.S. Bureau of Indian Affairs from 1997-2002. I have served on the Standing Rock Tribal Council as a District Representative of the Bear Soldier District 2009-2013, and served on the Health, Education and Welfare Committee. I am a veteran of the armed forces, with an honorable discharge in 1996. (Army Active).

Q. Describe your duties as Director of the Standing Rock Sioux Tribe?

A. I supervise all of the Department's activities involving the regulation of water flows and water quality on the Standing Rock Indian Reservation. I oversee implementation of the Standing Rock Sioux Tribe Water Code, which requires permits for most diversions of surface and groundwater. I also supervise all Clean Water Act Section 106 activities, including the maintenance of baseline water quality data through the sampling and analysis of surface water and ground water resources, and the development of water quality standards for the Standing Rock Reservation. This involves calibration of testing and sampling equipment, including maintaining required updates, sample collection methods, chain of custody forms, quality control practices and quantitative analysis procedures, and use designations of our waters. As needed, our Department also samples for domestic drinking water source supplies for appropriate parameters, and consults with the Standing Rock Municipal, Rural and Industrial Water Supply system on compliance with the Clean Water Act and Safe Drinking Water Act.

I assist with the coordination between the Standing Rock Sioux Tribe and state and federal water management agencies. The Standing Rock Sioux Tribe is engaged in a multi-year effort to identify needed water flows and perfect our reserved water rights, through negotiations

with water teams appointed by the governors of South Dakota and North Dakota. I serve as the lead Tribal agent with the Army Corps of Engineers on the management of Missouri River water flows. I also serve as a lead organizer on the Standing Rock Emergency Response Committee, for purposes of responding to chemical or other spills, flood management and related emergency response by the Tribal government.

Q. What is the Winters Doctrine?

A. The judicially crafted *Winters Doctrine* (1908) provides water for the needs of Native Americans who reside on Tribally-reserved lands. This judicial guarantee is highly significant, given the demands for this critical natural resource in a region where water is often not abundantly available.

Water policy in the Great Plains is shaped by powerful political forces. Economic demands translate into political pressures and ultimately into water law. State water laws are generally designed to allocate water for "beneficial uses," following the doctrine of prior appropriation. Stressing uses, rather than needs, is inconsistent with Native American ideals, whereby water, like other aspects of the environment, is connected to a higher sacred order. Consequently, European American water schemes have often been in conflict with Native American concepts. As Director of the Department of Water Resources, it is my job to reconcile Lakota values with modem regulatory requirements, for the optimal protection of our water.

In 1908, Native Americans prevailed in the landmark case *Winters v. United States,* 207 U.S. 564 (1908). The case involved the Gros Ventres and Assiniboines of the Fort Belknap Reservation in Montana and their right to use the water of the Milk River. When farmers upstream diverted water upstream, the United States brought an injunction against them, reasoning that this left insufficient water for agriculture on the reservation. The farmers appealed. On January 6, 1908, the Supreme Court ruled in favor of the United States and the Native Americans, arguing that the establishment of the Fort Belknap Reservation entitled the Native Americans to perpetual use of the water that it contained. Their rights were "reserved" at the date of establishment (1888), and, contrary to the doctrine of prior appropriation, those rights could not be lost through nonuse.

The Winters Doctrine was a major victory for all Native Americans, serving notice that state laws are secondary to federally reserved water rights and preventing prior appropriation

schemes from extinguishing Native American needs. In 1976, in *Cappaert* v. *United States,* 426 U.S. 128 (1976), the doctrine was extended to groundwater use on or near federally created reservations.

As a result of these court cases, under federal law, the Standing Rock Sioux Tribe possesses reserved water rights for all present and future beneficial uses that are necessary for our Reservation to be a permanent homeland for our people. We own land, and we own the water rights needed for our land to sustain our people through the generations. In times of shortage, our priority date traces back to the establishment of our Reservation in the 1868 Fort Laramie Treaty. We possess the senior water right. Our reserved water rights are very important to our Tribe.

While the Winters Doctrine protects Native American water rights, this protection is still vulnerable to changes in the prevailing political climate. Consequently, I am very concerned with the water use by TransCanada in the construction of Keystone Pipleine, as well as the potential pollution that would result from the release of oil near one of the many river crossings in South Dakota. (Peter J. Longo University of Nebraska, Kearney).

Q. What waters does the Tribe claim a right to under the Winter Doctrine?

A. We possess reserved water rights to all waters arising on, bordering or crossing our Reservation, and aquifers subsurface to our lands. This includes extensive rights to divert water from the Missouri River, Grand River, Cannon Ball River, Cedar Creek, Porcupine Creek, Oak Creek and our groundwater.

Q. Does the Winters Doctrine include the right to future water use on the Reservation?

A. Yes. It extends to all reasonable, beneficial uses that are needed in the present and in the future.

Q. How do you know much water you will need in the future?

A. We are engaged in a process with the States of South Dakota and North Dakota, by which a Tribal water team appointed by the Tribal Council meets bi-monthly with teams appointed by the governors. The purpose is to address the present and future water consumptive

needs of the Tribe, and the Missouri River water levels and Grand River instream flows that are needed to fulfill our needs.

Q. Is the Winters Doctrine a federal law?

A. Yes. Compliance with the *Winters Doctrine* would be required under Amended Condition number 1 in the 2010 Final Order in HP 09-001.

Q. Will construction of the Keystone Pipeline affect the waters claimed by the Tribe under the Winter Doctrine?

A. Yes. Keystone has estimated that the construction of the pipeline will require 79 million gallons of water. The Standing Rock Sioux Tribe asked TransCanada interrogatories about the points of diversion for all of this water, and they gave unclear, even conflicting answers. So we really do not know the sources from which TransCanada will take water. But 79 million gallons equals approximately 250 acre-feet – and that is a significant amount of water to be taken from tributaries to the Missouri River in western South Dakota, even if for temporary use. I do question that amount as too conservative for a construction project of that magnitude. We asked TransCanada for information supporting that calculation, and none was provided.

Q. How has the recent drought affected the waters the Tribe?

A. Our waters are in danger. The snow melt from the Rocky Mountains is declining annually. Data from stream gages of the U.S. Geologic Survey preliminarily indicate diminished streamflows is a long-term trend, for important tributaries to the Missouri River. I also make reference to Cook et al, *Unprecedented 21st Century Drought Risk in the American Southwest and Central Plains*, J. ADVANCEMENT OF SCIENCE (Feb. 12, 2015), which states,

> In the multi-model mean, all three moisture balance metrics show markedly consistent drying during the later half of the 215[1] century... the consistent cross-model drying trends are driven primarily by the forced response to increased greenhouse gas concentrations, rather than any fundamental shift in ocean-atmospheric dynamics.

Consequently, I remain concerned that the drought is indeed long-term. This jeopardizes our way of life as hunters. Some people call it being an outdoorsman, but to the Lakota, subsistence hunting has always been a way of life, and it remains so today. The long-term

drought affects wildlife. There is less vegetation cover in the riparian areas. Farmers are being forced to take land out of the CRP program to maintain their harvest of hay and feed for livestock, which further diminishes wildlife habitat. Our surface waters are increasing in temperature, resulting in fish kills, on the Standing Reservation – right here in South Dakota. I reference the study by the National Wildlife Federation, *Great Plains: Wildlife in the Grips of Heat Waves and Drought.*

Q. TransCanada has identified the Little Missouri River, Cheyenne River, North Fork of the Moreau River, Bad River and White River s water sources for significant depletions for hydrostatic testing and other construction activities. Are these river systems in South Dakota potentially impacted by long-term drought?

A. Yes.

Q. If Keystone withdraws water from these river systems, is it possible that downstream water users, including Tribal water uses and non-Indian farmers and ranchers, will have adequate water supplies?

A. Yes, in a drought condition, these rivers do not carry unappropriated water in the quantities needed by TransCanada for construction of Keystone XL. TransCanada has not complied with Finding of Fact number 41, in which the temporary water use permitting process was deemed underway.

The treatment of water in the Construction Mitigation and Reclamation Plan (CRMP) reflects the problem with the CRMP generally, from an ecology standpoint. It is too general, too vague. For example, it states, "Throughout construction, the contractor shall maintain adequate flow rates to protect aquatic life and to prevent the interruption of downstream uses." (TransCanada 2008) p. 53. However, no specific steps are identified. Instead, TransCanada identified stream systems throughout South Dakota from which it seeks to divert water, which are already over-appropriated during drought conditions. There is already environmental stress in these riparian habitats. The platitudes in the CRMP are meaningless, in light of the water requirements for construction. Amended Conditions number 13-14 will not be achieved due to the lack of specificity with respect to mitigation in the CRMP.

Q. Will construction of the Keystone Pipeline affect water quality?

A. Yes. We have learned more about the potential impacts of pipeline construction from the release of the U.S. State Department Supplemental Environmental Impact Statement (SEIS) in January, 2014. The SEIS identifies "Construction-related impacts" as including "Temporary increases in total suspended solids (TSS) concentrations and increased sedimentation during stream crossings." (US DOS 2014). The pipeline will cross the Little Missouri and North Fork of the Grand River, which directly flows onto the Standing Rock Reservation. Both of these waters are currently listed as impaired waters under the Clean Water Act, due to high levels of TSS. The 2012 S.D. *Integrated Report for Surface Water Quality Assessment* states, "The Little Missouri River is listed as impaired for TSS... (and) Elevated specific conductance and sodium absorption ratios (SAR) are typical of the entire (Grand River) basin." (S.D. DENR 2012, pp. 96, 111). The construction activities associated with stream crossings will exacerbate the current water quality impairments of these waters of the Standing Rock Sioux Tribe.

The EPA has urged that this issue be addressed, in order to ensure that Indian water rights are not adversely impacted by Keystone XL. I reference the EPA letter dated July 16, 2010, stating "We recommend ... (that the State Department) address the potential impacts to areas where Tribes may have unadjudicated claims to water bodies that could be affected by spills. From the proposed pipeline." Giles July 16, 2010, encl. p. 6. However, this has never been done. Consequently, the project will infringe upon the reserved water rights of Standing Rock and other South Dakota Tribes, in violation of Amended Condition number 1 in the 2010 permit, requiring compliance with all applicable laws.

Q. Would a release of oil from the Keystone Pipeline near the Grand River or Missouri River affect the waters claimed by the Tribe under the Winter Doctrine?

A. Yes, very possibly.

Q. Are you concerned about that?

A. The most direct threat to our water stems from potential spills. Many recommendations for pipeline safety and spill response have been ignored or glossed over. The EPA explained in a letter dated July 16, 2010,

> The potential human health impacts associated with both air emissions from refineries and the potential contamination of drinking water supplies from an oil spill have not been evaluated. We recommend that the State Department prepare a health risk assessment to specifically address these issues as they relate to low income, minority and Tribal communities. (Giles, July 16, 2010, p.6).

For these reasons, the State Department FEIS on the Keystone XL Pipeline was rated as insufficient by the Environmental Protection Agency. (Giles, June 6, 2011).

Q. In the Final SEIS volume on "Potential Releases" the State Department estimated that any spills would likely be minor. So why are you concerned?

A. There have been numerous significant oil spills since TransCanada was awarded its S.D. permit on June 29, 2014. In the last three months there have been significant spills affecting the Missouri River basin – the Bridger Pipeline spill which released 40,000 gallons of crude into the Yellowstone River and shut down the drinking water system in Glendive due to benzene in the water, and 3 million gallons released from a Summit Midstream Partners pipeline near Williston, N.D. From Montana, to Arkansas to Michigan, communities are affected by oil pipelines, especially when heavy tar sands crude is transported.

TransCanada's spill frequency estimates are widely considered by objective commentators to be too conservative. I reference the Congressional Research Service, *Oil Sands and Keystone XL Pipeline: Background and Selected Environmental Issues*, CRS REPORT TO CONGRESS (2012): "the pipeline's operating parameters – temperature and pressures higher than conventional crude pipelines – would yield spill frequencies above historical averages ... Keystone has operated the Keystone mainline pipeline and the Cushing Extension since 2010. Since that time **the Keystone Pipeline has generated 14 unintentional releases."** p. 39; Daniel J. Graeber, *Are Pipeline Spills a Foregone Conclusion*, May 21, 2013, posted at http://oilprice.com/TheEnvironment/Oil-S pills/Are-Pipeline-Spills-a-Foregone-Conclusion. (emphasis added).

Q. Are you familiar with TransCanada's safety record? Explain.

A. From 2011-2013, the Coast Guard National Response Center indicates that TransCanada had 34 reported spills, and was required to contribute $118 million for remediation. The Pipeline and Hazardous Materials Safety Administration has been critical of TransCanada's safety record, denying numerous waiver requests (reference PHMSA letters dated June 27, 2011, June 27, 2011, June 27, 2011, July 26, 2010, July 16, 2010 and May 5, 2010). PHMSA wrote "PHMSA is denying your May 26, 2010 special permit application based on operator compliance issues related to not performing weekly aerial patrols and quarterly ground controls as required." (PHMSA, June 26, 2011). That is a repeated complaint by the federal regulators with TransCanada – a lack of on-going monitoring for leaks.

Safety may be further compromised by the low cost of oil at present. The production of tar sands is jeopardized by high productions costs generally. The decreasing cost of oil enhances the importance of Keystone XL as a cost-effective means of transporting tar sands crude, as compared to rail. So the Keystone XL Pipeline will result in the production of greater amounts of tar sands, and will increase greenhouse gas emissions.

That exacerbates the long-term severe drought currently affecting the northern plains and the Standing Rock Indian Reservation. On November 23, 2003, the Tribe's drinking water intake at Fort Yates for our community drinking water system malfunctioned, due to low water levels caused by drought. Three Standing Rock Reservation communities and 6,000 Tribal members were without potable water for two weeks. Schools were affected, and Tribal elders on kidney dialysis were forced to travel to Bismarck for treatment, 60 miles away. The Standing Rock Sioux Tribe already suffers the effects of long-term drought and climate change.

Meanwhile, companies like TransCanada may compromise on safety, due to lower revenues. This could pose further adverse effects on our water. In any event, TransCanada can no longer demonstrate the capability to comply the Findings of Fact number 43-45 in the Final Order, HP 09-001, with respect to spill frequency estimates. It also fails to meet Finding number 52 regarding the threat of contamination to surface water.

Q. You testified that as Water Resources Director you assist with emergency management on the Standing Rock Reservation. Are you satisfied with TransCanada's Emergency Response Plan?

A. TransCanada is hiding it. They will not release a copy of a Facility Response Plan for the Keystone XL Pipeline, as required in the Clean Water Act and in Finding of Fact number 51. The PUC order also requires TransCanada to engage in training for local emergency response personnel in Finding of Fact number 51, and that has not occurred. TransCanada is unable to certify to the PUC that important findings have been complied with.

Q. Have you ever seen an oil pipeline emergency response plan?

A. Yes. The Kinder Morgan Canada, Inc. *Emergency Response Plan for the Puget Sound Pipeline System,* wholly unredacted, 1s posted at (ecy.wa.gov/programs/spills/preparedness/cplan/Kinder _Morgan_Plan_Review_ 4_7_08.pdf&keyword=kinder). The Washington State Department of Ecology also makes public and posts on-line a HazMat Spill Contractors List and Approved Primary Response Contractors list – information that TransCanada has refused to disclose for the Keystone XL Pipeline. This is all standard emergency response cooperation. However, TransCanada will not provide this information to the South Dakota PUC as required in Finding of Fact number 52, or to the Standing Rock Sioux Tribe.

Q. Do you know why Washington State has emergency response plans for the release of oil from pipelines and lists of available contractors and equipment, but TransCanada refuses to provide this information in proceedings before the South Dakota Public Utilities Commission?

A. No, TransCanada is totally unjustified in keeping Tribal, state and local emergency responders in the dark.

Q. As Director of the Water Resources Department, if an oil company initiated a dialogue or consultation with the Standing Rock Tribal government, in the ordinary course of business, would this be the type of meeting you would be informed of, and participate in?

A. Yes.

Q. Do you know Lou Thompson is?

A. No.

Q. Did you ever meet Lou Thompson?

A. No.

Q. Do you know Sarah Metcalf is?

A. No.

Q. Did you ever meet Sarah Metcalf?

A. No.

Q. Is there anything else you would like to say to the Public Utilities Commission?

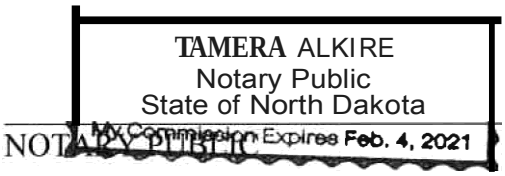
A. The State Department released the Final Supplemental EIS in January, 2014. This document casts a pall over any further approval of the Keystone XL Pipeline. I reference the EPA letters dated June 6, 2011, rating the draft study as inadequate (Giles 2011); and February 2, 2015, EPA found that "Over the 50-year lifetime of this pipeline, this could translate into releasing as much as 1.37 billion more tons of greenhouse gases into the atmosphere." (Giles 2015). The *Fifth Assessment Climate Change Synthesis Report* by the United Nations Intergovernmental Council on Climate Change (2014) comprises new information on the need to mitigate greenhouse gas emissions, which was not available to the PUC in 2010, and which requires a denial of the certification of the Keystone XL Permit.

Errol Doug Crow Ghost Jr.

STATE OF NORTH DAKOTA)

SIOUX COUNTY)

SUBSCRIBED and SWORN to before me this ___ day of April, 2015.



NOTARY PUBLIC

My Commission Expires _____

Culturally Important Plants of the Lakota

Based on interviews, research, and a comprehensive review of historical documents.

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1	*Acer negundo*	boxelder maple	*čhaŋšúška*	Sap is collected in the early spring by "tapping" trees and is used as a sweetener or a refreshing beverage. The leaves are sucked to relieve dry mouth during Sundances. The inner bark is edible, but only used during food shortages. The seeds are also edible after the husks have been removed and the seeds boiled.
2	*Acer saccharinum*	silver maple	*tȟahálo*	A decoction of the bark is used to dye hides. The sap is sometimes collected and used as a sweetener or refreshing beverage. An infusion of the bark is used to treat diarrhea, dysentery, and cramps.
3	*Acer saccharum*	sugar maple	*čhaŋhásaŋ*	Sap is collected in early spring by "tapping" trees and is used as a sweetener. A decoction made from the inner bark is used as a expectorant.
4	*Achillea millefolium*	Western yarrow, common yarrow	*ȟaŋté čhaŋȟlóǧaŋ, tȟaópi pȟežúta*	Poultice of dried leaves and flowers used to heal spider and other insect bites. Wad of moistened leaves put in outer ear to cure earache. Poultice made from whole plant applied to wounds to stop bleeding. Leaves chewed for toothache. Leaves rubbed on irritated skin to relieve itching. An infusion made from leaves used to treat stomach pains, coughing, and sore throat. An infusion is also used to stimulate sweating and urination, as a mild laxative, to cleanse/detoxify the blood, to cure female organ problems and heal internal bleeding.
5	*Achnatherum hymenoides*	Indian ricegrass	*psíŋ*	The seeds are edible when cooked. They are often ground into flour and used to make bread or to thicken soups. The seeds are sometimes roasted.
6	*Acorus calamus*	sweet flag, bitterroot	*siŋkpé tȟawóte*	A decoction of the roots is taken for fever, sore throats, coughs, stomach problems, heart disease, high blood pressure and diabetes. Root chewed for sore throat and toothache. Poultice of crushed root used externally for muscle cramps. Root is chewed and then put onto one's face to ward off fear in the presence of an enemy. Pulverized root mixed with gun powder and made into a decoction, which is effective against arm and leg cramps. Piece of root placed inside of cheek to ward off bad spirits.

7	*Agastache foeniculum*	lavender hyssop	*waȟpé yatȟápi*	Leaves used to make a pleasant tea. Leaves chewed for their "licorice" flavor and to freshen breath. They may also be added to cooked meats and fruits. An infusion of the leaves is used to treat colds and fevers, and to strengthen the heart.
8	*Alisma plantago-aquatica*	water plantain	*wakíŋyaŋla paȟlí hú*	Root is edible - it is harvested in the late fall and then dried for later use. Use caution when harvesting in the fall, as one must ensure correct identification so as to not confuse the tubers of this plant with poisonous death camas.
9	*Allium spp.*	wild onion	*pšíŋ šičámna*	Whole plant cooked in soups and stews; it is also eaten raw. Plant rubbed on bee and wasp stings to relieve pain and swelling. Onions are excellent for heart health and blood detoxification.
10	*Amaranthus spp.*	amaranth, pigweed	*waȟpé makȟá ayúblaya, waȟpé makȟá yatȟápi iyéčheca*	Leaves eaten similarly to spinach. Seeds ground into flour. All members of this genus are edible.
11	*Ambrosia artemisifolia*	annual ragweed	*poíphiye, caŋȟlóǧaŋ waštémna*	A poultice is made by preparing a decoction of the leaves and soaking material in the liquid and applying the material to swellings. A poultice may also be made by macerating the leaves and applying them directly onto the swollen area. An infusion made from roots promotes regular bowel movements and urination. An infusion is also taken by women who are having difficulty giving birth.
12	*Ambrosia trifida*	giant ragweed	*uŋzípakhiŋte, yamnúmnuǧa iyéčheca*	Leaves are rough like a cat's tongue and were used as toilet paper. A poultice of the whole plant is used as a treatment for infected toes. An infusion of the leaves and stems is taken for pneumonia and fever and as a treatment for diarrhea.

13	*Amelanchier alnifolia*	juneberry, serviceberry, Saskatoon serviceberry	*wípazutkȟaŋ*	Stems are formed into hoops and covered with leather to use for a game of skill. Stems sometimes used for arrow shafts. Leaves boiled to make a tasty tea. Berries eaten fresh or dried for later use. Berries have a mild laxative effect. The fruits of this species are added to dried meat and mixed together with fat to make wasna (also known as pemmican).
14	*Amorpha canescens*	leadplant	*ziŋtká wóte, ziŋtkála tȟačháŋ, tȟatȟáŋka hotȟúŋ, pté hotȟúŋ, šuŋgtȟáwote*	Leaves used to make tea. This infusion is excellent as a simple beverage, but it is also effective in treating lung congestion caused by the flu. Leaves dried and added to smoking mixtures. An infusion of the leaves is used as a bath to treat eczema. Stems are used in ceremonies, especially before bison hunts. Stems are boiled and used to treat neuralgia and rheumatism.
15	*Amorpha fruticosa*	false indigo	*ziŋtkála tȟačháŋ*	Straight branches used to make arrow shafts.
16	*Amphicarpaea bracteata*	American hog peanut, mousebean, groundbean	*makȟátomniča*	There are two types of fruit on this vine. Fruit that hangs from the upper part of the vine is not edible, but fruits that hang from the lower part of the vine actually extend underground as a sort of root pod. These fruits contain seeds that are known as groundbeans. These "beans" are collected from vole caches. Lakota women would always sing songs to ask the voles (mice) permission to take the beans and they would also leave a gift of corn meal or some other food in exchange for the *makatominica*. If a reciprocal gift is not given, it is said that the woman and her family would go hungry during the winter. The groundbeans are eaten raw or in soups and stews.
17	*Andropogon gerardii*	big bluestem, turkeyfoot	*pȟeží šašá ókhihe tȟaŋkíŋkiŋyaŋ*	Boys use the stems as arrows in mock war games. This grass is excellent forage for bison and other grazing animals.
18	*Anemone canadensis*	meadow anemone	*waȟpé owáŋyaŋg wašté*	The roots are quite astringent and are used to stop bleeding. A decoction of the root is used to treat lower back pain. An infusion of the root is used as an eye wash to treat sore eyes, crossed eyes, and eye twitching. The root is eaten to clear the throat to promote good singing.

19	*Anemone cylindrica*	candle anemone, thimbleweed	*iȟúŋkala tȟatȟúŋkče*	There are stories about this plant. A poultice of the boiled, mashed root is used to treat all types of wounds. A poultice of the leaves is used to treat burns. An infusion of the root is used to treat headaches.
20	*Anemone patens*	pasque flower, prairie crocus	*hokší čhekpá waȟčá*	This is one of the very first flowers of spring. There are many songs about the beauty of this flower and the joy of seeing the first one in early spring. The whole plant is also used as a counter-irritant in the treatment of arthritis.
21	*Antennaria parvifolia*	small-leaf pussytoes, mouse ear everlasting	*chaŋȟlógaŋ hú waŋžíla, iȟúŋkala nakpá*	Whole plant used as a poultice to treat swellings. The inflorescences are sometimes chewed like tobacco or even gum. Known by some medicine men as "eagle medicine."
22	*Apios americana*	Indian potato	*bló, bló pahú*	This potato is mixed into soups and stews. It can also be eaten raw, roasted or boiled. The green tops of the plant are also edible and are called "blo hu."
23	*Apocynum cannabinum*	Indian hemp, dogbane	*napéoilekiyapi*	This plant is considered toxic by the Lakota, but the milky sap is used to "burn-off" warts when applied to the wart three times a day for 5-7 days. Stem fibers are used to make nets and twine. The Lakota are aware that snakes tend to hide under this plant.
24	*Arabis hirsuta*	hairy rockcress	*čhaŋȟlógaŋ hú waŋžíla*	Green parts of plant are eaten raw or cooked similarly to spinach.
25	*Arctium minus*	burdock	*waȟpé tȟáŋka*	INTRODUCED. The young, green shoots are eaten raw or cooked, as are the tender roots. It sometimes takes a lot of boiling to remove the bitter taste from the roots. A decoction of the roots is also an excellent blood tonic (detoxifier) and is also effective against throat infections, boils, rashes, eczema, acne, boils, and insect bites. It is used in the treatment of colds with sore throat and cough.

26	*Arctostaphylos uva-ursi*	bearberry	*čhaŋlí wápe*	Fruit is considered edible, but it is only used as "trail food." An infusion of the whole plant is used as a cough medicine, and as a treatment for colds and back pain.
27	*Argemone polyanthemos*	prickly poppy	*thókahu wahíŋkpe uŋ zíyapi*	The roots of this plant are used to make yellow dye for arrow shafts.
28	*Argentina anserina*	silverweed, shrubby cinquefoil	*zuyá phežúta*	The leaves are made into a pleasant tea. The roots are also edible raw or cooked. An infusion of the leaves and stems is used to treat diarrhea. The whole plant is regarded as "medicine to use against the enemy."
29	*Aristida purpurea*	red three awn, wiregrass	*peží thakháŋ kazá*	Lakota recognize this plant because the awns get stuck in animals mouths and cause infections. Therefore, the Lakota will not graze their horses in areas where this grass is present.
30	*Artemisia absinthium*	absinth wormwood	*wapezuta*	INTRODUCED: This plant is one ingredient in the distilled liquor called absinth. The liquor has been shown to be psychoactive and was outlawed in the United States. A decoction of the whole plant is used to treat heart disease and diabetes; however, care must be taken, as large quantities of this infusion may be toxic. It has been known to stimulate the liver, gall bladder and digestive system. The plant is also used externally to treat insect bites and stings.
31	*Artemisia campestris & dranunculoides*	Western sagewort, false tarragon sagewort	*čhaŋhlógaŋ waštémna*	An infusion of the roots of either plant is used to treat constipation, difficulty urinating, and difficulty in childbirth. Decoction of leaves taken to abort difficult pregnancies. Pulverized roots are put on a sleeping man's face so that his horses can be stolen easily. The pulverized root is also used as a perfume
32	*Artemisia cana*	silver sagebrush, white sagebrush	*pheží hóta thothó*	The Lakota recognize that this is the best sage for winter browsing by game and livestock. The leaves and stems are also burned as insect repellant.

33	*Artemisia frigida*	fringed sagewort, little wild sage	*pȟeží ȟóta waštémna, waȟčá zí sutá, makȟá čheyáka*	This sage is known as "women's medicine." Women use it in their bath water or to make a bitter infusion. The infusion helps to regulate menstruation and to cause contractions in pregnant women who are overdue.
34	*Artemisia ludoviciana*	cudweed sagewort, cudleaf sage, ceremonial sage	*pȟeží hóta wápe blaskáska*	Leaves and stems burned as incense and used for "smudging." That is, the sage is burned and the smoke breathed in, and wafted all over the body to purify one's self. An infusion of the plant is used to treat stomach disorders, to treat intestinal worms, to calm nerves, and to treat colds, sore throats and diarrhea. This sage is used to form wreaths and bracelets for Sundancers (Wiwayang Wacipi).
35	*Artemisia tridentata*	big sagebrush	*pȟeží ȟóta tȟáŋka*	A decoction of the leaves is used to treat indigestion and sore throat. An infusion of the dried leaves is used to treat pneumonia, colds, coughs and bronchitis. It is used both internally and externally to treat rheumatism. A poultice of the crushed plant is used on open wounds, and a decoction of the leaves is used as an antiseptic wash for cuts, wounds and sores. The dried plant is burned in one's house as a disinfectant.
36	*Asclepias incarnata*	swamp milkweed	*wahíŋheya íphiye, waȟčáȟča hú bloká*	The pulverized root is made into a salve which is used to treat swollen glands. The young seed pods are edible after cooking. An infusion of the roots is used to treat asthma, rheumatism, syphilis, and a weak heart.
37	*Asclepias pumila*	low milkweed, dwarf milkweed	*čhešlóšlo pȟežúta, pȟeží swúla čík'ala, ȟaŋté iyéčheča*	Infusion of leaves used as diarrhea medication, especially for children.

38	*Asclepias speciosa*	showy milkweed	*waȟpé thíŋpsila, pȟanúŋpala, waȟčáȟča*	Blossoms are boiled, mixed with flour, and eaten. Decoction of plant used to help lactating women produce milk. Young shoots are used in soups, like wild cabbage. This plant can be toxic as it matures, so use caution. Floral buds are used to thicken soups. Open flowers are chopped up to make a sort of chutney or "preserve."
39	*Asclepias stenophylla*	narrowleaf milkweed	*thíŋpsila pȟežúta*	Infusion of whole plant used to stimulate appetite. Roots are made into an infusion, or a small piece of the root is chewed, especially by children, to improve appetite.
40	*Asclepias syriaca*	big milkweed, common milkweed	*pȟanúŋpala waȟčáȟča*	Infusion of whole plant used as diarrhea medicine. Young shoots can be eaten in soups or stews. Flower buds are also edible.
41	*Asclepias verticillata*	whorled milkweed	*waȟpé thíŋpsila iyéčheča*	An infusion is used to treat diarrhea. An infusion is also made from this plant to help lactating women produce milk.
42	*Asclepias viridiflora*	green milkweed (both slim leaf and wide-leaf varieties)	*húčhiŋška*	Pulverized roots made into an infusion, which is used to treat diarrhea, especially for children. An infusion is also given to lactating women to aid them in producing more milk.
43	*Aster ericoides & falcatus*	heath aster	*čhaŋȟlógaŋ pȟépȟela*	These aster species are grazed readily by deer and pronghorn antelope.
44	*Astragalus canadensis*	Canadian milkvetch	*pȟežúta ská hú, šuŋkówašakala*	Seeds are eaten by horses. Decoction of root used to treat fevers in children. The root is chewed to relieve chest pain and coughing. The roots of *A. canadensis* are mixed with the roots of *Glycyrrhiza lepidota* (American licorice), the macerated mixture is made into an infusion, which is used to treat the spitting up of blood.
45	*Astragalus crassicarpus*	groundplum milkvetch	*pté tȟawóte, tȟatȟáŋka omníča*	The fruits of the groundplum resemble small plums, but are very firm and no larger than a ping-pong ball. They are an excellent snack food and the taste resembles raw green beans, but slightly sweeter. The Lakota consider this plant to be good medicine for their horses.

46	*Astragalus gilviflorus*	plains orophaca	*núŋǧoka yazáŋ pȟežúta*	The small, silvery-gray leaves are moistened, rolled into a ball, and put in the outer ear to relieve earache.
47	*Astragalus gracilis*	slender milkvetch	*pȟežúta skúya*	The roots are chewed by lactating women to increase milk production.
48	*Astragalus racemosus*	locoweed, alkali milkvetch	*pȟežúta ská hú, šuŋkléža hú*	One must be careful to not confuse this plant with other milkvetch species. This plant is poisonous to both humans and livestock.
49	*Balsamorhiza sagittata*	arrowleaf balsamroot	*hutkáŋ tȟáŋka*	Decoction of the whole plant (including roots) is used to treat stomach pains and headache. Sticky resin is used as an antiseptic for wounds. The root may be eaten raw, boiled, or roasted.
50	*Beckmannia syzigache*	sloughgrass	*mní pȟeží*	Excellent forage for wildlife.
51	*Betula papyrifera*	birch, paper birch, white birch	*čhaŋhásaŋ*	The shredded bark is bound together to make torches. The bark is formed into a container, which is used to collect and hold the sweet sap from *Acer* spp. (maple trees).
52	*Bidens spp.*	beggartick, stickseed sunflower	*mnióhuta aglágla, waȟčá zí*	Infusion of whole plant is used to alleviate pain and it is also used as an anti-diarrheal.
53	*Bouteloua gracilis*	blue grama	*pȟeží okhížata*	This is an excellent forage for wildlife. Lakota children would play a game using this grass: Most of the stems have two inflorescences on them, so children would compete to see who could find the stems with three inflorescences. (Akin to finding a four leaf clover.)
54	*Bouteloua hirsuta*	hairy grama	*pȟeží okhížata*	Excellent forage for wildlife.
55	*Bovista plumbia*	tumbling puffball	*hokší čhekpá*	When brown and dried, the powdery spores of this mushroom are used as an antibacterial styptic for wounds, especially on a newborn's unhealed navel. The mushroom is also a choice edible when young and marshmallow-white in the center.
56	*Brickellia eupatorioides*	false boneset	*waȟpé pȟá*	The entire plant is used to make a poultice for swellings.

57	*Bromus inermis spp. pumpellianus*	Pumpellii bromegrass	*pȟeží háŋskaska psíŋ iyéčheča*	This is a native subspecies of bromegrass. It is excellent forage for wildlife.
58	*Buchloe dactyloides*	buffalo grass	*pȟeží iwíčhakȟoyaka, pȟeží hiŋkpíla*	This grass is excellent forage for bison. It is now being propagated as lawn sod, due to the fact that it does not grow taller than a few inches (no mowing required) and does not require irrigation.
59	*Calamovilfa longifolia*	sandreed	*saŋtúhu ȟčáka*	The inflorescence (spike) is used as ceremonial decoration, similar to a feather in one's hair. Crazy Horse was said to have worn a sandreed spike in his hair. It was also considered a war charm. Long sandreeds were used as pipe cleaners.
60	*Calavatia cyathiformis*	purple spored puffball	*hokší čhekpá*	As with all puffball mushrooms when brown and dried, the powdery spores are used as an antibacterial styptic for wounds, especially on a newborn's unhealed navel. The mushroom is also a choice edible when young and marshmallow-white in the center.
61	*Callirhoe involucrata*	purple poppy mallow	*pȟežúta naŋtíažila*	A decoction of the root is taken for internal pains. The smoke of the dried root is used to "bathe" or waft over aching body parts, and is inhaled for head colds.
62	*Calochortus gunnisonii*	sego lily	*pšíŋ tȟáŋka*	The bulbs are eaten raw, boiled or roasted. The bulbs are also macerated and combined with other plants to create a poultice that is used to treat breast cancer.
63	*Calochortus nuttalii*	mariposa lily	*pšíŋ tȟáŋka*	The bulbs are eaten raw, boiled or roasted. The bulbs are also macerated and combined with other plants to create a poultice that is used to treat breast cancer.
64	*Calylophus serrulatus*	yellow evening primrose, yellow prairie mallow, yellow sundrops	*waȟčá zí čík'ala*	This primrose is good forage for wildlife.

65	*Campanula rotundifolia*	harebell	*waȟpé tȟó*	The leaves are edible raw or cooked. An infusion of the root is used to treat earaches.
66	*Capsella bursa-pastoris*	shepherd's purse	*napčhóka gmiyáŋ*	INTRODUCED: The leaves, young stems, and seed pods are edible raw or cooked. An infusion of the dried plant is used to treat internal bleeding of the stomach, uterus, or kidneys.
67	*Cardamine bulbosa*	spring cress	*huŋtkaŋ kȟáta*	The roots of this plant are poisonous, but the leaves are edible raw or cooked.
68	*Carex spp.*	sedge	*pȟeží psuŋpsúŋla*	Sedges provide good forage and cover for wildlife and the leaves of some species are used to make baskets and mats.
69	*Carex douglasii*	Douglas' sedge	*pȟeží psuŋpsúŋla*	The young shoots and soft stems are eaten raw.
70	*Carya ovata*	hickory	*čhaŋsúhu*	Hickory nuts are a tasty and nutritious food source. The nuts were eaten whole or ground into flour. The sap of the hickory is sometimes used as a sweetener.
71	*Castilleja sessilflora*	downy paintbrush, painted cup	*waȟpé yazókapi*	The fresh flowers are edible, offering the reward of sweet nectar in the bottom of the corolla tube.
72	*Ceanothus herbaceous*	small red stem, new jersey tea, inland ceanothus	*uŋpȟáŋ tȟawóte*	Leaves are used to make a fragrant tea. An infusion is used to treat asthma, chronic bronchitis, whooping cough, consumption, and dysentery, fevers and sore throat.
73	*Celastrus scandens*	bittersweet	*zuzéča tȟawóte, waȟlókapi šni pȟežúta*	Roots chewed and then smeared on the body to make one impervious to wounding. All parts of the plant are believed to be toxic, but the bark is used to make an ointment or poultice, which is used to treat burns, scrapes, and rashes. The root is also made into a diuretic decoction.
74	*Celeriac macrantha*	junegrass	*pȟeží šičámna*	This grass is excellent forage for deer and other wildlife.
75	*Cenchrus longispinus*	sand bur	*pȟeží uŋkčéla*	The burrs (*unkcecela*) stick to clothing and fur and may irritate the skin. One must be careful not to set one's food/meat on the burrs.

76	*Chenopodium berlandieri*	lamb's quarters	*wahpé thothó, čhaŋȟlóǧaŋ íŋkpa gmigméla*	The leaves and young stems are an excellent green vegetable, and are eaten raw or cooked.
77	*Chrysothamnus nauseosus*	rubber rabbit brush, rabbitbrush	*pȟeží ȟóta šičámna*	In large quantities, this plant can be toxic. Jackrabbits and squirrels use this plant for food and cover. Leaves and stems are sometimes chewed to extract a type of "chewing gum." A decoction of the twigs has been used in the treatment of toothaches, coughs and chest pains. An infusion of the flowering stems has been used in the treatment of colds and TB. An infusion of the leaves and stems has been used to treat colds, diarrhea, and stomach cramps. It has also been used externally as a wash for sores and skin eruptions, especially smallpox.
78	*Cicuta maculata*	water hemlock	*yažópi hú*	POISONOUS - all parts of this plant are deadly and should be avoided.
79	*Cirsium spp.*	thistle	*tȟókahu*	The root and stems may be peeled and eaten raw or in soups and stews. It can also be dried and stored for winter use. The stems may be tough or stringy, much like celery, so one may need to cook them before eating.
80	*Cirsium undulatum*	wavy leaf thistle	*tȟókahu*	The root and stems may be peeled and eaten raw or in soups and stews. It can also be dried and stored for winter use. The stems may be tough or stringy, much like celery, so one may need to cook them before eating. A decoction of the root has been used in the treatment of gonorrhea. A cool infusion of the root has been used as a wash for eye diseases.

81	*Clematis ligusticifolia*	Western virgin's bower	*čhaŋíyuwe skaská naȟčá, čhaŋíyuwi owíčak'o, owíčak'ola hú*	Leaves are chewed as a cold and sore throat remedy. Infusion of roots taken for headache. The root is macerated and used as a poultice to treat open sores, chest pains and rheumatic joints. An infusion of the plant has been used as a wash for skin eruptions, sores, wounds, backaches, swollen limbs, tired feet, syphilitic sores, and eczema. The stalks and roots have been used to make a woman's contraceptive. A poultice made from the cut stems has been applied to the teeth for treating toothache. A poultice of the mashed, moistened seeds is applied to severe burns.
82	*Cleome serrulata*	Rocky Mountain bee plant	*waȟpéȟ'eȟ'é*	This plant is used in combination with Amorpha canescens to ensnare bison into a trap. Young shoots, leaves and flowers may be eaten as a potherb. An infusion of the plant is drunk to treat fevers to relieve stomach disorders. A poultice made from the macerated, moistened leaves is used to relieve sore eyes.
83	*Conium maculatum*	poison hemlock	*yažópi hú čík'ala*	POISONOUS - all parts of this plant are deadly and should be avoided.
84	*Convolvulvus arvensis*	creeping Jenny, bindweed	*kimímila tȟawánaȟča čík'ala psitȟóla hú iyéčheča*	INTRODUCED: This vine is considered a noxious weed. However, it is used by some Lakotas in the treatment of fevers. An infusion of the flowers is laxative and is also used in the treatment of fevers and wounds. A cold tea made from the leaves is laxative and is also used as a wash for spider bites or taken internally to reduce excessive menstrual flow.

85	*Conyza canadensis*	horseweed	*čhaŋȟlóǧaŋ waštémna iyéčheča*	An infusion is made form the roots and lower stalks to treat diarrhea and pain in the bowels, especially in children. Horseweed is boiled to make steam for sweat lodges, taken as a snuff to stimulate sneezing during the course of a cold and burned to create a smoke that wards off insects. It is quite astringent and is also used to treat diarrhea and dysentery. It is also said to be an effective treatment for bleeding hemorrhoids.
86	*Coreopsis tinctoria*	golden tickseed	*čhaŋȟlóǧaŋ wakȟályapi*	This plant is known as "life-medicine" and the dried plant is used to make a coffee substitute. Lakota women made an infusion of the shoots (above ground parts of plant) when they desired a female child.
87	*Cornus sericea*	red osier dogwood, red willow	*čhaŋšáša*	During very cold months, the Lakota collect the stems of this shrub and then peel off the bright red, outer bark. Some boil the stems to make this task easier. What is desired is the cambium layer just below the red, outer bark. This material will be a light green to white color when freshly peeled, later turning a reddish brown. *Can sasa* is used in ceremonial pipe smoking, and is considered a very sacred plant.
88	*Corylus americana*	hazelnut	*úmahu*	The nuts are very tasty and delicious, although somewhat smaller than their domesticated relatives.
89	*Crataegus succulenta & chrysocarpa*	hawthorn	*matȟó tȟaspáŋ, tȟaspáŋ hú*	birds and other wildlife. The berries are sometimes mixed with other medicines to make them more palatable. A tasty tea can be made by boiling the twigs. The flowers and berries are excellent for treating heart related illnesses, muscular issues, and multiple sclerosis. A decoction or even a tincture of the fruits and flowers is excellent for strengthening the heart and for treating high blood pressure. The long, sharp thorns are used for sewing.
90	*Croton texensis*	skunkweed, Texas croton	*waȟpé ȟčaȟčá*	An infusion of the leaves is used for rheumatism, stomach ache, and paralysis. The seeds are placed in the outer ear to treat earache. Smoke from the burning plant is inhaled to treat headache.

91	*Cucurbita foetidissima*	buffalo gourd	*wagmú pȟežúta*	The root is used to treat ailments in all parts of the body. A poultice of the fruit is used to treat skin conditions. The seeds are made into an infusion that is used to kill intestinal worms. The fruit is also used as a soap substitute.
92	*Cucurbita lagenaria*	dipper gourd, bottle gourd	*wagmú há*	This gourd is used to make rattles which are used to make ceremonial music.
93	*Cucurbita maxima*	Lakota squash	*wagmú*	This delicious squash was harvested in late fall. It was dried for use during winter months, and is still used in soups and stews.
94	*Cycloloma atriplicifolium*	winged pigweed	*čhaŋȟlóǧaŋ owíčak'o*	The seeds were ground into flour and made into mush or cakes. The inflorescences, stems and leaves are made into an infusion, which is used to treat rheumatism, fevers and headaches.
95	*Cyperus esculentus*	flat sedge, yellow nutsedge	*mní saŋtúhu*	Roots are eaten raw, boiled, or roasted.
96	*Cypripedium acaule*	lady's slipper	*makȟá čhaŋnákpa*	The root is known for treating anxiety and sleeplessness. The roots have also been used in the treatment of menstrual disorders, stomach aches, kidney and urinary tract disorders and venereal disease.
97	*Dalea aurea*	silk top dalea, golden prairie clover	*tȟokȟála tȟapȟéžuta*	An infusion of the leaves is taken for dysentery and stomachache. A decoction of the leaves is used for colic.
98	*Dalea candida*	white prairie clover	*tȟokȟála tȟapȟéžuta hú bloká*	The roots are peeled and chewed for their sweetness. An infusion is made form the dried roots, which is used to prevent disease.
99	*Dalea enneandra*	nineanther prairie clover, slender dalea	*heȟáka tȟapȟéžuta*	An infusion of the leaves is used to relieve stomachache and dysentery.

100	*Dalea purpurea*	purple prairie clover	*thokhála thaphéžuta hú wíŋyela*	Roots are peeled and chewed for their sweetness. An infusion of the leaves is used to treat diarrhea. The pulverized roots are mixed with water and this "gruel" is drunk to prevent disease. A poultice of the crushed leaves is applied to wounds. An infusion of the leaves and flowers is used treat heart problems. A decoction of the roots is used to treat measles.
101	*Dalea villosa*	hairy prairie clover, silky prairie clover	*blaye zinʒka thačháŋ hustóla, čhasmú huȟólȟota, waptáya huȟólȟota*	A decoction of the roots is used as a laxative. The leaves and blossoms were eaten to reduce swelling of the throat. Roots are used to make a purgative.
102	*Dasiphora fruticosa*	shrubby cinquefoil	*čhaŋkȟályapi zí*	A pleasant tea is made from the leaves.
103	*Daucus carota*	Queen Anne's Lace, wild carrot	*pȟaŋǧí zí*	INTRODUCED: The root is edible in the same manner as cultivated carrots. One must be very careful not to confuse this plant with poisonous hemlock *(Conium maculata* or *Cucuta maculata*). The root is very tonic, and is excellent to stimulate the kidneys and the liver. It is especially good for treating digestive disorders. An infusion of the leaves is taken to prevent and even eliminate kidney stones. The root is used to stimulate the uterus, so it shouldn't be used by pregnant women.
104	*Delphinium viruses*	prairie larkspur	*wanáǧi thíŋpsila*	This plant is poisonous to livestock A tincture of the flowers or seeds may be mixed with shampoo to eliminate lice.
105	*Desmanthus illinoensis*	mimosa	*ȟaŋté pȟepȟé iyéčheča*	Bean pods are used as play rattles by young boys. The seeds were sometimes used as food after roasting. An infusion of the leaves is used to treat eczema and psoriasis.
106	*Desmodium canadense*	Canada tickclover	*wókaȟtaŋ blaskáska*	This plant provides good forage for wildlife.
107	*Dichanthelium oiligosanthes*	panic grass	*pȟeží wakȟáŋ*	This grass is believed to be poisonous to horses.

108	*Distichlis spicata var. stricta*	saltgrass, inland saltgrass	*pȟeží suksúta*	Grows in high alkalinity/high salinity environments.
109	*Dyssodia papposa*	fetid marigold, dogweed	*pispíza tȟawóte*	The dried, powdered leaves were inhaled to relieve breathing difficulties and headaches. A decoction made from fetid marigold and Gutierrezia sarothrae (broomweed) is used to treat cough due to colds. A decoction of fetid marigold and Grindelia squarrosa (curlycup gumweed) flowers is used to treat tuberculosis and hemorrhaging.
110	*Echinacea angustifolia*	echinacea, purple coneflower, blackroot	*ičháȟpe hú, uŋglákčapi*	A poultice of the root is applied to wounds, swellings, and sores. The roots and seed heads are chewed to relieve toothache, sore throat, tonsillitis, stomach-ache, over-perspiration, and to quench thirst. The chewed root and its juices are applied to venomous bites (including snakes, spiders, and bees), and are also applied to burns. The smoke from the burning root is inhaled to treat headaches in people and distemper in horses. The dried, prickly head is used to brush hair. A tincture, or decoctions made from the root is used to boost the immune system and relieve flu and cold symptoms. Echinacea is also being investigated as a treatment for cancer.
111	*Echinochloa crus-galli*	barnyard grass, cockspur grass	*pȟeží skúya*	The seeds have a sweet flavor and are used to season food or are ground into flour. Recently, some Lakotas have used a decoction of this grass or a meal made from the seeds to treat cancers.
112	*Echinocystis lobata*	wild cucumber, mock apple	waȟnáȟnaheča	The fruits of the wild cucumber are used medicinally in combination with other plants. The pulverized root was used as a poultice for headaches. An infusion of the roots in used to chills and fever.
113	*Elymus canadensis*	Canada wildrye	*pteyáȟota*	Excellent forage for bison. The seeds are edible when cooked.
114	*Equisetum arvense*	field horsetail	*waŋyéča swúla, pȟeží swúla*	If this plant gets mixed into hay, it may cause poisoning to livestock. It contains certain harmful alkaloids, so it is not advisable to eat it - although the Lakota sometimes did when it was very young. It is quite astringent and a decoction is excellent to stop bleeding.

115	*Equisetum hymenale*	scouring rush	*waŋyéča hú tȟáŋka*	This plant is very high is silica, and is therefore used as a scrubbing tool. It is excellent for polishing or to clean utensils.
116	*Erigeron annuus*	fleabane	*inážiŋ pȟežúta, uŋwáhinižaŋtȟuŋpi*	The blossoms of fleabane are mixed with brains, gall bladders, or spleens of animals and the mixture is used to bleach or tan hides. The flowers are dried and powdered and the resulting powder is inhaled to cause uncontrollable sneezing, which relieves head congestion. An infusion of the plant is used to treat mouth sores and to encourage urination in adults.
117	*Eriogonum flavum*	yellow wild buckwheat	*čhaŋȟlóǧaŋ hutkáŋ sapsápa šuŋgtȟáwote*	The seeds may be ground into flour.
118	*Eryngium yuccifolium*	rattlesnake master, button snakeroot	*wazímniŋkpa iyéčheča*	Root used as medicine for bladder trouble. The root is also used antidote to rattlesnake and scorpion venom. A decoction of the root is used to make men more virile.
119	*Erysimum asperum*	Western wallflower	*waȟčá zí šičámna*	The Lakota dried and then chewed the bitter foliage or made an infusion of the entire plant to treat stomach and bowel troubles, such as dysentery. The crushed seeds are put into warm water and drunk for the same purpose.
120	*Eupatorium maculatum*	Joe pyeweed, purple boneset	*waȟčá pȟepȟéla*	Excellent forage for grouse. Grows along streams and riverbanks. An infusion of the whole plant is diuretic and is used to treat kidney ailments, painful urination, and rheumatism. A decoction of the roots lowers fevers, treats colds, and kidney infections.
121	*Euphorbia esula*	leafy spurge	*šiŋská*	INTRODUCED: This is a noxious weed which has taken over many acres of pasture and rangeland throughout the Great Plains. The milky sap may be irritating to the skin.
122	*Euphorbia geyerii*	Geyer's spurge	*čhaŋȟlóǧaŋ waphóštaŋ, pȟayá pȟežúta*	The stems were woven together to make a sort of hat that was used to protect one's head from the sun.

123	*Euphorbia marginata*	snow on the mountain	*itópta sápa thapȟéžuta, asáŋpi pȟežúta*	An infusion of the crushed leaves is used as a liniment for swelling. An infusion of the whole plant is used to help lactating women produce breast milk. Use caution because the plant may be toxic.
124	*Euphorbia petaloides-eaplon*	prairie spurge	*apéla tȟáphišlečala iyéčheča*	The milky sap of this plant is poisonous.
125	*Fragaria vesca*	wild strawberry	*wažúšteča*	The fruits are never very plentiful, but when available, were eaten fresh or dried for later.
126	*Fraxinus pennsylvanica*	green ash	*pseȟtíŋ čháŋ*	The wood of the ash tree is used to make bows, tipi pins and pegs, drums, drying racks, and pipestems. It is makes an excellent firewood.
127	*Fritillaria atropurpurea*	purple spotted fritillaria, spotted missionbells, leopard lily, checker lily	*čhaŋȟlógaŋ makȟáthȟola pȟežúta, wahíŋheya iphíye*	The scaly bulbs are tasty when eaten raw or cooked, but they are small and relatively scarce, so one must take steps to prevent over harvesting.
128	*Galega officinalis*	goat's rue	*čhošáša*	INTRODUCED: This plant is considered a noxious weed in most states. The leaves contains galegine, an alkaloid that strongly reduces blood sugar levels; therefore, an infusion of the plant is used to treat diabetes. An infusion is also used to increase milk production in lactating mothers.
129	*Galium aparine*	cleavers, bedstraw	*waȟpé wáŋčaga hú bloká*	This plant often clings to clothing with the aid of tiny hairs along the stems, leaves and fruits. The roasted seeds may contain caffeine and was used as a coffee substitute. A salve made from cleavers is excellent in treating skin irritations.
130	*Galium boreale*	Northern bedstraw	*čhaŋȟlógaŋ ská waštémna*	The leaves are edible after cooking. A decoction of the whole plant is used to prevent pregnancy. Women wear dried stems under their belts as a sort of perfume. Red dye is made from the roots.

131	*Galium triflorum*	sweet scented bedstraw	*waȟpé wáŋčaǧa hú wíŋyela*	Women sometimes use the dried plant as a sort of perfume by slipping a stem under their belt.
132	*Gaura coccinea*	scarlet gaura	*tȟatȟáwabluška tȟačháŋȟloǧaŋ, ošúŋk'oyuspapi*	The Lakota chew the plant and rub it on their hands to attract and catch horses.
133	*Gaura mollis*	velvety gaura	*heȟáka hé*	This plant is used as a sort of love medicine.
134	*Gentiana andrewsii*	closed gentian, bottle gentian	*kapȟópa, waȟčá wašté*	Roots are used to flavor beverages. The root is also rubbed on the skin to prevent snakebite.
135	*Gentiana puberulenta*	downy gentian	*pȟežúta zí*	A decoction of the root is taken as a bitter tonic.
136	*Geum triflorum*	prairie smoke, torch flower, old man's whiskers, lion's beard, maiden hair	*piŋkpá hiŋšmá*	A decoction of the whole plant is used to treat sore eyes. A decoction of the root is used as a mouthwash for canker sores and sore throat and is also used to bathe wounds. The dried foliage is used to make a tonic infusion. The achenes were used as perfume. The dried root is used to make a healing salve for wounds. The root is also scraped and added to smoking mixtures.
137	*Grindelia squarrosa*	curlycup gumweed	*pté íčhiyuha*	An infusion of the tops of the plants is used to treat asthma and/or to relieve bronchial symptoms. However, the plant should not be used by those with heart or kidney disorders. The decoction, taken three times a day, will relieve constricted airways and even help to dry phlegm.
138	*Glycyrrhiza lepidota*	American licorice, wild licorice	*wináwizi čík'ala*	The root is chewed for its pleasant flavor and to treat toothache and the flu. A decoction of the dried root or leaves is used to treat diarrhea, upset stomach, fever, coughs, chest pain, and sore throat. Leaves are steeped to produce a topical treatment for earache. The leaves are chewed and applied as a poultice to the sore backs of horses. The root is also used to protect pregnant women from spiritual harm.

139	*Gypsophila muralis*	baby's breath	*waȟčá ská čík'ala*	INTRODUCED: This plant is used in a creemony to treat Bell's Palsey and other symptoms of stroke. The ceremony must be repeated four times.
140	*Hedeoma hispida*	rough pennyroyal	*makȟá čheyáka*	Infusion of leaves used to treat colds and loss of appetite in those who are sickly.
141	*Helianthus annuus*	annual sunflower, common sunflower	*waȟčá zizí, waȟčá zí tȟáŋka*	The inflorescences are collected after the seeds have matured and are then boiled. The sunflower oil rises to the top of the water, is collected, and used to moisturize hair and skin. The boiled flowers (the entire inflorescence) with the bracts removed are boiled and the resulting liquid drank to treat pulmonary problems. The seeds are also eaten.
142	*Helianthus maximiliani*	Maximilian's sunflower	*waȟčá zií*	The small roots were sometimes eaten and the seeds are also edible.
143	*Helianthus tuberosus*	Jerusalem artichoke	*pȟaŋǧí zí*	Tubers are boiled or roasted and sometimes fried after boiling and then eaten. Overuse of these tubers is said to cause flatulence.
144	*Hesperostipa spartea*	porcupine grass	*mačápȟeča*	The culms are used by young boys as play arrows. The seeds have long sheaths that are collected and bound together to make hairbrushes.
145	*Heuchera richardsonii*	alum root	*waȟpéǧa, waȟpé t'áǧa, čhaŋȟlóȟsnasnala*	An infusion of the root of this plant is used as a treatment for diarrhea - it is very high in tannins. A poultice of the powdered root is applied to wounds and sores. Deer and elk occasionally eat this plant.
146	*Hierochloe odorata*	sweetgrass	*pȟeží wačháŋǧa*	Strands of this grass are braided together and the braid is burned to call upon guardian spirits, and to create good feelings. The wonderful smell of sweetgrass is often used for this purpose in Lakota ceremonies.

147	*Hordeum jubatum*	squirrel tail, foxtail barley	*yus'íŋs'iŋ ité, ité ašníyaŋpi*	This grass is sometimes foraged by geese. It is also an indicator of high-alkaline soil. The seeds are edible and may be ground into flour, although it is difficult to separate from the husk. The dried root may be used as a poultice for sties on eyes.
148	*Humulus lupulus*	hops, common hops	*čhaŋíyuwe waȟpé onápȟóȟye, waȟpé akíkašpapi*	The papery fruits of the hops vine are steeped and the resulting infusion drunk to treat fever and intestinal pains. Hops are also boiled and the resulting liquid mixed with various flour sources (ground nuts, ground roots, pollens) to make bread. Hops encourages CO2 production and therefore makes bread rise. The resulting dough is used to make bread. Hops contain a natural sedative and an infusion, although bitter, is excellent for treating sleeplessness.
149	*Hydrastis canadensis*	goldenseal	*pȟóge očáŋčaŋ pȟežúta*	An infusion of the root treats digestive disorders and soothes mucous membranes. It is also extremely useful in treating of constipation. An infusion also treats earache, sore throat, and runny nose. Goldenseal is antibacterial and long-term use may destroy beneficial intestinal organisms, so use for limited periods of time. An infusion of the root is used externally as a wash for skin diseases, vaginal infections, and gum disease.
150	*Hymenopappus tenuifolius*	wooly hymenopappus	*šuŋghuštiphiye*	This plant is make into a salve or wash that is used to treat sores on horse's hooves.
151	*Hypsizgus tessulatus (formerly Pleurotus tessulatus)*	elm cap mushroom	*čhaŋnákpa*	This delicious mushroom grows on boxelder trees in the autumn, often from the tiny holes made when boxelder is tapped for its sap in the spring. The mushrooms are dried or used fresh in soups and stews.
152	*Ipomoea leptophylla*	bush morning glory	*pȟežúta nigé tȟáŋka pȟetáǧa*	The Lakota eat the peelings of the root to treat stomach disorders. Before the days of matches and lighters, the Lakota would "store" a fire within the root and hang it in a tree. The fire would keep burning for months within the root.
153	*Ipomopsis congesta*	ballhead gilia	*yažókapi hú*	An infusion of the whole plant is used as a blood tonic.

154	*Iva xanthifolia*	marsh elder	*waȟpé šíča*	The seeds may cause irritation to skin. A decoction of the whole plant is taken internally or made into a salve and applied externally and used to treat cough and congestion.
155	*Juglans nigra*	black walnut	*gmá, čhaŋsápa*	The deliciously rich nuts are used for food. The bark of the root is used to make black dye. The bark and leaves are made into a poultice that is excellent for treating skin ailments such as poison ivy, eczema and even herpes. A weak decoction of the bark is useful in treating diarrhea, even in children. The juice of the husk is applied externally to kill ringworm.
156	*Juniperus virginiana, communis*	Eastern red cedar	*ȟaŋté šá*	Juniper leaves are burned ceremonially, especially to cure the fear of thunder. A decoction is made from the cones and leaves is used to treat coughs. The cones have an incredibly strong "pine" flavor, but are effective in relieving thirst. Smoke from burning twigs is inhaled to relieve head congestion. Red Cloud had a vision that he should drink a decoction of the leaves or bathe in the decoction to treat cholera. It was said that this cure was infallible.
157	*Lactuca oblongifolia, pulchella*	blue lettuce	*ažúŋtka yazáŋpi, wablúška hiŋšmá iyéčheča*	The roots yield a milky resin that was sometimes used as a type of "chewing gum." An infusion of the leaves and stems is taken for stomachaches. The young leaves are eaten as a green vegetable, but are quite bitter, so are best mixed with other lettuces and greens and collected early in the spring.
158	*Lactuca serriola*	wild lettuce	*waȟpé íŋkpa žiží*	The young leaves are eaten by lactating women to aid in milk production.
159	*Lappula occidentalis*	desert stickseed, hairy stickweed	*hú pȟepȟé*	This plant is known to spread quickly.
160	*Lepidium densiflorum*	peppergrass	*ziŋtkála tȟawóte*	An infusion of the whole plant is excellent for the kidneys. The young greens make a nice addition to any salad and the seeds may be used as a substitute for pepper in any dish. The mature seeds are quite spicy.

161	*Lepidium densiflorum*	clasping peppergrass	*apé yuwí*	INTRODUCED: The young leaves are edible raw or cooked. They have a spicy, peppery flavor.
162	*Leucocrinum montanum*	Star of Bethlehem, common starlily, sand lily, mountain lily	*yapízapi iyéčheča*	The roots are eaten roasted or cooked in soups and stews. A poultice of the roots is used to treat sores and swellings.
163	*Levisticum officinale*	lovage	*čhaŋlí ičáhiye*	INTRODUCED. The root is chewed for toothaches. It is also used in pipe-smoking mixtures. The leaves and stems are edible raw or cooked and taste very much like celery. The whole plant is effective in treating digestive and respiratory complaints, especially indigestion, colic, fever, and bronchitis.
164	*Liatris punctata*	blazing star, dotted gayfeather, liatris	*tȟatéte čhaŋnúŋga*	The pulverized roots are eaten to improve appetite and they are also eaten during times of famine. The roots are best collected in the early spring when they are still tender, as they get very woody later in the year.
165	*Ligusticum porteri*	osha root, bear root	*matȟó tȟapȟéžuta*	The fragrant leaves may be used as a celery substitute. A decoction of the roots or seeds is used to treat poor circulation, fevers, bronchitis, and cramps. The root is used in ceremonial pipe-smoking. The root is burned and the smoke inhaled through the nose to relieve headache and to eliminate sinus infections.
166	*Lilium philadelphicum*	wood lily, wild lily	*mnáȟčaȟčá*	Pulverized or chewed flowers are applied to spider bites to reduce pain and swelling. The root bulb is edible when cooked and provides a nice carbohydrate source. A decoction of the bulbs is used to treat stomach complaints, coughs, and fevers.

167	*Linum perenne*	wild blue flax	*čhaŋȟlóǧaŋ nabláǧa*	Stem fibers are used as cordage. Flax seeds are added to all sorts of foods for their delicious flavor and also for added nutrition. Flax seeds are boiled and used as a thickener for soups and stews. They should not be eaten raw, as they do contain cyanide, but it is eliminated through cooking.
168	*Linum rigidum*	stiffstem flax, large-flowered yellow flax	*áta sosapina, nabláǧa čhaŋȟlóǧaŋ nabláǧa*	The seeds are eaten after being roasted.
169	*Lithospermum caroliniense*	hairy puccoon, Carolina puccoon	*pȟežúta wahesa, pȟežúta hásapa*	The powdered root is packed into chest wounds to stop bleeding and prevent infection. A beautiful red dye is obtained form the dried and powdered roots.
170	*Lithospermum incisum*	cleft gromwell, narrowleaf puccoon	*pȟežúta sapsápa*	The root is chewed to treat colds, lung hemorrhaging, and coughs. It is also eaten as an oral contraceptive. An infusion of the root is used to treat of stomach aches and kidney pain.
171	*Lobelia siphilitica*	lobelia, blue cardinal flower	*zuzéča tȟawóte, úma/uŋmá wápe tȟotȟó hé*	The root is used to treat fluid retention, diarrhea, and dysentery. The fresh root is used in conjunction with *Podophyllum peltatum* (mayapple) and *Prunus virginiana* (chokecherry), and then dusted the ulcers with the bark of *Ceanothus americanus*. The Lakota also used the root as a love charm by adding powdered root to the food of a person whom one was trying to woo.
172	*Lomatium cous*	cous biscuitroot	*waȟčá zí iyawicaskapa*	The root is peeled and eaten raw or cooked. The root is also ground into flour to be used as a thickener and to make bread.
173	*Lomatium dissectum*	bear root, fernleaf biscuitroot	*matȟó tȟapȟéžuta*	The fragrant and resinous root of this plant was used very much like *Ligusticum porteri.* Some Lakotas believe that the plants were used interchangeably depending upon availability. The root is sometimes ground into flour to make breads, or may also be added to other foods such as wasna (dried meat) and soups to give flavor.

174	*Lomatium foeniculaceum*	desert biscuitroot, wild parsley, carrotleaf parsley	*šahíyela tȟathíŋpsila huzízi, waȟčá zí iyawicaskapa*	The dried plant is used in a love charm. The root is edible, but has a strong flavor that is diminished through roasting. After roasting, it is sometimes ground into flour to make breads or to thicken soups and stews.
175	*Lomatium macrocarpum*	bigseed biscuitroot	*šahíyela tȟathíŋpsila hú*	A tasty tea may be made from the stems and leaves. The root is a nice edible, particularly when it is dried and ground into flour. It may also be added to soups and stews, and is very nutritious.
176	*Lomatium orientale*	white flowered parsley	*tȟathíŋpsila hú*	The root is used for food. Roots are rubbed into hot ash to remove the strong flavor and then eaten. The roots of most Lomatium species should be gathered in early spring.
177	*Lonicera spp.*	honesysuckle	*čhaŋwískuye, čhuŋwískuye*	The flowers are used as a sort of candy. The nectar is sucked out of the flowers because it is deliciously sweet.
178	*Lotus purshianus*	American deervetch, Spanish clover	*ziŋtkála tȟawóte*	The seeds of deervetch make good forage for birds and rodents. The whole plant provides nutritious feed for larger animals.
179	*Lupinus sericeus*	low lupine, silky lupine	*čhaŋȟlóǧaŋ nabláya*	This plant is recognized as forage for deer and elk.
180	*Lygodesmia juncea*	skeleton plant, prairie pink	*čhaŋȟlóǧaŋ hú čháŋ, swúla un hé tuktéktel yuŋké, makȟá čhaŋš'iŋhu*	An infusion made from the whole plant is used for children with diarrhea. The milky sap is sometimes chewed like gum and it is also rubbed on mosquito bites to relieve itching.
181	*Lysimachia thyrsiflora*	tufted loosestrife	*čhaŋȟlóǧaŋ waȟčá zí špaŋšpáŋžela*	An infusion of the leaves and stems is used to treat dysentery and diarrhea.

182	*Mahonia aquifolium*	Oregon grape root	*húte zí*	Oregon grape is used to treat stomach disorders and weak digestive systems. It will also stimulate kidney and gallbladder function and to reduce phlegm in the nose and lungs. An infusion of the whole plant is used to treat psoriasis and respiratory infections. The fruit is edible, but is quite laxative. The compound Berberine, which is present in the roots of Oregon grape, is very antibacterial and is used to treat all kinds of infections, especially of the lungs.
183	*Maianthemum racemosum*	star-flowered false Solomon's seal	*yapízapi hú*	The berries are eaten raw or cooked, but they have a very mild laxative effect. The rhizome is dried, ground into powder, and used as a styptic for wounds.
184	*Malva pusilla*	mallow	*ápe kalúlu*	INTRODUCED: The leaves of this plant make a very tasty green vegetable. They are edible raw or cooked. A poultice of the leaves is used to treat bruises and inflammation.
185	*Matricaria discoidea*	pineapple weed	*skuyómna*	INTRODUCED: The flowers made a nice, pineapple-scented tea. An infusion of the flowers is drunk as a sedative and to relieve post-partum exhaustion.
186	*Medicago lupulina*	black medic	*ápe yámni*	INTRODUCED: The leaves are edible raw or cooked. An infusion of the plant is used to soothe nerves.
187	*Medicago sativa*	alfalfa	*waȟpókhižate, tȟačháŋičahu tȟáŋka*	INTRODUCED: The sprouts are edible as are the mature leaves. Alfalfa leaves are eaten to improve appetite, and to promote the healing of internal wounds.
188	*Melilotus officinalis*	yellow sweet clover	*waȟpé swúla*	INTRODUCED: This plant is very attractive to insects and during years when sweetclover is prolific, it covers the Great Plains in a beautiful blanket of bright yellow.

189	*Mentha arvensis*	field mint	*čheyáka, čháŋ pȟežúta čík'ala*	The leaves and stems are boiled to make tea, which is commonly served at ceremonies, feeds, and various meetings. The leaves may also be eaten fresh or dried to treat indigestion. A strong decoction made from the roots is used to teat headaches and fever. Women use sprigs of mint as a sort of perfume by placing some of the leaves in pockets or under belts.
190	*Mentzelia decapetala*	ten petal blazing star, ten petal mentzelia, prairie lily	*čhaŋȟlóǧaŋ maȟ'áwaŋglakela*	This plant is well known for its beautiful white flowers. A decoction of the roots is used to treat rheumatism and arthritis. The seeds are edible, and were usually ground into mush.
191	*Mentzelia nuda*	bractless blazing star, sand lily	*tȟókahu pȟepȟé*	The boiled and strained sap is applied externally to treat fever. One may use the crushed leaves in the same way.
192	*Mimulus glabratus*	roundleaf monkeyflower yellow monkeyflower	*čheškíkȟaŋ iyéčheča*	The leaves are eaten raw or cooked. They have a bitter flavor, but the bitterness diminishes after cooking.
193	*Mirabilis hirsuta*	hairy four o'clock, hairy umbrellawort	*čhaŋȟlóǧaŋ ókhihetȟuŋ*	The dried leaves are sometimes mixed with various tobaccos for pipesmoking.
194	*Mirabilis linearis*	narrowleaf four o'clock, narrowleaf umbrellawort	*huókhihe habskáska*	An infusion of the dried leaves used to treat difficulty urinating.
195	*Mirabilis nyctaginea*	wild four o'clock, prairie four o'clock	*poíphiye, caŋȟlóǧaŋ waštémna*	A decoction of the roots of *poipiye* and the roots of Echinacea angustifolia is used to kill intestinal worms. A decoction of the root is used to treat fever. A poultice of the whole plant, including the root, is used to treat swellings and broken bones. A poultice, mixed with other plants, is used to treat breast cancer.

196	*Monarda fistulosa*	wild bergamot, beebalm, horsemint, purple bergamot	*heȟáka tȟapȟéžuta, heȟáka tȟawóte, waȟpé waštémna*	The leaves are used to make a refreshing tea. The leaves are also edible raw or cooked, although they have a very strong scent and flavor. An infusion of the flowers or leaves is used to treat abdominal pains, indigestion, fevers, sore throats, colds, whooping cough, and fainting. A poultice of the leaves is used to treat snakebites, to stop bleeding, to relieve sore eyes, and to prevent wounds from getting infected. The leaves are chewed while singing, dancing or hunting to prevent sore throat. A decoction of the whole plant is used to bathe diabetic ulcers - this will kill the infection and promote healing. The name "hehaka tapejuta" or "elk medicine" refers to this plant's use as a love charm.
197	*Morchella esculenta*	morel mushroom	*nasúla iyéčheča*	Delicious mushroom is collected in early spring and them eaten fresh or dried for later.
198	*Morus alba*	white mulberry	*čhaŋská*	The berries are eaten fresh or dried for later. The inner bark is also edible and was readily used during times of famine. A decoction of the leaves is used to treat colds and influenza. The root bark is made into a decoction to treat asthma and bronchitis.
199	*Musineon divaricatum*	wild parsley	*tȟathíŋpsila*	The roots are eaten raw.
200	*Nelumbo lutea*	yellow lotus, American lotus	*thewápa, khewápa*	The seeds are shelled and then boiled with meat to make soup. The peeled tubers are cooked with meat and hominy. The leaves are also edible. This plant is characterized as having mystical powers.
201	*Nepeta cataria*	catnip, catmint	*igmú tȟačhéyaka*	The young leaves are edible or can be made into a refreshing, although slightly bitter, tea. An infusion is used to treat indigestion, cold, flues, and fevers, even for children.
202	*Nuphar lutea*	yellow water lily	*thewápa, khewápa*	The roots and leaf stalks are edible after boiling. The root is dried and powdered to use as a styptic for wounds.

203	*Oenothera biennis*	evening primrose	*čhaŋȟlóǧaŋ húȟla*	A poultice of the whole plant is applied to bruises. The seeds are sometimes used as perfume. The leaves are used to treat asthma and cough. Evening primrose oil is used today to treat acne, fibrocystic breast tissue, rheumatoid arthritis, cirrhosis, and high cholesterol.
204	*Oenonthera caespitosa*	alkali lily, gumbo lily, tufted evening primrose	*čhaŋȟlóǧaŋ hú saŋsáŋ*	A poultice of the crushed roots is applied to sores and swellings.
205	*Oligoneuron rigidum*	stiff goldenrod	*tȟal'ágnake, čhaŋȟlóǧaŋ makȟá ayúblaya, miméla waȟčázi*	The leaves are laid on the ground to create a type of "plate" on which meat is placed to prevent dirt or other foreign objects from getting on the meat.
206	*Onosmodium bejariense*	false gromwell, Western marbleseed	*šúŋkačhaŋkȟahúiphi ye*	The seeds are put into gourds or turtle shells to make ceremonial rattles. A decoction of the roots and seeds is used to treat swelling (this remedy is said to only be used by men); it is also used as a rubbing solution for the sore muscles of horses, and it is sometimes given to them as a tea.
207	*Opuntia polyacantha*	plains pricklypear	*uŋkčéla blaská, fruit- uŋkčéla tȟašpú*	The roots of pricklypear are mixed with the roots of Yucca glauca - this mixture is made into a decoction that is used to strengthen contractions and progress childbirth. A decoction of the roots is taken for urinary tract infections. The "pears" or fruits are eaten raw or dried for later use. The thick, juicy, green stem segments or "pads" are edible when the thorns have been safely removed. An infusion of the pads is used to treat diarrhea.
208	*Orobanche fasciculata*	clustered broomrape	*wápe šašá*	This plant is edible raw or cooked. A poultice of the root is used to treat wounds and open cuts and sores.
209	*Ostraya virginiana*	American hop hornbeam, ironwood	*išpáŋšpaŋheča*	This tree has very hard wood that is used to make bows and utinsel handles. A decoction of the bark is used to massage sore muscles.

210	*Oxytropis lambertii*	purple locoweed, Lambert crazyweed	*sunkthápȟežuta*	In large quantities, this plant is considered toxic. Horses will eat the entire plant if it is available, but if eaten in large quantities, they often suffer from trembling, paralysis, and even death.
211	*Packera cana*	silvery ragwort, wooly groundsel	*šúŋkawakȟáŋ thapȟéžuta*	The whole plant is used as an unspecified "horse medicine." It contains toxic alkaloids, so the author does not believe it was used internally.
212	*Packera plattensis*	prairie ragwort	*čhaŋȟlóǧaŋ sutá*	This plant is known as being poisonous to horses and livestock.
213	*Panicum capillare*	witch grass	*ité awíčhašniyaŋ hú*	The seeds of this grass are readily used by birds, but were also cooked whole or ground into flour by the Lakota.
214	*Panicum virgatum*	switch grass	*pȟeži blaskaska*	This grass is grazed by bison.
215	*Parmelia spp.*	lichen	*pȟeží blaskáska*	Lichens are boiled to make a yellow dye, which is used to dye porcupine quills. Lichens are also burned as ceremonial incense and used for smudging.
216	*Parthenocissus vitacea*	woodbine	*čhaŋíyuwi iyéčheča*	The Lakota believe this plant to be poisonous to humans.
217	*Pascopyrum smithii*	Western wheatgrass	*pȟéži ȟčáka*	This grass is excellent forage for bison and horses.
218	*Penstemon albidus*	white beardtongue, white penstemon	*čhaŋȟlóǧaŋ hú sluslúta*	Butterflies love the beautiful flowers of this plant.
219	*Penstemon angustifolius*	narrowleaf beardtongue, broadbeard beardtongue	*čhaŋȟlóǧaŋ ȟláȟla, háŋpi nathópi*	The blossoms of this plant are used to make blue paint for moccasins.
220	*Penstemon gracilis*	slender beardtongue, lilac beardtongue	*zuzéča thapȟéžuta, uŋ huŋkálowaŋpi iyéčheča*	The roots are rubbed on the skin to repel snakes.

221	*Penstemon grandiflorus*	large beardtongue, shell leaf penstemon	*kimímila tȟawánaȟča*	A decoction of the leaves is taken for chills and fever. A decoction of the roots is taken for chest pain.
222	*Phaseolous vulgaris*	common bean	*omníča*	This bean is very similar to the Navy bean. It is eaten raw, cooked alone or in soups and stews.
223	*Phlox andicola*	plains phlox	*waȟpé pȟepȟé*	This low-growing plant has very sharp, pointed leaves that will get stuck in meat if meat is accidentally lain on this plant.
224	*Physalis heterophylla*	clammy groundcherry	*tȟamníoȟpi hú*	DANGER - All parts of this plant are poisonous except for the ripe fruit. The fruits, which turn orange when ripe, are eaten raw or cooked.
225	*Physalis longifolia*	long-leaved groundcherry	*tȟamníoȟpi hú*	DANGER - All parts of this plant are poisonous except for the ripe fruit. The fruits, which turn orange when ripe, are eaten raw or cooked.
226	*Picea glauca*	Black Hill's spruce	*waziȟčaka*	The young shoots are gathered in spring and boiled for long periods to eat as emergency food. The hardened sap is chewed as a sort of gum. The inner bark is quite nutritious and is dried, powdered and blended with flour to make bread. An infusion of the leaves is drunk to treat TB, influenza, coughs and colds.
227	*Pinus contorta*	lodgepole pine	*wazí čháŋ*	The cones of this pine tree are called "wazi pinkpa." A decoction of the roots is used to tan deerhides. The tall, this tress are used for tipi poles. The sap or pitch from all species of pine is antibacterial and is wonderful for making salves.
228	*Pleurotus ostreatus*	oyster mushroom	*čhaŋnákpa ská*	These mushrooms grow on dead deciduous trees and are harvested throughout spring and summer. They are eaten fresh or dried for later.

229	*Plantago major*	common plantain, broadleaf plantain	*wihúta hú iyéčheča*	The leaves are made into a poultice that is extremely effective in the treatment of burns and scalds. It is also applied to bruises, sprains, sores, insect bites, bee stings, snakebites, and splinters. The poultice will quickly stop bleeding on open wounds. The young, green leaves are eaten raw or cooked, and the seeds are added to soups and stews.
230	*Plantago patagonica*	Pursh's plantain, wooly plantain	*čhaŋȟlógaŋ waphóštaŋ kágapi*	Chewing the leaves is used to treat toothache.
231	*Polanisia dodecandra*	clammyweed	*waȟpé ȟlá*	The leaves are cooked and eaten.
232	*Polygala alba*	white milkwort	*waȟpé ská čík'ala*	A decoction of the roots is used to treat earaches. An infusion of the root is also used as an expectorant.
233	*Polygonatum biflorum*	Soloman's seal	*zuzéča tȟawóte hú, tȟaŋkíŋyaŋ héčha*	The rhizomes are eaten in soups and stews, they are also dried for later use. The young shoots can be eaten raw or cooked. The seeds and fruits are considered toxic.
234	*Polygonum amphibium*	swamp smartweed, marsh smartweed	*táku šašála, pšitȟóla hú iyéčheča*	The young shoots are eaten raw or cooked. The root is also eaten and is said to have a pleasant, nutty flavor.
235	*Polygonum lapathifolium*	curlytop knotweed, pale knotweed	*táku šašála hú wíŋyela*	The young shoots are eaten raw or cooked.
236	*Polygonum pensylvanicum*	jointweed, pink knotweed	*táku šašála swúla*	The seeds are eaten in soups and stews or roasted and ground into flour.
237	*Polygonum persicaria*	lady's thumb, heartweed	*táku šašála swúla*	The young shoots are eaten raw or cooked.

238	*Populus balsamifera*	balsam poplar	*šáka čháŋ*	The buds are covered in sticky resin, which is a prized Lakota medicine. The buds are made into a salve to treat sores and wounds. An infusion of the buds is used as a wash for sprains, inflammation, muscle pains and wounds. The infusion is also taken internally to treat lung ailments and coughs. The buds can also be put in hot water and used as an inhalant to relieve congested nasal passages.
239	*Populus deltoides*	cottonwood	*čhaŋyáȟ'u, šaká čháŋ, waȟčhíŋča wahcinca,*	The inner bark is eaten in small pieces or ground into flour and added to soups and stews. The young shoots are also eaten in early spring. The bark is excellent forage for horses during harsh winter months - the term for this is canha yuslotan. Cottonwood tree trunks are used to build the framework for Sundance lodges. The bark contain salicin, a noted painkiller and the bark is therefore chewed to treat toothache, or made into a decoction that is drunk to treat headaches, menstrual cramps, and fevers. The sticky buds are used to make yellow dye.
240	*Portulaca oleracea*	purslane	*wápe šóka*	INTRODUCED: The leaves are a delicious edible vegetable - raw or cooked. They are very succulent and are a good source of moisture.
241	*Prunus americana*	wild plum	*kȟáŋta*	The fruits are eaten raw or dried for later. A strong decoction of the twigs is used to treat asthma. A poultice of the inner bark will prevent infection and is used to treat open wounds. The fruits of all Prunus species are added to dried meat and mixed together with fat to make wasna (also known as pemmican).
242	*Prunus pumila*	sandcherry	*aúŋyeyapi, tȟaȟpíyoǧiŋ*	The fruits are eaten raw or dried for later use. The pigments from the fruits are used as face paint. The fruits of all Prunus species are added to dried meat and mixed together with fat to make wasna (also known as pemmican).

243	*Prunus virginiana*	chokecherry	*čhaŋpȟá;* dried cherry patties*:* *čhaŋpȟákaški*	Bundles of branches are tied to Sundance poles as a sacred offering. The leaves are made into tea for Sundancers. Sundancers suck on small bits of the stem to relieve thirst. Small pieces of the wood are sharpened and used to pierce Sundancer's skin. The fruits are eaten raw or dried for later. The dried berried are reconstituted with water to make *wojapi*, which is a kind of pudding. *Wojapi* is still made using chokecherries, but these days corn starch and sugar are sometimes added. The stems are sometimes used to make arrows. The fruits of all *Prunus* species are added to dried meat and mixed together with fat to make *wasna* (also known as pemmican).
244	*Pediomelum argophyllum*	silverleaf scurfpea	*maȟó tȟathíŋpsila, thíčaničahu*	The roots are fed to horses as an energy stimulant. The tough green stems are woven into baskets to carry meat home. The roots are edible, and are usually eaten in soups and stews.
245	*Pediomelum esculentum*	breadroot scurfpea, prairie turnip, Indian turnip	*thíŋpsila, šahíyela thíŋpsila,* top of plant*: thíŋpsila pȟahú,* hole from which turnip is taken*: owá wópte*	The roots are eaten fresh or dried for later. They are still a staple of the Lakota diet and are an excellent source of complex carbohydrates, so they do not raise blood sugar levels like potatoes tend to. The dried root is ground up and made into porridge which is used to treat stomach ulcers and irritated bowels, including for gastroenteritis.
246	*Psoralidium tenuiflorum*	slimflower scurfpea	*thíčaničahu tȟáŋka, waȟpé pȟeží, waȟpókiŋžate*	An infusion of the dried roots if used to treat headaches. The whole plant may be burned to repel insects. Stems were woven together to make a sort of hat to protect the head from the sun.
247	*Psoralidium lanceolatum*	lemon scurfpea, lance-leaved scurfpea	*čhaŋȟlóǧaŋ hutkȟáŋ háŋska*	Chewing the roots or leaves of this plant will relieve hoarseness.
248	*Pycnanthemum virginianum*	Virginia mountain mint	*waȟpé ičikȟoyagyaka, waȟpé čheyáka*	The leaves make a very pleasant tea. An infusion of the plant is taken for coughs.
249	*Pyrus ioensis*	crabapple	*tȟaspáŋ hú iyéčheča*	The berries are eaten raw, usually as a "trail food."

250	*Quercus macrocarpa*	burr oak	*uskúyeča hú, útahu čháŋ*	The acorns of the burr oak are an excellent food source. The Lakota boiled the acorns repeatedly to remove bitter tannins and ate them whole or ground them into flour to make bread. They were sometimes roasted after boiling, giving them a flavor similar to chestnuts. The bark, including root bark is made into a weak infusion to treat diarrhea. A decoction of the bark is used to treat poison ivy or any other seeping, wet rash.
251	*Quercus velutina*	black oak	*ithúhu*	The Lakota boiled the acorns repeatedly to remove bitter tannins and ate them whole or ground them into flour to make bread. They were sometimes roasted after boiling, giving them a flavor similar to chestnuts.
252	*Ranunculus cardiophyllus*	crowfoot, heartleaf buttercup	*čhaŋȟlógaŋ wičhágnaška*	This plant is considered to be poisonous and should be avoided.
253	*Ratibida columnifera*	yellow coneflower	*asáŋpi iyátke, wapȟóšta hú, waȟčá zí čík'ala*	An infusion of the flowers is used to treat chest pain and kidney ailments. A poultice of the flowers is used to treat all types of wounds. An infusion of the entire inflorescence is used to treat headaches and stomachaches. A decoction of the whole plant is used as a wash for snakebites. The whole plant is fed to horses to treat urinary tract infections. The cone was sometimes used as a pacifier for babies. A pleasant tea is made from the flowers and leaves.
254	*Rhus glabra*	smooth sumac	*čhaŋzí*	The red, autumn leaves are used in pipesmoking. The roots are used to make a yellow dye.
255	*Rhus trilobata*	skunkbrush sumac	*čháŋ uŋkčémna*	The leaves are mixed with various tobaccos for pipesmoking. The berries, while unpleasant to smell, are edible and were eaten during times of famine. An infusion of the leaves or berries makes a refreshing tea, reminiscent of lemonade. Do not boil the tea, simply steep the plant parts in warm or cold water. A decoction is used to treat excessive vaginal discharge and thrush.

256	*Ribes americanum*	black currant	*čhapčhéyazala*	The fruits are eaten raw or dried for later. A poultice of the root bark is used to treat swellings.
257	*Ribes aureum*	golden currant, buffalo currant	*wičhágnaška hú*	The fruits are eaten raw or dried for later. A poultice of the root bark or the inner bark is used to treat swellings.
258	*Ribes missouriense*	Missouri gooseberry	*wičhágnaška thǎ́ŋka*	The fruits are eaten raw or dried for later.
259	*Rosa arkansana*	wild rose, prairie rose	*uŋžíŋžiŋtka hú*	The petals, hips and roots all make a nice tea. The hips are dried for later use as food, especially during times of famine. They are very satisfying when added to soups or stews. An infusion of the flowers or hips is used to treat bladder infections and kidney stones. The petals and hips are extremely high in Vitamin C, and they also contain essential fatty acids, which is unusual for a fruit.
260	*Rosa woodsii*	wild rose	*uŋžíŋžiŋtka hú*	*see above entry
261	*Rubus occidentalis*	wild raspberry	*thǎkhǎ́ŋhečala hú*	The fruits are eaten raw or dried for later. An infusion of the leaves is used to treat diarrhea in children. An infusion of the roots is used to treat sore eyes. A decoction of the leaves is used to treat infected sores.
262	*Rumex altissimus*	water dock	*táku šašála hú iyéčheča*	A poultice of the green leaves is applied to boils. An infusion of the whole plants is used to treat diarrhea, hemorrhaging, and stomach cramps.
263	*Rumex aquaticus*	Western dock	*oskúya*	A decoction of the plant is used to treat indigestion, cramps, piles, constipation, cirrhosis, congestion, jaundice, and hepatitis. A poultice of the green leaves is used to draw pus out of infected wounds. An infusion of the plant is an excellent blood detoxifier. The leaves are placed on the rocks in the sweatlodge to relieve rheumatic pains.
264	*Rumex crispus*	curly dock	*waȟpé skúya*	The green leaves have a citrusy flavor and are eaten both raw and cooked.

265	*Rumex venosus*	winged dock, wild begonia	*waȟpé skúya*	An infusion of the roots is used to help women expel the placenta after giving birth. The roots and dried leaves are used to make red dye.
266	*Sagittaria latifolia*	arrowleaf, arrowhead	*hiŋháŋ tȟahápi, pšitóla hú*	The bulbous roots are boiled or roasted and then eaten. They are best when harvested in late summer or early fall. One must use caution when collecting and ensure proper identification so as not to confuse it with poisonous plant species.
267	*Salix amygdaloides*	peachleaf willow	*čhoȟáŋ waŋžíča tȟáŋka, waȟpé pȟópa čháŋ*	This is the largest, native willow on the Great Plains. The inner bark is eaten during times of extreme famine. The Lakota also make a decoction of the bark which is used to treat headaches and fever. The peeled bark is also used as a poultice for wounds and cuts. The bark of all willows contain salicin, from which aspirin is derived. The bark is used to make brown dye.
268	*Salix candida*	hairy willow	*čhoȟáŋ waŋžíča šašá*	This willow is burned to repel insects.
269	*Salix eriocephala*	diamond willow, Missouri River willow	*čȟoȟáŋ waŋžíča wapȟáha*	The branches of this willow and many other species of willow are sometimes attacked by a fungus (probably *Valsa sordida*) and his fungus creates a distinctive "diamond" shape at each node. They are prized for making sacred staffs and walking sticks. The Lakota also make a decoction of the bark which is used to treat headaches and fever. The peeled bark is also used as a poultice for wounds and cuts. The bark of all willows contain salicin, from which aspirin is derived.
270	*Salix exigua*	sandbar willow	*čȟoȟáŋ waŋžíča, waȟpé wazílya*	The branches of this willow species are used in making sweatlodge frames. The peeled outer bark is used for tying sweatlodge frames together. The whole tree is used during an unspecified mourning ceremony. The Lakota also make a decoction of the bark which is used to treat headaches and fever. The peeled bark is also used as a poultice for wounds and cuts. The bark of all willows contain salicin, from which aspirin is derived.

271	*Sambucus nigra*	elderberry	*čaphute hú*	The fruits are eaten after being dried or cooked. An infusion of the flowers makes a pleasant tea. The flowers were sometimes dipped in maple sap and then dried and eaten like candy. The ripe berries are boiled with honey or maple sap and the resulting syrup is used to treat cough and cold or any other viral illness. However, caution must be used, as the leaves and stems are poisonous.
272	*Sanicula marilandica*	snakeroot, black snakeroot, Maryland sanicle	*waptá yahúžiži, waptá yaȟlá, waptá yaȟóta*	A decoction of the roots is used to treat fever, eczema, psoriasis, sore throat, coughs, excessive perspiration, morning sickness (during pregnancy), toothaches, and menstrual irregularities. A poultice of the root is applied to snakebites.
273	*Sanguinaria canadensis*	bloodroot	*ok šaša*	Bloodroot must be used with extreme caution. It is incredibly potent and toxic in large doses. The juice can even "burn" one's skin. Blood root is made into a very weak decoction and is then used to treat fevers and rheumatism, and to induce vomiting. It is also used as an expectorant for lung congestion. A poultice of the root is also used in the treatment of skin cancers and other skin conditions.
274	*Schedonnardus paniculatus*	tumblegrass, crabgrass	*wablúška ȟúha óta pȟeží*	Birds are known to eat the seeds of this grass.
275	*Schoenoplectus tabernaemontani*	giant bulrush	*pšá čhiŋčá*	The tender, white base of the stem and the roots are eaten raw or cooked. The pollen is mixed with flour to add nutrients and flavor. The tough stems are woven together to make mats. These mats are called "pšá owíŋža" or "pšá oyúŋke." A poultice of the pith is used to stop bleeding.
276	*Schizachyrium scoparium*	little bluestem	*pȟeží šašá swúla*	The dried leaves and culms are rubbed into soft fibers, which are used as an insulting, waterproof lining for shoes.

277	*Scirpus pallidus*	pale bulrush	*pȟeží iwíčhakȟoyaka*	The tender, white base of the stem and the roots are eaten raw or cooked. The pollen is mixed with flour to add nutrients and flavor. The tough stems are woven together to make mats. A poultice of the pith is used to stop bleeding.
278	*Scirpus validus*	bulrush	*psá, wihúta hú swúla*	A decoction of the whole plant is used as a ceremonial emetic. The stems are woven together to make mats. These mats are called "psa owinja" or "psa oyunke."
279	*Senecio riddellii*	Riddell's groundsel, Riddell's ragwort	*čhaŋȟlóǧaŋ sutá*	This plant is known as being poisonous to horses and livestock.
280	*Shepherdia argentea*	buffaloberry, silver buffaloberry	*maštíŋčaphuté*	The berries are eaten fresh or dried for later. They are usually collected after the first frost, otherwise they are quite sour. The berries are also mildly laxative.
281	*Silphium laciniatum*	compass plant, pilot plant	*čhaŋšíŋšiŋla*	Children sometimes use the resin as chewing gum. An infusion of the whole plant is used to rid horses and humans of intestinal worms. An infusion of the leaves is used to loosen phlegm in the lungs.
282	*Silphium perfoliatum*	cup plant	*čhaŋšíŋšiŋla tȟáŋka*	The roots are burned and the smoke is inhaled to treat headaches, colds, neuralgia, and rheumatism.
283	*Sisymbrium altissimum*	tumble mustard	*čhaŋȟlóǧaŋ wablúška hú*	INTRODUCED: The leaves and young shoots are edible raw or cooked and make a nice addition to salads. The ground seeds may be used as a substitute for mustard.
284	*Sium suave*	water parsnip	*waȟpé ská*	The Lakota ate the roots of this plant, but the author does not advise this. It is edible, but this plant so closely resembles POISONOUS water hemlock, that it is not worth the risk. If one does decide to collect roots, they are best collected in the spring or fall and only with positive identification.

285	*Smilax herbacea*	Jacob's ladder, carrion flower	*zuzéča thawóte, ptápta ikhóyaka*	The fruits are eaten to relieve hoarseness. They are also eaten as trail food when they are fully ripe. The leaves and young shoots are edible raw or cooked. A decoction of the root is used to treat back pain, stomachaches, and kidney pain.
286	*Solanum rostratum*	buffalo burr, prickly nightshade	*špáŋšni yútapi iyéčheča*	The entire plant is covered in thorns and prickly burrs, so handle carefully. Most members of this genus are poisonous, so use extreme caution. However, the Lakota did make an infusion of buffalo burr to treat nausea.
287	*Solanum triflorum*	cut-leaved nightshade	*čhaŋhlóǧaŋ škiškíta*	POISONOUS: One or two berries are eaten to treat stomachache and diarrhea, but one must use extreme caution, as they can be quite poisonous if they are not fully ripe.
288	*Solidago canadensis*	Canada goldenrod	*waȟčáziblu*	The young leaves and shoots are edible after blanching in a few changes of water. An infusion of the dried leaves, flowers, or roots is used to treat stomachaches. A poultice of the root is applied to burns. A decoction of the entire plant is used to expel kidney stones.
289	*Solidago missouriensis*	prairie goldenrod, Missouri goldenrod	*čhaŋnúŋǧa hú pteptéčela*	An infusion of the dried leaves, flowers, and stems treats stomachaches, gastroenteritis, and influenza. It is also used to treat urinary tract infections, yeast infections, and sore throats. A nice tea is made from the dried flowers. A decoction of the entire plant is used to expel kidney stones.
290	*Sonchus arvensis & olearceus*	sow thistle, milk thistle	*waȟpé zí čík'ala iyéčheča*	INTRODUCED: The young leaves and stems are edible raw or cooked. The roasted root was used by early settlers as a coffee substitute. A poultice of the leaves relieves swelling. An infusion of the leaves is also said to calm nerves.
291	*Sophora nuttalliana*	mescal bean, silky sophora	*makȟátomniča hú ȟolȟóta*	The sweet roots are chewed as a sort of snack. The seeds are poisonous and should be avoided. The leaves and stems contain cytosine, a compound similar to nicotine and so these parts of the plant should be avoided.

292	*Sorghastrum nutans*	Indian grass	*pȟeží šašá íŋkpa žiží*	This grass provides excellent forage for bison and other grazing animals.
293	*Spartina pectinata*	prairie cordgrass, sandgrass	*saŋtúhu iyéčheča*	The long tillers of this grass are used as pipecleaners. When the Lakota began building cabins, this grass was used to thatch roofs.
294	*Sphaeralcea coccinea*	scarlet globemallow	*heyókȟa tȟapȟéžuta*	The heyoka is one of several types of medicine men in the Lakota culture. They are sometimes described as "backwards" or "contrary" or even as "clowns" because of their distinctive behavior of doing the opposite of what a "normal" person does. For example, heyokas have been known to ride horses backwards, or to wash off in the sand and dry off in the water. Scarlet globemallow is used by heyokas in the following way: they boil the root until the liquid turns into a type of gel. Then they rub the gel all over their hand and arm until completely covered. This "glove" makes their skin impervious to burning when they reach into boiling water. They often did this at certain ceremonies to prove the power of their "medicine."
295	*Sporobolus cryptandrus*	sand dropseed	*pȟeží tȟakȟáŋ*	The tillers of sand dropseed are known for being incredibly tough, but the seeds may be ground into flour and used to make bread.
296	*Strophostyles helvola*	fuzzy bean	*omníča hú*	The beans are eaten after cooking.
297	*Strophostyles leiosperma*	slickseed fuzzy bean	*omníča hú*	The beans are eaten after cooking.
298	*Symphoricarpos occidentalis*	buckbrush, wolfberry	*uŋšúŋgnasapi hú, zuzéča tȟawóte*	The long, straight tillers are used as play arrows by young boys. All parts of the plant are used as a poultice for wounds. An infusion of the leaves is used as an eyewash. An infusion of the roots is drunk as a tonic. An infusion of the inner bark is used to treat constipation.

299	*Taraxacum officinale*	dandelion	*waȟčá zí*	All parts of the plant are edible, from root to flower. A decoction of the root is drunk as a tonic, liver stimulant, or as a mild laxative. The flowers are dried and used to make a delicious tea. All parts of the plant are diuretic, and it is actually sold as a prescription drug in Canada for this purpose. The roasted roots make a nice coffee substitute. The leaves may be added to salad, and they are often used to help regulate blood sugar. Dandelions are also high in the antioxidant luteolin, which is said to be effective in preventing certain types of cancer. The plant has antibacterial properties, inhibiting the growth of *Staphylococcus aureus* , *Pneumococci* , *Meningococci* , *Bacillus dysenteriae* , and others.
300	*Thalictrum dasycarpum*	meadow rue, purple meadow rue	*wazímna, wazímniŋkpa*	The seeds of this plant are fed to horses as an energy stimulant. The seeds are also chewed and then rubbed on the skin to repel insects.
301	*Thermopsis rhombifolia*	prairie goldenpea, false lupine	*waȟpé sóta*	The flowers are dried and then burned - the smoke is used to treat rheumatism.
302	*Thlaspi arvense*	pennycress, fanweed	*apé mázaská*	The young leaves are eaten raw. The seeds are ground up and used to add a mustard-like flavor to foods. A decoction of the whole plant is used to treat strep throat.
303	*Thuja plicata*	Western red cedar, flat cedar	*ȟaŋté*	The pitch or sap from this tree is antibacterial and is used in making salves. The leaves are dried and then burned during sweatlodge ceremonies. A small pinch is placed on each rock that is brought into the sweatlodge. A decoction of the leaves is used to treat colds and flu symptoms. A decoction of the leaves and stems is used to treat coughs, colds, and tuberculosis and is also effective in treating dandruff.
304	*Tilia americana*	basswood	*híŋta*	The inner bark is used to make rope and cordage. The leaves and flowers are edible raw or cooked. A decoction of the inner bark is applied to burns, and is very soothing to the skin. A poultice of the leaves is used to treat burns, scalds, broken bones, and swellings.

305	*Townsendia exscapa*	large-flowered townsendina, Easter daisy	*iȟ'éȟ'e čhaŋȟlóǧaŋ*	This is known by the Lakota as one of the first flowers of spring.
306	*Toxicodendron rydbergii*	poison ivy	*wikȟóška pȟežúta*	Contact with this plant causes a very irritating, long-lasting rash. It is avoided. The Lakota use a poultice of an oak bark decoction to treat poison ivy rash.
307	*Tradescantia bracteata*	bracted spiderwort	*čhaŋȟlóǧaŋ pȟáŋpȟaŋla*	The flowers are used to make blue paint for shoes. Lakota men wrote and sang songs about this beautiful flower, often relating and comparing it to the women they loved. The leaves and flowers are edible raw or cooked.
308	*Tradescantia ohiensis*	bluejacket, softweed spiderwort	*čhaŋȟlóǧaŋ pȟáŋpȟaŋla*	The flowers are used to make blue paint for shoes. Lakota men wrote and sang songs about this beautiful flower, often relating and comparing it to the women they loved. The leaves and flowers are edible raw or cooked.
309	*Tragopogon dubius*	Western salsify	*waȟčá zí iyéčheča*	The root is edible after cooking; it is excellent in soups, stews and casseroles. The soft stems and leaf bases are also edible.
310	*Trametes versicolor*	turkeytail mushroom	*čháŋ siŋté*	The entire mushroom is used to strengthen the immune system. A decoction of the mushroom and it's mycelium is used to treat hepatitis and liver infections. The polysaccharides found in the mycelium of the mushroom and from the fermented decoction, have significant anti-carcinogenic activity. In Japan, turkeytail mushroom is prescribed as a drug for the treatment of malignant tumors, and it is used as a preventive and curative for liver cancer.

311	*Trifolium pratense*	red clover	*blayé ziŋtká thačháŋ*	INTRODUCED: The leaves and flowers are edible raw or cooked, and are best collected before flowering. The leaves are best cooked. The seed can be sprouted and used in salads. The root is edible after cooking. A deliciously sweet tea is made from the fresh or dried flowers. Red clover is into a salve or poultice to treat skin conditions, normally in combination with *Arctium minus* and *Rumex crispus*. A very strong decoction of the flowers, or a crushed poultice, is applied to cancer of the breast, which encourages the tumor to come to a head and eventually burst. An infusion of the whole plant is drunk to treat and psoriasis, whooping cough and dry coughs.
312	*Trifolium repens*	white clover	*blayé ziŋtká thačháŋ ská*	INTRODUCED: The leaves are edible raw or cooked, and should be harvested before flowering. The leaves are best cooked. The root is edible after cooking. An infusion of the flowers is used to treat coughs, colds, fevers, and vaginal discharge. A decoction or poultice of the flowers is also used to treat sore eyes.
313	*Triodanis leptocarpa*	Western Venus' looking glass	*čhaŋhlóǧaŋ kčaŋkčáŋla*	There are songs about this beautiful flower.
314	*Typha latifolia*	cattail	*wihúta hú, hiŋtkáŋ, stem = hiŋtkáŋ hú*	The soft down obtained from the carpel spike is used for lining baby's diapers and cradleboards. It is also applied as a poultice to burns. The down is mixed with fat and applied to smallpox sores. The pollen from the male spike is added to flour - it makes pancakes or bread incredibly delicious and much more nutritious. The young cattail shoots are edible raw or cooked, as are the fleshy rhizomes. Today, the rhizomes are cut into chunks and sauteed in butter to make a fantastic side-dish that is delicate and reminiscent of water chestnuts. The root is also dried and ground into powder to make flour.
315	*Ulmus americana*	American elm	*p'eíkčeka, p'éčhaŋ*	An infusion of the outer and inner bark is used to treat TB and lung hemorrhaging, coughs, colds, influenza, dysentery, eye infections, cramps and diarrhea. A decoction of the bark is used to wash wounds. The wood is used for fuel, to make pots, and as building material.

316	*Ulmus rubra*	black elm, slippery elm	*p'etúŋtuŋpa*	boiled and then the resulting mucilaginous liquid may be added to oatmeal to make it more nutritious. Decoction of the inner bark also makes a very nutritious drink; it is a gentle and effective remedy for chest congestion, stomach irritation, and intestinal irritation. This decoction is also very soothing and healing when used to treat sore throats, indigestion, digestive irritation, stomach ulcers. It was also applied externally to fresh cut, abrasions, swellings, burns and wounds. A decoction of the outer bark is used to induce abortions, because it is very irritating to the uterus.
317	*Urtica dioica*	stinging nettles	*čhaŋíčaȟpehu*	As it's name implies, you will want to take care when handling or walking near stinging nettles. Tiny hairs cover the entire plant and, when touched, release a trio of chemicals that causes a burning rash, similar to poison ivy but much shorter in duration and very easy to relieve. If you do come into contact with raw nettles, simply wash the affected area with warm, soapy water or rub wet mud on the area and allow it to dry before rubbing it off. In spite of its faults, nettles are incredibly useful. The young leaves make an delicious and nutritious potherb, and all of the stinging effect is removed through cooking, crushing, drying, or chopping. Nettles are high in nutrients and protein. They also make a nice tea that can be used to treat stomach aches. Stem fibers of mature plants were used to make rope and cordage. The young leaves are edible when they are cooked and are very high in vitamins and minerals. An infusion of the young leaves is consumed for general health and is especially good for children. An infusion is also used to treat arthritis, rheumatism, and eczema. The whole plant is used to make a salve that is excellent in treating sciatica, eczema, and dandruff. The young leaves are made into a decoction that is taken internally to treat hives. The whole plant is used to "whip" arthritic joints as a counter-irritant. An infusion of the whole plant is used as a hair wash to increase hair growth.

318	*Usnea spp.*	old man's beard	*čhaŋ wíziye*	Usnea is a powerful antibiotic and antifungal. It makes an excellent poultice for open wounds and sores. An infusion is used in the treactment of respiratory infections and urinary tract infections.
319	*Vaccinum scoparium*	grouseberry, huckleberry, whortleberry	*háza*	This fruit is delicious eaten fresh or dried.
320	*Verbascum thapsus*	common mullein	*apé hiŋšmá*	An infusion of the leaves reduces the formation of mucus and acts as an expectorant. It is therefore used to treat any type of chest congestion associated with bronchitis or influenza. A decoction of the leaves is made into a poultice, which is used to heal diabetic ulcers on the legs or feet.
321	*Verbena bracteata*	bigbract verbena	*apé sloháŋ*	INTRODUCED: An infusion of the root is used to treat tuberculosis, particularly when it has spread to the lymph nodes.
322	*Verbena hastata*	blue vervain, blue verbena	*čhaŋȟlógaŋ pȟežúta, pȟéstola*	An infusion of the roots and leaves is used to treat stomachache, fevers, and kidney stones. The seeds may be ground to make flour. This is a warming herb that promotes good circulation.
323	*Verbena stricta*	wooly vervain, hairy verbena	*tȟopȟéstola, tȟó pȟestóla*	An infusion of the leaves and roots is used to treat fever and stomachaches.
324	*Vernonia fasciculata*	ironweed, prairie ironweed	*waȟpé apé blaskáska, tȟal'ágnake iyéčheča*	The leaves are formed into a sort of "plate" that keeps foreign matter from getting on meat. An infusion of he root is used to regulate menstrual periods.
325	*Veronicastrum virginicum*	culver's root	*waȟpé pȟáŋpȟaŋla*	An infusion of the root stimulates the liver and increases the flow of bile. However, one must be very careful, as it can cause violent vomiting. The Lakota would only use roots that were well dried; some herbalists say the root needs to dry for at least a year before being used. Smoke from the burning root is used to smudge and purify those who have come into contact with a person who mourning the death of a family member.

326	*Viburnum lentago*	black haw, nannyberry	*mnahú*	The fruits are edible raw or dried for later. They are not a favorite for eating purposes, as they have a thick skin and can be very dry. A decoction of the roots is used to treat irregular periods. An infusion of the leaves is used to treat measles.
327	*Vicia americana*	American vetch	*thasúsu*	This plant provides excellent forage for grazing animals. A poultice of the leaves is applied to spider bites. An infusion of the leaves is used by women as love medicine.
328	*Viola spp.*	violet	*wahpé thó čík'ala*	The young leaves and flower buds are edible raw or cooked. The leaves are added to thicken soups and stews. An infusion of the leaves and roots is used to treat asthma in children. A decoction of the roots and leaves is used as a wash or poultice to relieve sore and swollen joints. A poultice of the chewed leaves is applied to sore eyes.
329	*Vitis riparia*	wild grape	*čhaŋwíyapeha iyúwi, čhaŋwíyape*	The fruits are edible raw or cooked. They are also collected and dried for later use.
330	*Wyethia amplexicaulis*	mule's ear	*thápča nakpá*	The roots are edible after cooking. They were usually pit roasted for two days.
331	*Xanthium strumarium*	cocklebur	*wináwizi hú thápŋka hča*	This plant is poisonous if eaten by livestock. The Lakota burned the leaves and the roots as ceremonial incense. A decoction of the root is used to treat high fevers and to help a woman expel afterbirth. A salve is made with the powdered seed and is used on open sores.
332	*Yucca glauca*	yucca, soapweed	*huphéstola*	The root is dried and powdered - the powder is then boiled for long periods to make an excellent shampoo. A decoction of the root is used to treat stomachaches. The fumes given off by the burning root is said to allow horses to be easily caught. The roots of this plant and the roots of *Opuntia polyacantha* are made into an infusion that is used to help women progress childbirth. The flowers, buds, and seed pods are all edible.

333	*Zigadenus elegans, Zigadenus venenosus*	death camas	*pšíŋ hublóka*	All parts of this plant are highly POISONOUS. It is avoided.
334	*Ziziana aquatica*	wild rice	*psíŋ*	Wild rice was collected along the Missouri River (at Big Lake) by the Lakota of Standing Rock. In the 1950's the river was flooded, killing all the rice plants on the river. Since then, it has been left out of the Lakota diet. Formerly, the Lakota ate the rice in soups and stews. Other bands of Lakota also used wild rice.

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Interviews

Numerous interviews were conducted throughout the Great Lakota, Dakota, and Nakota Nations. Many Elders did not want credit for their contributions, and therefore they will remain nameless. However, I am endlessly thankful to them for agreeing to pass on this sacred knowledge to the people. I vow to never misuse this knowledge and to keep passing it on to the Next Generation. I hope that whoever reads this will respectfully do the same. I extend many thanks to the following people, many of whom have already begun the journey on the Red Road – *wopila tanka*.

Zona Loans Arrow

Mary Louise Defender-Wilson

Bea Medicine

George Iron Shield

Keva Sitting Dog

Wilbur Flying By

Delores Taken Alive

Vernon Iron Cloud

Theo Iron Cloud

Gladys Hawk

Everette Jamerson

Lavorra Jones

Helmina Makes Him First

Earl Bullhead

Alberta Crowe

Imogene Taken Alive

Vivian High Elk

. . . and almost 65 others who wish to remain anonymous.

Certificate of Service

The undersigned hereby certifies that, on this day, I served the Prefiled testimony of Doug Crow Ghost, Waste Win Young, Phyllis Young and Linda Black Elk via electronic mail to –

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Dated this 2nd day of April, 2015

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