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

Exhibit 8001

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)).

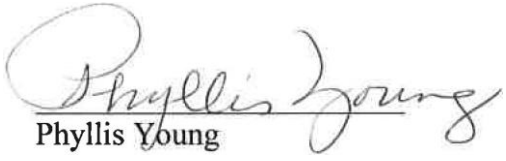
Under the Fort Laramie Treaty, we have the right to a healthy environment. Article 2 of the Treaty describes our ownership interest to the lands of the Great Sioux Reservation, as "set apart for the absolute and undisturbed use and occupation..." of the Great Sioux Nation. (15 Stat. 635). The revised 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_____

TREATY OF FORT LARAMIE WITH SIOUX, ETC., 1851.

Sept. 17, 1851.
11 Stats., p. 749.

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]

Peace to be observed.

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.

Roads may be established.

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.

Indians to be protected.

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.

Depredations on whites to be satisfied.

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.

Boundaries of lands.

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:

Sioux.

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 Bute, 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.

Grosventre, etc.

The territory of the Gros Ventre, Mandans, and Arrickaras Nations, commencing at the mouth 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.

Assinfboin.

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.

Blackfoot.

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.

Crow.

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.

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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 Fé road; thence in a northwesterly direction to the forks of the Platte River, and thence up the Platte River to the place of beginning. Cheyenne and Arapaho.

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. Rights in other lands.

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. Head chiefs of said tribes.

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. Annuities.

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. Annuities suspended by violation of treaty.

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-hi-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:
Bê-ah-té-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 Riflemen.
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.

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[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).

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TREATY WITH THE SIOUX—BRULÉ, OGLALA, MINICONJOU, YANKTONAI, HUNKPAPA, BLACKFEET, CUTHEAD, TWO KETTLE, SANS ARCS, AND SANTEE—AND ARAPAHO, 1868.

Apr. 29, 1868.
15 Stats., 635.
Ratified, Feb. 16, 1869.
Proclaimed, Feb. 24, 1869.

Articles of a treaty made and concluded by and between Lieutenant-General William T. Sherman, General William S. Harney, General Alfred H. Terry, General C. C. Augur, J. B. Henderson, Nathaniel G. Taylor, John B. Sanborn, and Samuel F. Tappan, duly appointed commissioners on the part of the United States, and the different bands of the Sioux Nation of Indians, by their chiefs and head-men, whose names are hereto subscribed, they being duly authorized to act in the premises.

War to cease and peace to be kept.

ARTICLE 1. From this day forward all war between the parties to this agreement shall forever cease. The Government of the United States desires peace, and its honor is hereby pledged to keep it. The Indians desire peace, and they now pledge their honor to maintain it.

Offenders against the Indians to be arrested, etc.

If bad men among the whites, or among other people subject to the authority of the United States, shall commit any wrong upon the person or property of the Indians, the United States will, upon proof made to the agent and forwarded to the Commissioner of Indian Affairs at Washington City, proceed at once to cause the offender to be arrested and punished according to the laws of the United States, and also re-imburse the injured person for the loss sustained.

Wrongdoers against the whites to be punished.

If bad men among the Indians shall commit a wrong or depredation upon the person or property of any one, white, black, or Indian, subject to the authority of the United States, and at peace therewith, the Indians herein named solemnly agree that they will, upon proof made to their agent and notice by him, deliver up the wrong-doer to the United States, to be tried and punished according to its laws; and in case they wilfully refuse so to do, the person injured shall be re-imbursed for his loss from the annuities or other moneys due or to become due to them under this or other treaties made with the United States. And the President, on advising with the Commissioner of Indian Affairs, shall prescribe such rules and regulations for ascertaining damages under the provisions of this article as in his judgment may be proper. But no one sustaining loss while violating the provisions of this treaty or the laws of the United States shall be re-imbursed therefor.

Damages.

Reservation boundaries.

ARTICLE 2. The United States agrees that the following district of country, to wit, viz: commencing on the east bank of the Missouri River where the forty-sixth parallel of north latitude crosses the same, thence along low-water mark down said east bank to a point opposite where the northern line of the State of Nebraska strikes the river, thence west across said river, and along the northern line of Nebraska to the one hundred and fourth degree of longitude west from Greenwich, thence north on said meridian to a point where the forty-sixth parallel of north latitude intercepts the same, thence due east along said parallel to the place of beginning; and in addition thereto, all existing reservations on the east bank of said river shall be, and the same is, set apart for the absolute and undisturbed use and occupation of the Indians herein named, and for such other friendly tribes or individual Indians as from time to time they may be willing, with the consent of the United States, to admit amongst them; and the United States now solemnly agrees that no persons except those herein designated and authorized so to do, and except such officers, agents, and employés of the Government as may be authorized to enter upon Indian reservations in discharge of duties enjoined by law, shall ever be permitted to pass over, settle upon, or reside in the territory described in this article, or in such territory as may be added to this reservation for the use of said Indians, and henceforth they will and do hereby relinquish all claims or right in and to any portion of the United States or Territories, except such as is embraced within the limits aforesaid, and except as hereinafter provided.

Certain persons not to enter or reside thereon.

Additional arable land to be added, if, etc.

ARTICLE 3. If it should appear from actual survey or other satisfactory examination of said tract of land that it contains less than one hundred and sixty acres of tillable land for each person who, at the time, may be authorized to reside on it under the provisions of this treaty, and a very considerable number of such persons shall be disposed to commence cultivating the soil as farmers, the United States agrees to set apart, for the use of said Indians, as herein provided,

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such additional quantity of arable land, adjoining to said reservation, or as near to the same as it can be obtained, as may be required to provide the necessary amount.

Buildings on reservation.

ARTICLE 4. The United States agrees, at its own proper expense, to construct at some place on the Missouri River, near the center of said reservation, where timber and water may be convenient, the following buildings, to wit: a warehouse, a store-room for the use of the agent in storing goods belonging to the Indians, to cost not less than twenty-five hundred dollars; an agency-building for the residence of the agent, to cost not exceeding three thousand dollars; a residence for the physician, to cost not more than three thousand dollars; and five other buildings, for a carpenter, farmer, blacksmith, miller, and engineer, each to cost not exceeding two thousand dollars; also a school-house or mission-building, so soon as a sufficient number of children can be induced by the agent to attend school, which shall not cost exceeding five thousand dollars.

The United States agrees further to cause to be erected on said reservation, near the other buildings herein authorized, a good steam circular-saw mill, with a grist-mill and shingle-machine attached to the same, to cost not exceeding eight thousand dollars.

Agent's residence, office, and duties.

ARTICLE 5. The United States agrees that the agent for said Indians shall in the future make his home at the agency-building; that he shall reside among them, and keep an office open at all times for the purpose of prompt and diligent inquiry into such matters of complaint by and against the Indians as may be presented for investigation under the provisions of their treaty stipulations, as also for the faithful discharge of other duties enjoined on him by law. In all cases of depredation on person or property he shall cause the evidence to be taken in writing and forwarded, together with his findings, to the Commissioner of Indian Affairs, whose decision, subject to the revision of the Secretary of the Interior, shall be binding on the parties to this treaty.

Heads of families may select lands for farming.

ARTICLE 6. If any individual belonging to said tribes of Indians, or legally incorporated with them, being the head of a family, shall desire to commence farming, he shall have the privilege to select, in the presence and with the assistance of the agent then in charge, a tract of land within said reservation, not exceeding three hundred and twenty acres in extent, which tract, when so selected, certified, and recorded in the "land-book," as herein directed, shall cease to be held in common, but the same may be occupied and held in the exclusive possession of the person selecting it, and of his family, so long as he or they may continue to cultivate it.

Others may select land for cultivation.

Any person over eighteen years of age, not being the head of a family, may in like manner select and cause to be certified to him or her, for purposes of cultivation, a quantity of land not exceeding eighty acres in extent, and thereupon be entitled to the exclusive possession of the same as above directed.

Certificates.

For each tract of land so selected a certificate, containing a description thereof and the name of the person selecting it, with a certificate endorsed thereon that the same has been recorded, shall be delivered to the party entitled to it, by the agent, after the same shall have been recorded by him in a book to be kept in his office, subject to inspection, which said book shall be known as the "Sioux Land-Book."

Surveys.

The President may, at any time, order a survey of the reservation, and, when so surveyed, Congress shall provide for protecting the rights of said settlers in their improvements, and may fix the character of the title held by each. The United States may pass such laws on the subject of alienation and descent of property between the Indians and their descendants as may be thought proper. And it is further stipulated that any male Indians, over eighteen years of age, of any band or tribe that is or shall hereafter become a party to this treaty, who now is or who shall hereafter become a resident or occupant of any reservation or Territory not included in the tract of country designated and described in this treaty for the permanent home of the Indians, which is not mineral land, nor reserved by the United States for special purposes other than Indian occupation, and who shall have made improvements thereon of the value of two hundred dollars or more, and continuously occupied the same as a homestead for the term of three years, shall be entitled to receive from the United States a patent for one hundred and sixty acres of land including his said improvements, the same to be in the form of the legal subdivisions of the sur-

Alienation and descent of property.

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veys of the public lands. Upon application in writing, sustained by the proof of two disinterested witnesses, made to the register of the local land-office when the land sought to be entered is within a land district, and when the tract sought to be entered is not in any land district, then upon said application and proof being made to the Commissioner of the General Land-Office, and the right of such Indian or Indians to enter such tract or tracts of land shall accrue and be perfect from the date of his first improvements thereon, and shall continue as long as he continues his residence and improvements, and no longer. And any Indian or Indians receiving a patent for land under the foregoing provisions, shall thereby and from thenceforth become and be a citizen of the United States, and be entitled to all the privileges and immunities of such citizens, and shall, at the same time, retain all his rights to benefits accruing to Indians under this treaty.

Certain Indians may receive patents for 160 acres of land.

Such Indians receiving patents to become citizens of the United States.

ARTICLE 7. In order to insure the civilization of the Indians entering into this treaty, the necessity of education is admitted, especially of such of them as are or may be settled on said agricultural reservations, and they therefore pledge themselves to compel their children, male and female, between the ages of six and sixteen years, to attend school; and it is hereby made the duty of the agent for said Indians to see that this stipulation is strictly complied with; and the United States agrees that for every thirty children between said ages who can be induced or compelled to attend school, a house shall be provided and a teacher competent to teach the elementary branches of an English education shall be furnished, who will reside among said Indians, and faithfully discharge his or her duties as a teacher. The provisions of this article to continue for not less than twenty years.

Education.

Children to attend school.

Schoolhouses and teachers.

ARTICLE 8. When the head of a family or lodge shall have selected lands and received his certificate as above directed, and the agent shall be satisfied that he intends in good faith to commence cultivating the soil for a living, he shall be entitled to receive seeds and agricultural implements for the first year, not exceeding in value one hundred dollars, and for each succeeding year he shall continue to farm, for a period of three years more, he shall be entitled to receive seeds and implements as aforesaid, not exceeding in value twenty-five dollars.

Seeds and agricultural implements.

And it is further stipulated that such persons as commence farming shall receive instruction from the farmer herein provided for, and whenever more than one hundred persons shall enter upon the cultivation of the soil, a second blacksmith shall be provided, with such iron, steel, and other material as may be needed.

Instructions in farming.

Second blacksmith.

ARTICLE 9. At any time after ten years from the making of this treaty, the United States shall have the privilege of withdrawing the physician, farmer, blacksmith, carpenter, engineer, and miller herein provided for, but in case of such withdrawal, an additional sum thereafter of ten thousand dollars per annum shall be devoted to the education of said Indians, and the Commissioner of Indian Affairs shall, upon careful inquiry into their condition, make such rules and regulations for the expenditure of said sum as will best promote the educational and moral improvement of said tribes.

Physician, farmer, etc., may be withdrawn.

Additional appropriation in such cases.

ARTICLE 10. In lieu of all sums of money or other annuities provided to be paid to the Indians herein named, under any treaty or treaties heretofore made, the United States agrees to deliver at the agency-house on the reservation herein named, on or before the first day of August of each year, for thirty years, the following articles, to wit:

Delivery of goods in lieu of money or other annuities.

For each male person over fourteen years of age, a suit of good substantial woolen clothing, consisting of coat, pantaloons, flannel shirt, hat, and a pair of home-made socks.

Clothing.

For each female over twelve years of age, a flannel skirt, or the goods necessary to make it, a pair of woolen hose, twelve yards of calico, and twelve yards of cotton domestics.

For the boys and girls under the ages named, such flannel and cotton goods as may be needed to make each a suit as aforesaid, together with a pair of woolen hose for each.

And in order that the Commissioner of Indian Affairs may be able to estimate properly for the articles herein named, it shall be the duty of the agent each year to forward to him a full and exact census of the Indians, on which the estimate from year to year can be based.

Census.

And in addition to the clothing herein named, the sum of ten dollars for each person entitled to the beneficial effects of this treaty shall be

Other necessary articles.

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annually appropriated for a period of thirty years, while such persons roam and hunt, and twenty dollars for each person who engages in farming, to be used by the Secretary of the Interior in the purchase of such articles as from time to time the condition and necessities of the Indians may indicate to be proper. And if within the thirty years, at any time, it shall appear that the amount of money needed for clothing under this article can be appropriated to better uses for the Indians named herein, Congress may, by law, change the appropriation to other purposes; but in no event shall the amount of this appropriation be withdrawn or discontinued for the period named. And the President shall annually detail an officer of the Army to be present and attest the delivery of all the goods herein named to the Indians, and he shall inspect and report on the quantity and quality of the goods and the manner of their delivery. And it is hereby expressly stipulated that each Indian over the age of four years, who shall have removed to and settled permanently upon said reservation and complied with the stipulations of this treaty, shall be entitled to receive from the United States, for the period of four years after he shall have settled upon said reservation, one pound of meat and one pound of flour per day, provided the Indians cannot furnish their own subsistence at an earlier date. And it is further stipulated that the United States will furnish and deliver to each lodge of Indians or family of persons legally incorporated with them, who shall remove to the reservation herein described and commence farming, one good American cow, and one good well-broken pair of American oxen within sixty days after such lodge or family shall have so settled upon said reservation.

Appropriation to continue for thirty years.

Army officer to attend the delivery.

Meat and flour.

Cows and oxen.

ARTICLE 11. In consideration of the advantages and benefits conferred by this treaty, and the many pledges of friendship by the United States, the tribes who are parties to this agreement hereby stipulate that they will relinquish all right to occupy permanently the territory outside their reservation as herein defined, but yet reserve the right to hunt on any lands north of North Platte, and on the Republican Fork of the Smoky Hill River, so long as the buffalo may range thereon in such numbers as to justify the chase. And they, the said Indians, further expressly agree:

Right to occupy territory outside of the reservation surrendered.

Right to hunt reserved.

1st. That they will withdraw all opposition to the construction of the railroads now being built on the plains.

Agreements as to railroads.

2d. That they will permit the peaceful construction of any railroad not passing over their reservation as herein defined.

3d. That they will not attack any persons at home, or travelling, nor molest or disturb any wagon-trains, coaches, mules, or cattle belonging to the people of the United States, or to persons friendly therewith.

Emigrants, etc.

4th. They will never capture, or carry off from the settlements, white women or children.

Women and children.

5th. They will never kill or scalp white men, nor attempt to do them harm.

White men.

6th. They withdraw all pretence of opposition to the construction of the railroad now being built along the Platte River and westward to the Pacific Ocean, and they will not in future object to the construction of railroads, wagon-roads, mail-stations, or other works of utility or necessity, which may be ordered or permitted by the laws of the United States. But 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.

Pacific Railroad, wagon roads, etc.

Damages for crossing their reservation.

7th. They agree to withdraw all opposition to the military posts or roads now established south of the North Platte River, or that may be established, not in violation of treaties heretofore made or hereafter to be made with any of the Indian tribes.

Military posts and roads.

ARTICLE 12. No treaty for the cession of any portion or part of the reservation herein described which may be held in common shall be of any validity or force as against the said Indians, unless executed and signed by at least three-fourths of all the adult male Indians, occupying or interested in the same; and no cession by the tribe shall be understood or construed in such manner as to deprive, without his consent, any individual member of the tribe of his rights to any tract of land selected by him, as provided in article 6 of this treaty.

No treaty for cession of reservation to be valid unless, etc.

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United States to furnish physician, teachers, etc.

ARTICLE 13. The United States hereby agrees to furnish annually to the Indians the physician, teachers, carpenter, miller, engineer, farmer, and blacksmiths as herein contemplated, and that such appropriations shall be made from time to time, on the estimates of the Secretary of the Interior, as will be sufficient to employ such persons.

Presents for crops.

ARTICLE 14. It is agreed that the sum of five hundred dollars annually, for three years from date, shall be expended in presents to the ten persons of said tribe who in the judgment of the agent may grow the most valuable crops for the respective year.

Reservation to be permanent home of tribes.

ARTICLE 15. The Indians herein named agree that when the agency-house or other buildings shall be constructed on the reservation named, they will regard said reservation their permanent home, and they will make no permanent settlement elsewhere; but they shall have the right, subject to the conditions and modifications of this treaty, to hunt, as stipulated in Article 11 hereof.

Unceded Indian territory.

ARTICLE 16. The United States hereby agrees and stipulates that the country north of the North Platte River and east of the summits of the Big Horn Mountains shall be held and considered to be unceded Indian territory, and also stipulates and agrees that no white person or persons shall be permitted to settle upon or occupy any portion of the same; or without the consent of the Indians first had and obtained, to pass through the same; and it is further agreed by the United States that within ninety days after the conclusion of peace with all the bands of the Sioux Nation, the military posts now established in the territory in this article named shall be abandoned, and that the road leading to them and by them to the settlements in the Territory of Montana shall be closed.

Not to be occupied by whites, etc.

Effect of this treaty upon former treaties.

ARTICLE 17. It is hereby expressly understood and agreed by and between the respective parties to this treaty that the execution of this treaty and its ratification by the United States Senate shall have the effect, and shall be construed as abrogating and annulling all treaties and agreements heretofore entered into between the respective parties hereto, so far as such treaties and agreements obligate the United States to furnish and provide money, clothing, or other articles of property to such Indians and bands of Indians as become parties to this treaty, but no further.

In testimony of all which, we, the said commissioners, and we, the chiefs and headmen of the Brulé band of the Sioux nation, have hereunto set our hands and seals at Fort Laramie, Dakota Territory, this twenty-ninth day of April, in the year one thousand eight hundred and sixty-eight.

N. G. Taylor, [SEAL.]
W. T. Sherman, [SEAL.]
Lieutenant-General.
Wm. S. Harney, [SEAL.]
Brevet Major-General U. S. Army.
John B. Sanborn, [SEAL.]
S. F. Tappan, [SEAL.]
C. C. Augur, [SEAL.]
Brevet Major-General.
Alfred H. Terry, [SEAL.]
Brevet Major-General U. S. Army.

Attest:
A. S. H. White, Secretary.

Executed on the part of the Brulé band of Sioux by the chiefs and headmen whose names are hereto annexed, they being thereunto duly authorized, at Fort Laramie, D. T., the twenty-ninth day of April, in the year A. D. 1868.

Ma-za-pon-kaska, his x mark, Iron Shell. [SEAL.]
Wah-pat-shah, his x mark, Red Leaf. [SEAL.]
Hah-sah-pah, his x mark, Black Horn. [SEAL.]
Zin-tah-gah-lat-skah, his x mark, Spotted Tail. [SEAL.]
Zin-tah-skah, his x mark, White Tail. [SEAL.]
Me-wah-tah-no-ho-skah, his x mark, Tall Mandan. [SEAL.]
She-cha-chat-kah, his x mark, Bad Left Hand. [SEAL.]
Bella-tonka-tonka, his x mark, Big Partisan. [SEAL.]
Mah-to-ho-honka, his x mark, Swift Bear. [SEAL.]
To-wis-ne, his x mark, Cold Place. [SEAL.]
Ish-tah-skah, his x mark, White Eyes. [SEAL.]
Ma-ta-loo-zah, his x mark, Fast Bear. [SEAL.]
As-hah-kah-nah-zhe, his x mark, Standing Elk. [SEAL.]
Can-te-te-ki-ya, his x mark, The Brave Heart. [SEAL.]

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No-wah-no-pah, his x mark, Two and Two. [SEAL.]
Tah-tonka-skah, his x mark, White Bull. [SEAL.]
Con-ra-washtu, his x mark, Pretty Coon. [SEAL.]
Ha-cah-cah-she-chah, his x mark, Bad Elk. [SEAL.]
Wa-ha-ka-zah-ish-tah, his x mark, Eye Lance. [SEAL.]
Ma-to-ha-ke-tah, his x mark, Bear that looks behind. [SEAL.]
Shunka-shaton, his x mark, Day Hawk. [SEAL.]
Tatanka-wakon, his x mark, Sacred Bull. [SEAL.]
Mapia shaton, his x mark, Hawk Cloud. [SEAL.]
Ma shun-a-ow, his x mark, Stands and Comes. [SEAL.]
Shon-ka-ton-ka, his x mark, Big Dog. [SEAL.]

Attest:

Ashton S. H. White, secretary of commission.
George B. Withs, phonographer to commission.
Geo. H. Holtzman.
John D. Howland.
James C. O'Connor.
Chas. E. Guern, interpreter.
Leon F. Pallardy, interpreter.
Nicholas Janis, interpreter.

Execution by the Ogallalah band.

Executed on the part of the Ogallalah band of Sioux by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized, at Fort Laramie, the twenty-fifth day of May, in the year A. D. 1868.

Tah-shun-ka-co-qui-pah, his x mark, Man-afraid-of-his-horses. [SEAL.]
Sha-ton-skah, his x mark, White Hawk. [SEAL.]
Sha-ton-sapah, his x mark, Black Hawk. [SEAL.]
E-ga-mon-ton-ka-sapah, his x mark, Black Tiger. [SEAL.]
Oh-wah-she-cha, his x mark, Bad Wound. [SEAL.]
Pah-gee, his x mark, Grass. [SEAL.]
Wah-non-reh-che-geh, his x mark, Ghost Heart. [SEAL.]
Con-reeh, his x mark, Crow. [SEAL.]
Oh-he-te-kah, his x mark, The Brave. [SEAL.]
Tah-ton-kah-he-yo-ta-kah, his x mark, Sitting Bull. [SEAL.]
Shon-ka-oh-wah-mon-ye, his x mark, Whirlwind Dog. [SEAL.]
Ha-hah-kah-tah-miech, his x mark, Poor Elk. [SEAL.]
Wam-bu-lee-wah-kon, his x mark, Medicine Eagle. [SEAL.]
Chon-gah-ma-he-to-hans-ka, his x mark, High Wolf. [SEAL.]
Wah-se-chun-ta-shun-kah, his x mark, American Horse. [SEAL.]
Mah-hah-mah-ha-mak-near, his x mark, Man that walks under the ground. [SEAL.]
Mah-to-tow-pah, his x mark, Four Bears. [SEAL.]
Ma-to-wee-sha-kta, his x mark, One that kills the bear. [SEAL.]
Oh-tah-kee-toka-wee-chakta, his x mark, One that kills in a hard place. [SEAL.]
Tah-ton-kah-ta-miech, his x mark, The poor Bull. [SEAL.]
Oh-huns-ee-ga-non-sken, his x mark, Mad Shade. [SEAL.]
Shah-ton-oh-nah-om-minne-ne-oh-minne, his x mark, Whirling Hawk. [SEAL.]
Mah-to-chun-ka-oh, his x mark, Bear's Back. [SEAL.]
Che-ton-wee-koh, his x mark, Fool Hawk. [SEAL.]
Wah-hoh-ke-za-ah-hah, his x mark, One that has the lance. [SEAL.]
Shon-gah-manni-toh-tan-ka-seh, his x mark, Big Wolf Foot. [SEAL.]
Eh-ton-kah, his x mark, Big Mouth. [SEAL.]
Ma-pah-che-tah, his x mark, Bad Hand. [SEAL.]
Wah-ke-yun-shah, his x mark, Red Thunder. [SEAL.]
Wak-sah, his x mark, One that Cuts Off. [SEAL.]
Cham-nom-qui-yah, his x mark, One that Presents the Pipe. [SEAL.]
Wah-ke-ke-yan-puh-tah, his x mark, Fire Thunder. [SEAL.]
Mah-to-nonk-pah-ze, his x mark, Bear with Yellow Ears. [SEAL.]
Con-ree-teh-ka, his x mark, The Little Crow. [SEAL.]
He-hup-pah-toh, his x mark, The Blue War Club. [SEAL.]
Shon-kee-toh, his x mark, The Blue Horse. [SEAL.]
Wam-Balla-oh-con-quo, his x mark, Quick Eagle. [SEAL.]
Ta-tonka-suppa, his x mark, Black Bull. [SEAL.]
Moh-to-ha-she-na, his x mark, The Bear Hide. [SEAL.]

Attest:

S. E. Ward.
Jas. C. O'Connor.
J. M. Sherwood.
W. C. Slicer.
Sam Deon.
H. M. Matthews.
Joseph Bissonette, interpreter.
Nicholas Janis, interpreter.
Lefroy Jott, interpreter.
Antoine Janis, interpreter.

Execution by the Minneconjon band.

Executed on the part of the Minneconjon band of Sioux by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized.

At Fort Laramie, D. T., May 26, '68, 13 names.

Heh-won-ge-chat, [SEAL.]
his x mark, One Horn.
Oh-pon-ah-tah-e-manne, [SEAL.]
his x mark, The Elk that bellows Walking.

At Fort Laramie, D. T., May 25, '68, 2 names.

Heh-ho-lah-reh-cha-skah,
his x mark, Young White Bull. [SEAL.]

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Wah-chah-chum-kah-coh-kee-pah, his x mark, One that is afraid of Shield. [SEAL.]
He-hon-ne-shakta, his x mark, The Old Owl. [SEAL.]
Moc-pe-a-toh, his x mark, Blue Cloud. [SEAL.]
Oh-pong-ge-le-skah, his x mark, Spotted Elk. [SEAL.]
Tah-tonk-ka-hon-ke-schne, his x mark, Slow Bull. [SEAL.]
Shonk-a-nee-shah-shah-a-tah-pe, his x mark, The Dog Chief. [SEAL.]
Ma-to-tah-ta-tonk-ka, his x mark, Bull Bear. [SEAL.]
Wom-beh-le-ton-kah, his x mark, The Big Eagle. [SEAL.]
Ma-toh-eh-schne-lah, his x mark, The Lone Bear. [SEAL.]
Mah-toh-ke-su-yah, his x mark, The One who Remembers the Bear. [SEAL.]
Ma-toh-oh-he-to-keh, his x mark, The Brave Bear. [SEAL.]
Eh-che-ma-heh, his x mark, The Runner. [SEAL.]
Ti-ki-ya, his x mark, The Hard. [SEAL.]
He-ma-za, his x mark, Iron Horn. [SEAL.]

Attest:

Jas. C. O'Connor.
Wm. H. Brown.
Nicholas Janis, interpreter.
Antoine Janis, interpreter.

Execution by the Yanctonais band.

Executed on the part of the Yanctonais band of Sioux by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized.

Mah-to-non-pah, his x mark, Two Bears. [SEAL.]
Ma-to-hna-skin-ya, his x mark, Mad Bear. [SEAL.]
He-o-pu-za, his x mark, Louzy. [SEAL.]
Ah-ke-che-tah-che-ca-dan, his x mark, Little Soldier. [SEAL.]
Mah-to-e-tan-chan, his x mark, Chief Bear. [SEAL.]
Cu-wi-h-win, his x mark, Rotten Stomach. [SEAL.]
Skun-ka-we-tko, his x mark, Fool Dog. [SEAL.]
Ish-ta-sap-pah, his x mark, Black Eye. [SEAL.]
Ih-tan-chan, his x mark, The Chief. [SEAL.]
I-a-wi-ca-ka, his x mark, The one who Tells the Truth. [SEAL.]
Ah-ke-che-tah, his x mark, The Soldier. [SEAL.]
Ta-shi-na-gi, his x mark, Yellow Robe. [SEAL.]
Nah-pe-ton-ka, his x mark, Big Hand. [SEAL.]
Chan-tee-we-kto, his x mark, Fool Heart. [SEAL.]
Hoh-gan-sah-pa, his x mark, Black Catfish. [SEAL.]
Mah-to-wah-kan, his x mark, Medicine Bear. [SEAL.]
Shun-ka-kan-sha, his x mark, Red Horse. [SEAL.]
Wan-rode, his x mark, The Eagle. [SEAL.]
Can-hpi-sa-pa, his x mark, Black Tomahawk. [SEAL.]
War-he-le-re, his x mark, Yellow Eagle. [SEAL.]
Cha-ton-che-ca, his x mark, Small Hawk, or Long Fare. [SEAL.]
Shu-ger-mon-e-too-ha-ska, his x mark, Tall Wolf. [SEAL.]
Ma-to-u-tah-kah, his x mark, Sitting Bear. [SEAL.]
Hi-ha-cah-ge-na-skene, his x mark, Mad Elk. [SEAL.]

Arapahoes:

Little Chief, his x mark. [SEAL.]
Tall Bear, his x mark. [SEAL.]
Top Man, his x mark. [SEAL.]
Neva, his x mark. [SEAL.]
The Wounded Bear, his x mark. [SEAL.]
Thirlwind, his x mark. [SEAL.]
The Fox, his x mark. [SEAL.]
The Dog Big Mouth, his x mark. [SEAL.]
Spotted Wolf, his x mark. [SEAL.]
Sorrel Horse, his x mark. [SEAL.]
Black Coal, his x mark. [SEAL.]
Big Wolf, his x mark. [SEAL.]
Knock-knee, his x mark. [SEAL.]
Black Crow, his x mark. [SEAL.]
The Lone Old Man, his x mark. [SEAL.]
Paul, his x mark. [SEAL.]
Black Bull, his x mark. [SEAL.]
Big Track, his x mark. [SEAL.]
The Foot, his x mark. [SEAL.]
Black White, his x mark. [SEAL.]
Yellow Hair, his x mark. [SEAL.]
Little Shield, his x mark. [SEAL.]
Black Bear, his x mark. [SEAL.]
Wolf Mocassin, his x mark. [SEAL.]
Big Robe, his x mark. [SEAL.]
Wolf Chief, his x mark. [SEAL.]

Witnesses:

Robt. P. McKibbin, captain, Fourth Infantry, brevet lieutenant-colonel, U. S. Army, commanding Fort Laramie.
Wm. H. Powell, brevet major, captain, Fourth Infantry.
Henry W. Patterson, captain, Fourth Infant.
Theo. E. True, second lieutenant, Fourth Infantry.
W. G. Bullock.
Chas. E. Guern, special Indian interpreter for the peace commission.

FORT LARAMIE, W. T., *Nov. 6, 1868.*

Makh-pi-ah-lu-tah, his x mark, Red Cloud. [SEAL.]
Wa-ki-ah-we-cha-shah, his x mark, Thunder Man. [SEAL.]
Ma-zah-zah-geh, his x mark, Iron Cane. [SEAL.]
Wa-umble-why-wa-ka-tuyah, his x mark, High Eagle. [SEAL.]
Ko-ke-pah, his x mark, Man Afraid. [SEAL.]
Wa-ki-ah-wa-kou-ah, his x mark, Thunder Flying Running. [SEAL.]

Witnesses:

W. McE. Dye, brevet colonel, U. S. Army, commanding.
A. B. Cain, captain, Fourth Infantry, brevet major, U. S. Army.
Robt. P. McKibbin, captain, Fourth Infantry, brevet lieutenant-colonel, U. S. Army.
Jno. Miller, captain, Fourth Infantry.
G. L. Luhn, first lieutenant, Fourth Infantry, brevet captain, U. S. Army.
H. C. Sloan, second lieutenant, Fourth Infantry.
Whittingham Cox, first lieutenant, Fourth Infantry.
A. W. Vogdes, first lieutenant, Fourth Infantry.
Butler D. Price, second lieutenant, Fourth Infantry.

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HEADQRS., FORT LARAMIE, *Nov. 6, '68.*

Executed by the above on this date.

All of the Indians are Ogallalahs excepting Thunder Man and Thunder Flying Running, who are Brulés.

Wm. McE. Dye,
Major Fourth Infantry, and Brevet-Colonel
U. S. Army, Commanding.

Attest:

Jas. C. O'Connor.
Nicholas Janis, interpreter.
Franc. La Framboise, interpreter.
P. J. De Smet, S. J., missionary among the Indians.
Saml. D. Hinman, B. D., missionary.

Execution by the Uncpapa band.

Executed on the part of the Uncpapa band of Sioux, by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized.

Co-kam-i-ya-ya, his x mark, The Man that Goes in the Middle. [SEAL.]
Ma-to-ca-wa-weksa, his x mark, Bear Rib. [SEAL.]
Ta-to-ka-in-yan-ke, his x mark, Running Antelope. [SEAL.]
Kan-gi-wa-ki-ta, his x mark, Looking Crow. [SEAL.]
A-ki-ci-ta-han-ska, his x mark, Long Soldier. [SEAL.]
Wa-ku-te-ma-ni, his x mark, The One who Shoots Walking. [SEAL.]
Un-kca-ki-ka, his x mark, The Magpie. [SEAL.]
Kan-gi-o-ta, his x mark, Plenty Crow. [SEAL.]
He-ma-za, his x mark, Iron Horn. [SEAL.]
Shun-ka-i-na-pin, his x mark, Wolf Necklace. [SEAL.]
I-we-hi-yu, his x mark, The Man who Bleeds from the Mouth. [SEAL.]
He-ha-ka-pa, his x mark, Elk Head. [SEAL.]
I-zu-za, his x mark, Grind Stone. [SEAL.]
Shun-ka-wi-tko, his x mark, Fool Dog. [SEAL.]
Ma-kpi-ya-po, his x mark, Blue Cloud. [SEAL.]
Wa-min-pi-lu-ta, his x mark, Red Eagle. [SEAL.]
Ma-to-can-te, his x mark, Bear's Heart. [SEAL.]
A-ki-ci-ta-i-tau-can, his x mark, Chief Soldier. [SEAL.]

Attest:

Jas. C. O'Connor.
Nicholas Janis, interpreter.
Franc. La Framboi[e], interpreter.
P. J. De Smet, S. J., missionary among the Indians.
Saml. D. Hinman, missionary.

By the Blackfeet band.

Executed on the part of the Blackfeet band of Sioux by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized.

Can-te-pe-ta, his x mark, Fire Heart. [SEAL.]
Wan-mdi-kte, his x mark, The One who Kills Eagle. [SEAL.]
Sho-ta, his x mark, Smoke. [SEAL.]
Wan-mdi-ma-ni, his x mark, Walking Eagle. [SEAL.]
Wa-shi-cun-ya-ta-pi, his x mark, Chief White Man. [SEAL.]
Kan-gi-i-yo-tan-ke, his x mark, Sitting Crow. [SEAL.]
Pe-ji, his x mark, The Grass. [SEAL.]
Kda-ma-ni, his x mark, The One that Rattles as he Walks. [SEAL.]
Wah-han-ka-sa-pa, his x mark, Black Shield. [SEAL.]
Can-te-non-pa, his x mark, Two Hearts. [SEAL.]

Attest:

Jas. C. O'Connor.
Nicholas Janis, interpreter.
Franc. La Framboise, interpreter.
P. J. De Smet, S. J., missionary among the Indians.
Saml. D. Hinman, missionary.

Execution by the Cutheads band.

Executed on the part of the Cutheads band of Sioux by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized.

To-ka-in-yan-ka, his x mark, The One who Goes Ahead Running. [SEAL.]
Ta-tan-ka-wa-kin-yan, his x mark, Thunder Bull. [SEAL.]
Sin-to-min-sa-pa, his x mark, All over Black. [SEAL.]
Can-i-ca, his x mark, The One who Took the Stick. [SEAL.]
Pa-tan-ka, his x mark, Big Head. [SEAL.]

Attest:

Jas. C. O'Connor.
Nicholas Janis, interpreter.
Franc. La Framboi[e], interpreter.
P. J. De Smet, S. J., missionary among the Indians.
Saml. D. Hinman, missionary.

By the Two Kettle band.

Executed on the part of the Two Kettle band of Sioux by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized.

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Ma-wa-tan-ni-han-ska, his x mark, Long Mandan. [SEAL.]
Can-kpe-du-ta, his x mark, Red War Club. [SEAL.]
Can-ka-ga, his x mark, The Log. [SEAL.]

Attest:

Jas. C. O'Connor.
Nicholas Janis, interpreter.
Franc. La Framboise, interpreter.
P. J. De Smet, S. J., missionary among the Indians.
Saml. D. Hinman, missionary to the Dakotas.

By the Sans Arch band.

Executed on the part of the Sans Arch band of Sioux by the chiefs and headmen whose names are hereto annexed, they being thereunto duly authorized.

He-na-pin-wa-ni-ca, his x mark, The One that has Neither Horn. [SEAL.]
Wa-inlu-pi-lu-ta, his x mark, Red Plume. [SEAL.]
Ci-tan-gi, his x mark, Yellow Hawk. [SEAL.]
He-na-pin-wa-ni-ca, his x mark, No Horn. [SEAL.]

Attest:

Jas. C. O'Connor.
Nicholas Janis, interpreter.
Franc. La Framboi[illegible][e], interpreter.
P. J. De Smet, S. J., missionary among the Indians.
Saml. D. Hinman, missionary.

Execution by the Santee band.

Executed on the part of the Santee band of Sioux by the chiefs and headmen whose names are hereto subscribed, they being thereunto duly authorized.

Wa-pah-shaw, his x mark, Red Ensign. [SEAL.]
Wah-koo-tay, his x mark, Shooter. [SEAL.]
Hoo-sha-sha, his x mark, Red Legs. [SEAL.]
O-wan-cha-du-ta, his x mark, Scarlet all over. [SEAL.]
Wau-mare-tan-ka, his mark x, Big Eagle. [SEAL.]
Cho-tan-ka-e-na-pe, his x mark, Flute-player. [SEAL.]
Ta-shun-ke-mo-za, his x mark, His Iron Dog. [SEAL.]

Attest:

Saml. D. Hinman, B. D., missionary.
J. N. Chickering,
Second Lieutenant, Twenty-second Infantry, brevet captain, U. S. Army.
P. J. De Smet, S. J.
Nicholas Janis, interpreter.
Franc. La Framboise, interpreter.

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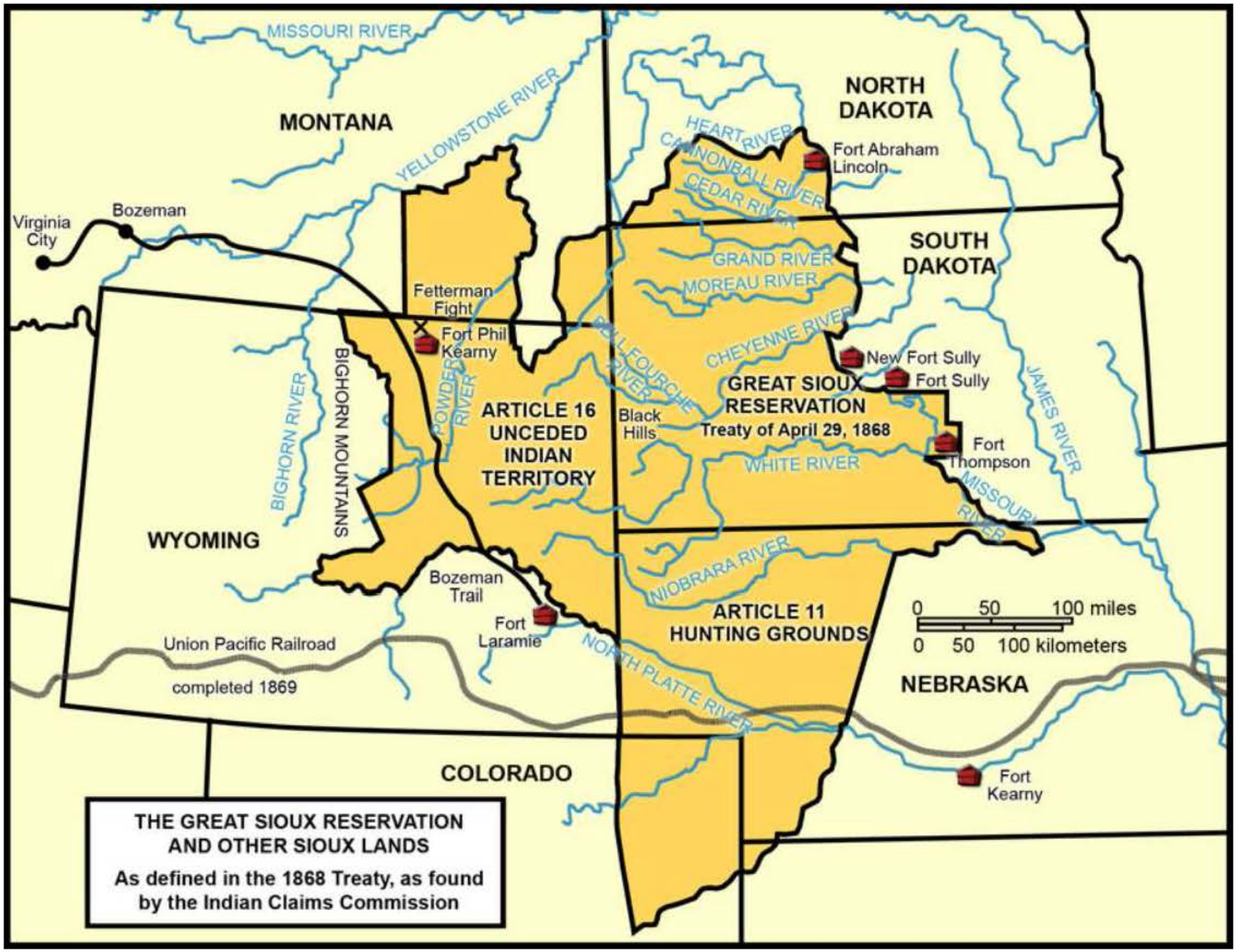


Exhibit 8004

022804

Go Forward Action Required

Prepare and deliver communication materials	Jason Veness, Stakeholder and Tribal Relations
Develop a Security Plan	Michael Nagina, Security
Provide a Map of the Work Force Camps in South Dakota	James Odom, Project Manager
Integrate planning with PGI	Lou Thompson, Manager Tribal Relations

Meeting De-Brief

Debrief participants included - Shawn Howard, James Odom, Steve Marr, Gary Duggan, Don Greenwood, Bud Andersen, Rick Perkins, Beth Jensen, Drew Duncan, Jason Veness, Lou Thompson

1. The meeting was held in Faith, SD – owing to some pressure for hosting in it in the school at Takini.
    a. Instead of exacerbate the issue we decided to more the meeting to Faith, SD
    b. A prayer was offered by tribal elders to set the tone of the meeting
2. About 40 people attended the meeting to get information on the work force camps
    a. Questions ranged from clarifications on work force camps to issues associated with the project in general
3. Opponents of the project soon began venting their concerns and it became clear that their intent was to try and raise fear in the people and intimidate TransCanada
4. Out of respect for the elders, leadership and people who were there to listen to the information on work force camps we decided to withdraw and leave the meeting instead of giving the opposition a venue to continue grandstanding.

Opportunities and Lessons learned

1. James Odom – We partially clarified issues and answered questions on workforce camps however owing to the vocal oppositions being present that message was neutralized. As well any neutrals in the crowd may have walked away from the meeting leaning towards the opposition because we gave them an opportunity to be vocal. On a related note there was no control of the room from a messaging perspective – no one to moderate the questions. A suggestion would be to have a moderated event if we chose to engage in the future.
2. James Odom/Steve Marr?– If we host an event like this in the future we would want to have overt security visible in the crowd.
3. Don Greenwood – As far as security was concerned, keeping a low profile was the best choice and we would not recommend overt security presence (previous meeting with the tribes Don mentioned that all police officers were searched and that tribal representatives tried to arrest them for bringing weapons on reservation)
4. Travis Kelley – Not sure if the information shared on workforce camps was beneficial in any measurable way. Would not endorse another meeting of this type in the future. Would recommend more structured facilitation of a meeting or town hall style event. Would have liked to have had someone watching in the crowd who could monitor the situation and pull the plug earlier.

Exhibit 8005

022805

5. Drew Duncan – This meeting was not conducive to reducing the risk of opposition in the state. In fact meetings like this raised the fear of local in the non-tribal communities and gave them reason to be non-supportive in the future. Meetings like this are not beneficial as they raise tension in the communities. We need to focus our efforts on the supporters of the project and stay away from engaging the local, vocal opponents in the community.
6. Lou Thompson – It is the TR groups responsibility for ensuring violent opposition to the project and in the community is addressed. Although the meeting was generally viewed internally as being of little benefit there are tremendous benefits from the meeting that are not immediately recognizable but still valid (listed below). The fact is TransCanada has an obligation and responsibility to tribal people to provide information to those that want it and need it. The TR team will continue to find ways to meaningfully engage tribal people in SD. Committed to including other business partners on TR planning in the future.

Benefits of the meeting – Lou and Jason

1. Identified violent opposition and their tactics
2. Clarified and corrected some of the misinformation regarding workforce camps
3. Provided factual information to the public on work force camps
4. Demonstrated that TransCanada was more than willing to increase and build upon a relationship with Tribal communities
5. Demonstrated that TransCanada would not be intimidated by an increasingly marginalized section of the tribal community in opposition to the project
6. Successfully reached out to people within the tribal community who want information on the work force camp and the project in general.
7. Opposition demonstrated they are increasingly losing ground in their community by disrespecting their own elders and leadership.

Go forward plans

1. Based on input from the Tribal Relations and Stakeholder Relations teams, the following strategy and tactical actions will continue to take place
    a. Continue to look at opportunities to influence the leadership of these communities in SD
    b. Empower PGI consulting team by supporting them with factual documentation of the project which they can communicate with tribes internally
    c. Look at opportunities to host a tour of a work force camp for tribal leadership and elders.
    d. Continue strategy of meaningful engagement and incremental success.
    e. Define opportunities for tribal participation in benefits of the project
    f. Funnel more information on TR related activities to broader internal groups
    g. Follow up with the town of Faith, SD on changes to proposed work force camps.

TransCanada
In business to deliver

July 18, 2012

TransCanada Pipelines Limited
450 - 1st Street S.W.
Calgary, Alberta, Canada T2P 5H1

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email
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Mr. Charles Long Crow
President Ideal Community
PO Box 52
Ideal, South Dakota 57541

Dear Mr. Long Crow;

We would like to thank you for inviting us to the Ideal Community Meeting on July 10, 2012. We appreciate the support for our proposal to develop a Workplan that identifies employment and economic opportunities related to the Keystone XL Pipeline. This initiative could be the foundation of a long term relationship between the Rosebud Sioux Tribe and TransCanada.

In order for us to invest into the development of the Workplan we would need verification from the community that they are willing to work with us. That verification can come in the form of a letter or a resolution.

As described at the meeting, we are prepared to commit to compensating the community for the development of the Workplan. As soon as we get verification we can begin working on this initiative. As per our discussion you indicated that at the August 7th meeting, a decision would be made to move forward with the Workplan. If this occurs we are willing to begin the process as early as August 14th.

We look forward to working with the Community of Ideal and should you have any questions, please contact me at (403) 461-6865.

With Regards,

Art Cunningham
Senior Aboriginal and Native American Policy Adviser
TransCanada Energy, Ltd.

KEYSTONE 1135

Exhibit 8006

Exhibit 8007

United States Department of State
Bureau of Oceans and International
Environmental and Scientific Affairs

Final Supplemental Environmental Impact Statement

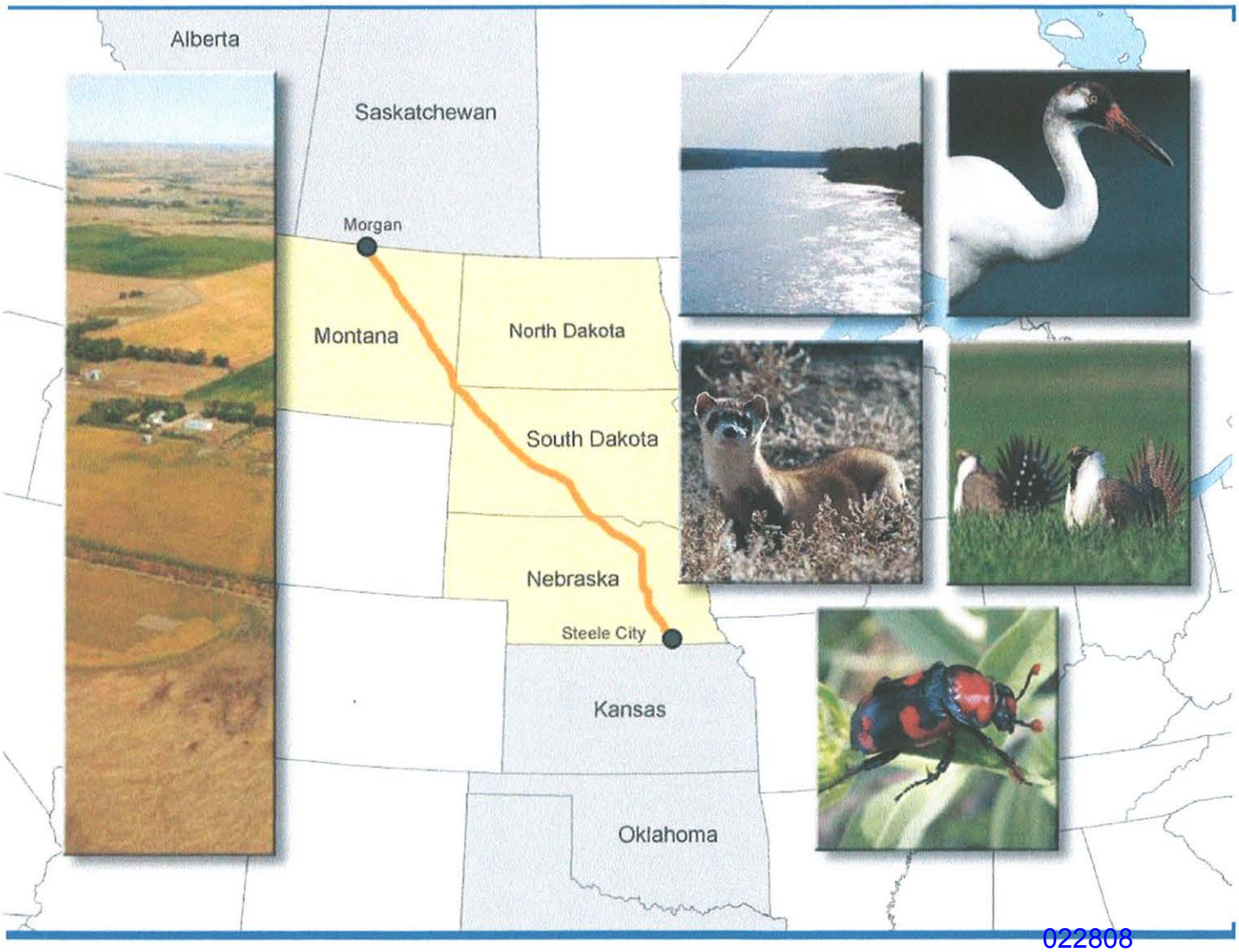
for the

Keystone XL Project

Volume V - Comments and Responses (Part 1)

January 2014

Applicant for Presidential Permit: TransCanada Keystone Pipeline, LP



PC.3.22 LEGAL AND REGULATORY REQUIREMENTS

Theme LEG 01

Theme Statement

Comments in this theme assert that the Draft Supplemental EIS is deficient because it is in violation of laws, treaties, conventions, and international agreements, such as Treaty 8, the Universal Declaration of Human Rights, Kyoto Accords, Pelly Amendment, Convention of Wetlands of International Importance, Convention of the Rights of Indigenous Peoples, the Fort Laramie Treaties and, due to the lack of action by the Canadian government to prevent impacts to the Athabasca Delta and its First Nation Peoples, the Rome Statute of the International Criminal Court.

Response

As described in Section 1.1, Background, the Final Supplemental EIS has been prepared consistent with NEPA and all other relevant laws and regulations. The scope of the NEPA evaluation is defined by the proposed Project area and those resources and receptors that may be impacted by the proposed Project, including consistency with statutes such as the ESA and NHPA, EOs on environmental justice, and other federal, state, tribal, and local laws and regulations.

Theme LEG 02

Theme Statement

Keystone has applied eminent domain to acquire private property for the GCP, and has threatened to do the same to landowners unwilling to sign easement agreements along the route of the proposed Project. It is inappropriate for a foreign corporation to use eminent domain to acquire private property in the United States.

Response

As noted in Section 2.1.7.2, Pipeline Construction Procedures, TransCanada-Keystone Pipeline, LP (Keystone) is a limited partnership organized under the laws of the state of Delaware. To construct, operate, and maintain the proposed Project, Keystone would be responsible for acquiring easement rights from landowners along the entire route in each state. Easement agreements would list the conditions to which both the landowner and Keystone agree, including financial compensation to the landowners in return for granting easements. Compensation would also be made for loss of use during construction, crop loss, loss of non-renewable or other resources, and restoration of any unavoidable damage to personal property during construction. The Department expects Keystone to negotiate fairly, honestly, and respectfully with landowners when they negotiate an easement; however, those negotiations and final agreements are private business concerns between the landowners and Keystone.

If Keystone obtains all necessary permits and approvals and an easement negotiation cannot be completed in a manner suitable to both parties, Keystone may attempt to use state eminent domain laws to obtain easements needed for pipeline construction, maintenance, and operation. State laws dictate the circumstances under which eminent domain may be used, and define the

Exhibit 8008

United States Department of State
Bureau of Oceans and International
Environmental and Scientific Affairs

Final Supplemental Environmental Impact Statement

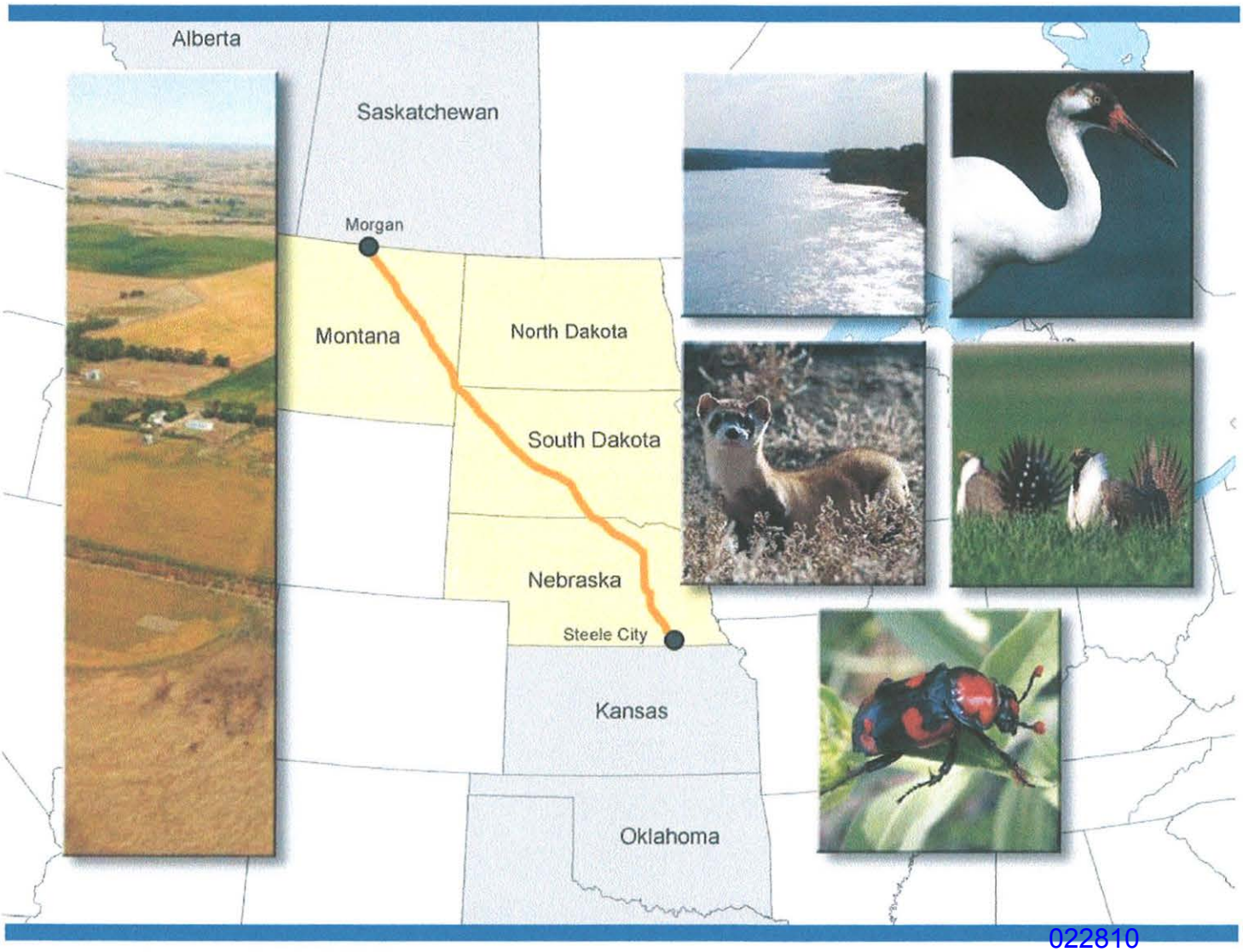
for the

Keystone XL Project

Volume III - Chapter 4

January 2014

Applicant for Presidential Permit: TransCanada Keystone Pipeline, LP



Project Name	Description	Regions Impacted	Geographic Relationship to Proposed Project
SourceGas LLC	SourceGas - Nebraska transmission system consists of approximately 5,000 miles of transmission and distribution pipeline in 57 counties across Nebraska. The system has interconnections with or laterals off the KMIGT, Pony Express, and Trailblazer pipelines.	Serves the western 2/3 of Nebraska	SourceGas pipelines within the PCIC in northwestern Holt County, Nebraska and southeastern Boone County, Nebraska.
Bakken NGL Pipeline	An approximately 600-mile long natural gas liquids (NGL) pipeline running from northeastern Montana, south to Colorado. Oneok Partners announced completion of this project in April 2013.	Montana, Wyoming, Colorado	Within the PCIC of the proposed pipeline route near Baker, Fallon County, Montana.
Ammonia Pipelines			
NuStar Pipeline	2,000 miles total, ranging from 4- to 10-inch carrying anhydrous ammonia, with a terminal at Aurora, Nebraska.	Pipeline extends through Indiana, Illinois, Missouri, Arkansas, Louisiana, and Nebraska. Specific cities impacted in Nebraska: Blair, Fremont, and Aurora	Anhydrous ammonia pipeline is within the PCIC in northwestern York County, Nebraska.
Water Delivery Systems			
Perkins County Rural Water System	Extension of Southwest Pipeline from Lake Sakakawea, North Dakota	Map of pipeline or system area not readily available; however, project is in Perkins County, South Dakota	Project route is through southwestern Perkins County, South Dakota. Water pipeline possibly within the PCIC depending on location.
Mni Wiconi Rural Water Supply System[a]	4,400 miles of pipeline through southwest and south-central South Dakota; 12- to 24-inch polyvinyl chloride water pipeline, which provides water to Pine Ridge, Rosebud, and Lower Brule Indian Reservations, along with other communities; Federally funded project; Estimated delivery volume 8,591-12,474 acre feet per year; Water source is Missouri River; Federal funding for the project ended in 2013; however, because some portions of the project remain incomplete, the Mini Wiconi Project Act Amendments of 2013 (S. 684) seek to raise the project funding ceiling and extend completion of the project to 2016	Haakon, Stanley, Jones, Lyman, Mellette, Todd, Jackson, Bennett, and Shannon counties, South Dakota. Portions of Pennington and Tripp counties, South Dakota	Mni Wiconi water pipeline possibly within the PCIC in Haakon, Jones, Lyman, and Tripp counties, South Dakota.

Project Name	Description	Regions Impacted	Geographic Relationship to Proposed Project
Bison Natural Gas Pipeline	A 302-mile-long, 30-inch-diameter pipeline with a capacity of 500 million cubic feet per day (MMcf/d); Pipeline system and related facilities that extend northeastward from the Dead Horse Region near Gillette, Wyoming, through southeastern Montana and southwestern North Dakota where the system connects with the Northern Border Pipeline system near Northern Border's Compressor Station No. 6 in Morton County, North Dakota; 407 MMcf/d capacity currently; compression (approved but not yet built) capacity will be approximately 477 MMcf/d , with potential expandability to approximately 1 bcf/d	Southwestern North Dakota, southeastern Montana, and northeastern Wyoming	The Bison pipeline intersects the PCIC in southern Fallon County, Montana.
Kinder-Morgan Interstate Gas Transmission (KMIGT)	Approximately 5,100 miles of transmission lines in Colorado, Kansas, Nebraska, Michigan, and Wyoming; The Huntsman natural gas storage facility, located in Cheyenne County, Nebraska, with approximately 10 billion cubic feet (bcf) of firm capacity commitments is also part of the system.	Transmission system comprised of west zone (central Wyoming); central zone (southeastern Wyoming, southwestern Nebraska, and northeastern Colorado); east-north zone (southern and eastern Nebraska); and east-south zone (northwestern Kansas)	KMIGT within the PCIC in the following counties: northern Fillmore County, Nebraska; central York County, Nebraska; eastern Boone County, Nebraska; eastern Antelope County, Nebraska; and northern Holt County, Nebraska.
Trailblazer Pipeline	436 miles of 36-inch pipe. Certificated capacity of 522,000 decatherms per day (Dth/day). Expansion planned: Expand Trailblazer by 324,000 Dth/day to bring total capacity to 846,000 Dth/day.	Runs generally east-west from Cheyenne, Wyoming along the Wyoming/Colorado border through southern Nebraska	Trailblazer Pipeline crosses the PCIC in southern Saline County, Nebraska.
Natural Gas Pipeline Co. of America—Amarillo Line	Total network: 10,000+ miles of pipelines, 265 bcf of working gas storage capacity. Amarillo Line (based on 2002 stats) produces 1.6 bcf/d.	Runs generally northeast to southwest from Chicago, Illinois through southern Iowa, across southeast Nebraska (at Steele City), central Kansas, western and southern Oklahoma, northwestern Texas, and southeastern New Mexico	The line is within the PCIC at Steele City, Jefferson County, Nebraska.
Central City Gas System	Natural gas pipeline system owned and operated by the city of Central City, Nebraska. 2- to 6-inch-diameter transmission line.	Serves Central City, Nebraska	Central City Gas Pipeline system is within the PCIC in southwestern Polk County, Nebraska.

022812

Project Name	Description	Regions Impacted	Geographic Relationship to Proposed Project
Magellan Pipeline	Total of 9,600 miles of refined product pipelines, including 50 terminals (four in Nebraska) and seven storage facilities.	The Magellan Pipeline system is located in the following states: North Dakota, Minnesota, South Dakota, Nebraska, Colorado, Iowa, Illinois, Missouri, Kansas, Oklahoma, Arkansas, and Texas.	Magellan Pipeline crosses the PCIC in southern York County, Nebraska.
NuStar Pipeline	Central East Region—East Refined Products Pipeline system transports refined petroleum products, including gasoline, diesel, and propane. The system includes 2,530 miles of pipelines that transport an average of 203,000 bpd and 21 distribution terminals (five in Nebraska, five in South Dakota) with a storage capacity of 4.8 million barrels.	Pipeline system runs north-south from central North Dakota to eastern South Dakota, western Iowa, eastern Nebraska, southern Nebraska, and central Kansas.	NuStar Pipeline is within the PCIC in Fillmore and York counties, Nebraska.
Natural Gas Pipelines			
Williston Basin Interstate Pipeline Company System	A 3,364-mile-long natural gas pipeline transmission system	Pipeline system runs through Montana, North Dakota, Wyoming, and South Dakota.	Portions of the Williston Basin System would be within the PCIC in Valley and Fallon counties, Montana, and Harding County, South Dakota.
Northern Border Pipeline	A 1,249-mile-long interstate natural gas pipeline with a design capacity of approximately 2.4 billion cubic feet per day (bcf/d) of gas	Pipeline runs generally northwest to southeast through Montana, North Dakota, South Dakota, Minnesota, Iowa, Illinois, and Indiana	Portions of the Northern Border Pipeline would be in the PCIC in Phillips and Valley counties, Montana, and would be near and parallel to the proposed Project for approximately 21.5 miles.
Northern Natural Gas	14,900 miles of pipeline, operational since 1930; 2- to 36-inch diameter; 2,357 receipt and delivery points	Minnesota, Wisconsin, Michigan, Iowa, South Dakota, Nebraska, Kansas, Oklahoma, Texas, and New Mexico	The Northern Natural Gas Pipeline system is within the PCIC in Jefferson and Saline counties, Nebraska.
Rockies Express West	A 713-mile-long 42-inch-diameter interstate natural gas transmission pipeline with a capacity of approximately 1.5 bcf/d. The project includes five compressor stations.	Colorado, Wyoming, southern Nebraska, northeastern Kansas, Missouri, Illinois, Indiana, and Ohio	Rockies Express West is within the PCIC in a generally west-to-east direction in the vicinity of Steele City, Nebraska.

022813

Table 4.15-1 Representative Past Projects Considered in the Cumulative Effects Assessment

Project Name	Description	Regions Impacted	Geographic Relationship to Proposed Project
Crude Oil Pipelines and Storage Facilities			
Express-Platte Pipeline System	Two pipelines: the Express has been in operation since 1997, the Platte since 1952. Approximately 1,700 miles total of crude oil pipelines that are 20 (Platte) and 24 (Express) inches in diameter.	Southeastern Alberta; central Montana; northeastern Wyoming; south-central Nebraska; northeastern Kansas; north-central Missouri	The Express-Platte system would be within the PCIC for the proposed Project near Steele City, Nebraska.
Keystone Mainline Oil Pipeline	Approximately 1,379-mile-long crude oil pipeline has a design capacity between 435,000 barrels per day (bpd) to 591,000 bpd.	Southeastern Alberta; southern Saskatchewan; southwestern Manitoba; eastern North Dakota; eastern South Dakota; eastern Nebraska; northeastern Kansas; central Missouri; central Illinois	The Keystone Mainline Oil Pipeline would be within the PCIC near Steele City, Jefferson County, Nebraska.
Keystone Cushing Extension	298-mile-long, 36-inch-diameter crude oil pipeline from Steele City, Nebraska, to Cushing, Oklahoma.	Southern Nebraska; central Kansas; central Oklahoma	The northern portion of the Cushing Extension would be within the PCIC in Steele City, Jefferson County, Nebraska.
True Company Pipelines and Crude Oil Storage Facility	A system of more than 3,400 miles of crude oil gathering and transportation pipelines, including Bridger Pipeline, LLC that owns and operates the Poplar, Little Missouri, Powder River, Butte, Belle Fourche, Four Bears, Parshall, and Bridger pipeline systems. Three collector pipelines to transport production from the north, west, and east into the Butte Pipeline near Baker are under construction. Plains All American, LP owns the Poplar Pipeline from the Canadian border to Raymond Station, Montana (6 miles south of the border).	Throughout Wyoming; eastern Montana; western and central North Dakota	Portions of the pipeline systems owned and operated by True Companies would be within the PCIC in near Baker, Fallon County, Montana.
Refined/Finished Product Pipelines			
Cenex Pipeline	Eight-inch products pipeline running from Fargo, North Dakota, at Williams Pipeline Terminal to Laurel Station at the Cenex Refinery in Montana.	Western North Dakota and eastern Montana	Within PCIC in southwestern Dawson County, Montana.

022814

ENVIRONMENTAL JUSTICE

Guidance Under the National Environmental Policy Act

Council on Environmental Quality
Executive Office of the President
Old Executive Office Building, Room 360
Washington, D.C. 20502
(202)395-5750
http://www.whitehouse.gov/CEQ/
December 10, 1997

Exhibit 8009

II.

Executive Order 12898 and the Presidential Memorandum

In addition to the general directive in Executive Order 12898 that each agency identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations,"[4] there are several provisions of the Executive Order and a number of supporting documents to which agencies should refer when identifying and addressing environmental justice concerns in the NEPA process.

First, the Executive Order itself contains particular emphasis on four issues that are pertinent to the NEPA process:

- The Executive Order requires the development of agency-specific environmental justice strategies.[5] Thus, agencies have developed and should periodically revise their strategies providing guidance concerning the types of programs, policies, and activities that may, or historically have, raised environmental justice concerns at the particular agency. These guidances may suggest possible approaches to addressing such concerns in the agency's NEPA analyses, as appropriate.

- The Executive Order recognizes the importance of research, data collection, and analysis, particularly with respect to multiple and cumulative exposures to environmental hazards for low-income populations, minority populations, and Indian tribes.[6] Thus, data on these exposure issues should be incorporated into NEPA analyses as appropriate.[7]

- The Executive Order provides for agencies to collect, maintain, and analyze information on patterns of subsistence consumption of fish, vegetation, or wildlife.[8] Where an agency action may affect fish, vegetation, or wildlife, that agency action may

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[4] Executive Order No. 12898, 59 Fed. Reg. at 7630 (Section 1-101).

[5] *Id.* at 7630 (Section 1-103).

[6] *Id.* at 7631 (Section 3-3).

[7] For further information on considering cumulative effects, see Considering Cumulative Effects Under The National Environmental Policy Act (Council on Environmental Quality, Executive Office of the President, Jan. 1997)

[8] *Id.* at 7631 (Section 4-401).

022816

also affect subsistence patterns of consumption and indicate the potential for disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, and Indian tribes.

- The Executive Order requires agencies to work to ensure effective public participation and access to information.[9] Thus, within its NEPA process and through other appropriate mechanisms, each Federal agency shall, "wherever practicable and appropriate, translate crucial public documents, notices and hearings, relating to human health or the environment for limited English speaking populations." In addition, each agency should work to "ensure that public documents, notices, and hearings relating to human health or the environment are concise, understandable, and readily accessible to the public."[10]

Second, the memorandum accompanying the Executive Order identifies four important ways to consider environmental justice under NEPA.

- Each Federal agency should analyze the environmental effects, including human health, economic, and social effects of Federal actions, including effects on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA.[11]

- Mitigation measures identified as part of an environmental assessment (EA), a finding of no significant impact (FONSI), an environmental impact statement (EIS), or a record of decision (ROD), should, whenever feasible, address significant and adverse environmental effects of proposed federal actions on minority populations, low-income populations, and Indian tribes.[12]

- Each Federal agency must provide opportunities for effective community participation in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents, and notices.[13]

- Review of NEPA compliance (such as EPA's review under § 309 of the Clean Air Act)

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[9] *Id.* at 7632 (Section 5-5).

[10] *Id.* at 7632 (Section 5-5).

[11] Memorandum from the President to the Heads of Departments and Agencies. Comprehensive Presidential Documents No. 279. (Feb. 11, 1994).

[12] *Id.*

[13] *Id.*

022817

an area potentially affected by a proposed agency action may include low-income populations, minority populations, or Indian tribes, and seek input accordingly. When the scoping process is used to develop an EIS or EA, an agency should seek input from low income populations, minority populations, or Indian tribes as early in the process as information becomes available.[26] Any such determination, as well as the basis for the determination, should be more substantively addressed in the appropriate NEPA documents and communicated as appropriate during the NEPA process.

If an agency identifies any potentially affected minority populations, low-income populations, or Indian tribes, the agency should develop a strategy for effective public involvement in the agency's determination of the scope of the NEPA analysis. Customary agency practices for notifying the public of a proposed action and subsequent scoping and public events may be enhanced through better use of local resources, community and other nongovernmental organizations, and locally targeted media.

Agencies should consider enhancing their outreach through the following means:

- Religious organizations (e.g., churches, temples, ministerial associations);
- Newspapers, radio and other media, particularly media targeted to low-income populations, minority populations, or Indian tribes;
- Civic associations;
- Minority business associations;
- Environmental and environmental justice organizations;
- Legal aid providers;
- Homeowners', tenants', and neighborhood watch groups;
- Federal, state, local, and tribal governments;
- Rural cooperatives;
- Business and trade organizations;
- Community and social service organizations;
- Universities, colleges, vocational and other schools;
- Labor organizations;
- Civil rights organizations;
- Local schools and libraries;
- Senior citizens' groups;
- Public health agencies and clinics; and
- The Internet and other electronic media.

[26] For more information on scoping, see Memorandum from Nicolas C. Yost, Scoping Guidance (Council on Environmental Quality, Executive Office of the President, April 30, 1981).

022818

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

Exhibit 8010

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&ke yword=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.

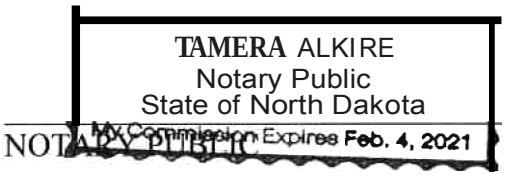


Errol Doug Crow Ghost Jr.

STATE OF NORTH DAKOTA)

SIOUX COUNTY)

SUBSCRIBED and SWORN to before me this ___ day of April, 2015.



NOTARY PUBLIC

My Commission Expires _____

CLIMATOLOGY

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Unprecedented 21st century drought risk in the American Southwest and Central Plains

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In the Southwest and Central Plains of Western North America, climate change is expected to increase drought severity in the coming decades. These regions nevertheless experienced extended Medieval-era droughts that were more persistent than any historical event, providing crucial targets in the paleoclimate record for benchmarking the severity of future drought risks. We use an empirical drought reconstruction and three soil moisture metrics from 17 state-of-the-art general circulation models to show that these models project significantly drier conditions in the later half of the 21st century compared to the 20th century and earlier paleoclimatic intervals. This desiccation is consistent across most of the models and moisture balance variables, indicating a coherent and robust drying response to warming despite the diversity of models and metrics analyzed. Notably, future drought risk will likely exceed even the driest centuries of the Medieval Climate Anomaly (1100–1300 CE) in both moderate (RCP 4.5) and high (RCP 8.5) future emissions scenarios, leading to unprecedented drought conditions during the last millennium.

INTRODUCTION

Millennial-length hydroclimate reconstructions over Western North America (*1*–*4*) feature notable periods of extensive and persistent Medieval-era droughts. Such "megadrought" events exceeded the duration of any drought observed during the historical record and had profound impacts on regional societies and ecosystems (*2*, *5*, *6*). These past droughts illustrate the relatively narrow view of hydroclimate variability captured by the observational record, even as recent extreme events (*7*–*9*) highlighted concerns that global warming may be contributing to contemporary droughts (*10*, *11*) and will amplify drought severity in the future (*11*–*15*). A comprehensive understanding of global warming and 21st century drought therefore requires placing projected hydroclimate trends within the context of drought variability over much longer time scales (*16*, *17*). This would also allow us to establish the potential risk (that is, likelihood of occurrence) of future conditions matching or exceeding the severest droughts of the last millennium.

Quantitatively comparing 21st century drought projections from general circulation models (GCMs) to the paleo-record is nevertheless a significant technical challenge. Most GCMs provide soil moisture diagnostics, but their land surface models often vary widely in terms of parameterizations and complexity (for example, soil layering and vegetation). There are few large-scale soil moisture measurements that can be easily compared to modeled soil moisture, and none for intervals longer than the satellite record. Instead, drought is typically monitored in the real world using offline models or indices that can be estimated from more widely measured data, such as temperature and precipitation.

One common metric is the Palmer Drought Severity Index (PDSI) (*18*), widely used for drought monitoring and as a target variable for proxy-based reconstructions (*1*, *2*). PDSI is a locally normalized index of soil moisture availability, calculated from the balance of moisture supply (precipitation) and demand (evapotranspiration). Because PDSI is normalized on the basis of local average moisture conditions, it can be used to compare variability and trends in drought across regions. Average moisture conditions (relative to a defined baseline) are denoted by PDSI = 0; negative PDSI values indicate drier than average conditions (droughts), and positive PDSI values indicate wetter than normal conditions (pluvials). PDSI is easily calculated from GCMs using variables from the atmosphere portion of the model (for example, precipitation, temperature, and humidity) and can be compared directly to observations. However, whereas recent work has demonstrated that PDSI is able to accurately reflect the surface moisture balance in GCMs (*19*), other studies have highlighted concerns that PDSI may overestimate 21st century drying because of its relatively simple soil moisture accounting and lack of direct CO2 effects that are expected to reduce evaporative losses (*12*, *20*, *21*). We circumvent these concerns by using a more physically based version of PDSI (*13*) (based on the Penman-Monteith potential evapotranspiration formulation) in conjunction with soil moisture from the GCMs to demonstrate robust drought responses to climate change in the Central Plains (105°W–92°W, 32°N–46°N) and the Southwest (125°W–105°W, 32°N–41°N) regions of Western North America.

RESULTS

We calculate summer season [June-July-August (JJA)] PDSI and integrated soil moisture from the surface to ~30-cm (SM-30cm) and ~2- to 3-m (SM-2m) depths from 17 GCMs (tables S1 and S2) in phase 5 of the Coupled Model Intercomparison Project (CMIP5) database (*22*). We focus our analyses and presentation on the RCP 8.5 "business-as-usual" high emissions scenario, designed to yield an approximate top-of-atmosphere radiative imbalance of +8.5 W $\vec{m}^2$ by 2100. We also conduct the same analyses for a more moderate emissions scenario (RCP 4.5).

Over the calibration interval (1931–1990), the PDSI distributions from the models are statistically indistinguishable from the North American Drought Atlas (NADA) (two-sided Kolmogorov-Smirnov test, $p \geq 0.05$), although there are some significant deviations in some models during other historical intervals. North American drought variability during the historical period in both models and observations is driven primarily by ocean-atmosphere teleconnections,

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Exhibit 8011

internal variability in the climate system that is likely to not be either consistent across models or congruent in time between the observations and models, and so such disagreements are unsurprising. In the multimodel mean, all three moisture balance metrics show markedly consistent drying during the later half of the 21st century (2050–2099) (Fig. 1; see figs. S1 to S4 for individual models). Drying in the Southwest is more severe (RCP 8.5: PDSI = −2.31, SM-30cm = −2.08, SM-2m = −2.98) than that over the Central Plains (RCP 8.5: PDSI = −1.89, SM-30cm = −1.20, SM-2m = −1.17). In both regions, the consistent cross-model drying trends are driven primarily by the forced response to increased greenhouse gas concentrations (*13*), rather than by any fundamental shift in ocean-atmosphere dynamics [indeed, there is a wide disparity across models regarding the strength and fidelity of the simulated teleconnections over North America (*23*)]. In the Southwest, this forcing manifests as both a reduction in cold season precipitation (*24*) and an increase in potential evapotranspiration (that is, evaporative demand increases in a warmer atmosphere) (*13*, *25*) acting in concert to reduce soil moisture. Even though cold season precipitation is actually expected to increase over parts of California in our Southwest region (*24*, *26*), the increase in evaporative demand is still sufficient to drive a net reduction in soil moisture. Over the Central Plains, precipitation responses during the spring and summer seasons (the main

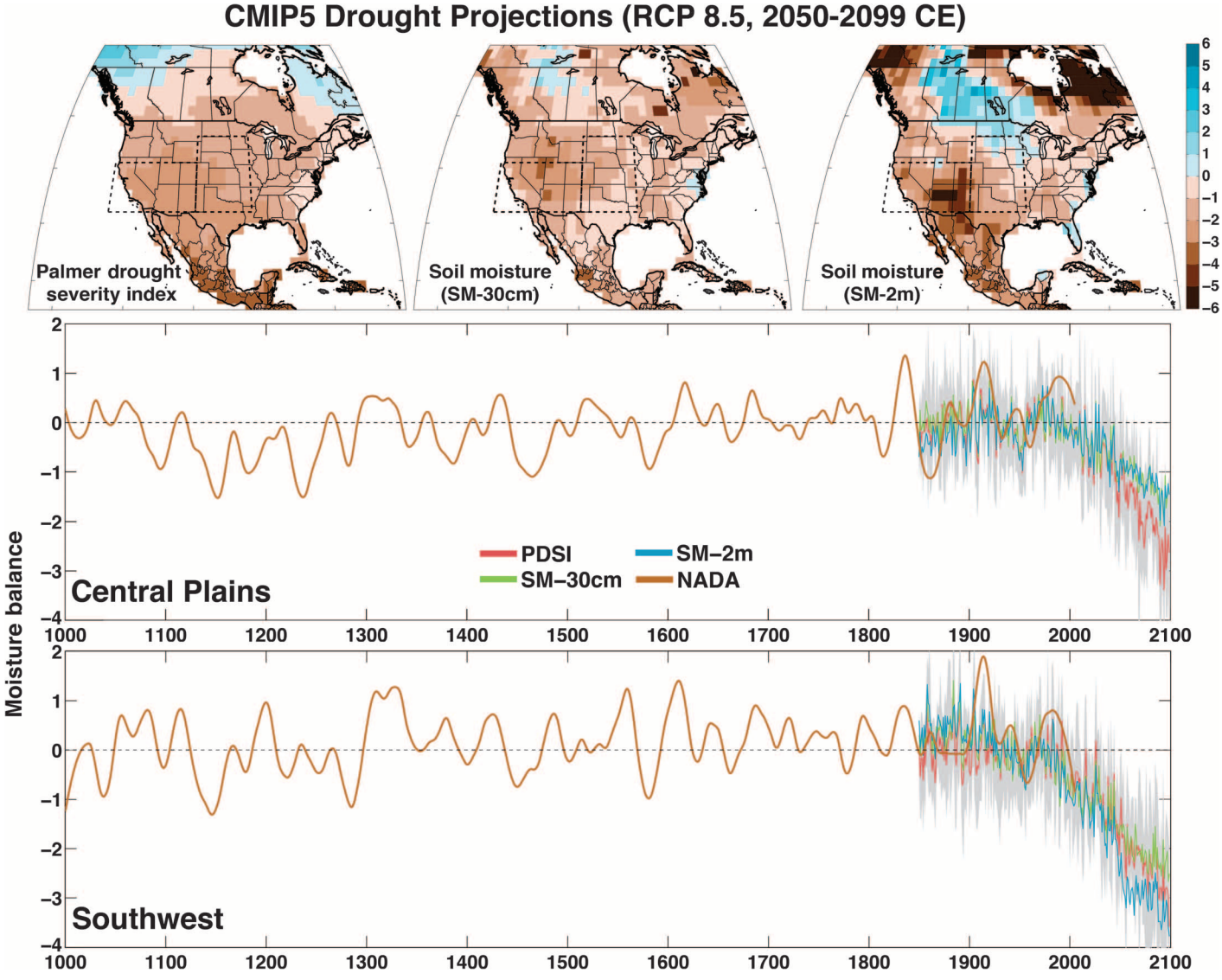


Fig. 1. Top: Multimodel mean summer (JJA) PDSI and standardized soil moisture (SM-30cm and SM-2m) over North America for 2050–2099 from 17 CMIP5 model projections using the RCP 8.5 emissions scenario. SM-30cm and SM-2m are standardized to the same mean and variance as the model PDSI over the calibration interval from the associated historical scenario (1931–1990). Dashed boxes represent the regions of interest: the Central Plains (105°W–92°W, 32°N–46°N) and the Southwest (125°W–105°W, 32°N–41°N). Bottom: Regional average time series of the summer season moisture balance metrics from the NADA and CMIP5 models. The observational NADA PDSI series (brown) is smoothed using a 50-year loess spline to emphasize the low-frequency variability in the paleo-record. Model time series (PDSI, SM-30cm, and SM-2m) are the multimodel means averaged across the 17 CMIP5 models, and the gray shaded area is the multimodel interquartile range for model PDSI.

seasons of moisture supply) are less consistent across models, and the drying is driven primarily by the increased evaporative demand. Indeed, this increase in potential evapotranspiration is one of the dominant drivers of global drought trends in the late 21st century, and previous work with the CMIP5 archive demonstrated that the increased evaporative demand is likely to be sufficient to overcome precipitation increases in many regions (*13*). In the more moderate emissions scenario (RCP 4.5), both the Southwest (RCP 4.5: PDSI = −1.49, SM-30cm = −1.63, SM-2m = −2.39) and Central Plains (RCP 4.5: PDSI = −1.21, SM-30cm = −0.89, SM-2m = −1.17) still experience significant, although more modest, drying into the future, as expected (fig. S5).

In both regions, the model-derived PDSI closely tracks the two soil moisture metrics (figs. S6 and S7), correlating significantly for most models and model intervals (figs. S8 and S9). Over the historical simulation, average model correlations (Pearson's r) between PDSI and SM-30cm are +0.86 and +0.85 for the Central Plains and Southwest, respectively. Correlations weaken very slightly for PDSI and SM-2m: +0.84 (Central Plains) and +0.83 (Southwest). The correlations remain strong into the 21st century, even as PDSI and the soil moisture variables occasionally diverge in terms of long-term trends. There is no evidence, however, for systematic differences between the PDSI and modeled soil moisture across the model ensemble. For example, whereas the PDSI trends are drier than the soil moisture condition over the Southwest in the ACCESS1-0 model, PDSI is actually less dry than the soil moisture in the MIROC-ESM and NorESM1-M simulations over the same region (fig. S7). These outlier observations, showing no consistent bias, in conjunction with the fact that the overall comparison between PDSI and modeled soil moisture is markedly consistent, provide mutually consistent support for the characterization of surface moisture balance by these metrics in the model projections.

For estimates of observed drought variability over the last millennium (1000–2005), we use data from the NADA, a tree-ring based reconstruction of JJA PDSI. Comparisons between the NADA and model moisture are shown in the bottom panels of Fig. 1. In the NADA, both the Central Plains (Fig. 2) and Southwest (Fig. 3) are drier during the Medieval megadrought interval (1100–1300 CE) than either the Little

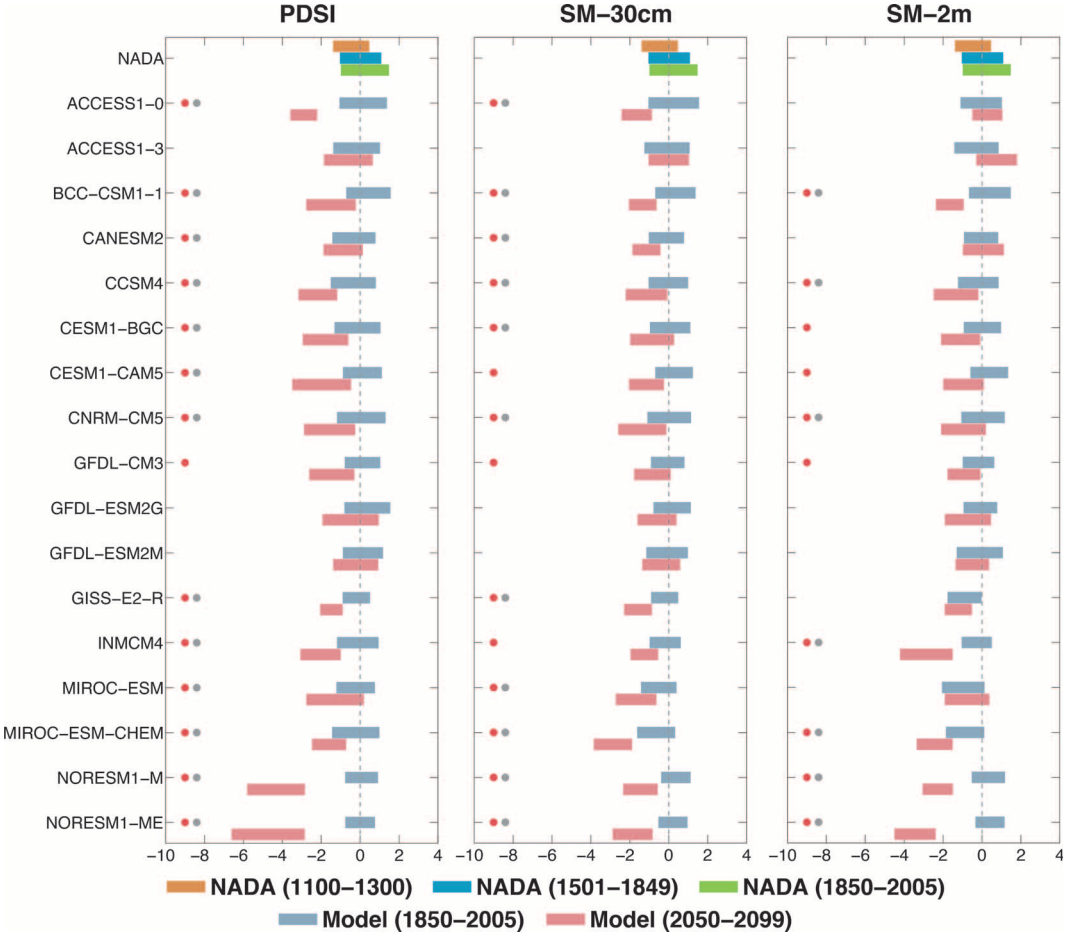


Fig. 2. Interquartile range of PDSI and soil moisture from the NADA and CMIP5 GCMs, calculated over various time intervals for the Central Plains. The groups of three stacked bars at the top of each column are from the NADA PDSI: 1100–1300 (the time of the Medieval-era megadroughts, brown), 1501–1849 (the Little Ice Age, blue), and 1850–2005 (the historical period, green). Purple and red bars are for the modeled historical period (1850–2005) and late 21st century (2050–2099) period, respectively. Red dots indicate model 21st century drought projections that are significantly drier than the model simulated historical periods. Gray dots indicate model 21st century drought projections that are significantly drier than the Medieval-era megadrought period in the NADA.

Ice Age (1501–1849) or historical periods (1850–2005). For nearly all models, the 21st century projections under the RCP 8.5 scenario reveal dramatic shifts toward drier conditions. Most models (indicated with a red dot) are significantly drier (one-sided Kolmogorov-Smirnov test, $p \leq 0.05$) in the latter part of the 21st century (2050–2099) than during their modeled historical intervals (1850–2005). Strikingly, shifts in projected drying are similarly significant in most models when measured against the driest and most extreme megadrought period of the NADA from 1100 to 1300 CE (gray dots). Results are similar for the more moderate RCP 4.5 emissions scenario (figs. S10 and S11), which still indicates widespread drying, albeit at a reduced magnitude for many models. Although there is some spread across the models and metrics, only two models project wetter conditions in RCP 8.5. In the Central Plains, SM-2m is wetter in ACCESS1-3, with little change in SM-30cm and slightly wetter conditions in PDSI. In the Southwest, CanESM2 projects markedly wetter SM-2m conditions; PDSI in the same model is slightly wetter, whereas SM-30cm is significantly drier.

When the RCP 8.5 multimodel ensemble is pooled together (Fig. 4), projected changes in the Central Plains and Southwest (2050–2099 CE) for all three moisture balance metrics are significantly drier compared to both the modern model interval (1850–2005 CE) and 1100–1300 CE in the NADA (one-sided Kolmogorov-Smirnov test, $p \leq 0.05$). In the case of SM-2m in the Southwest, the density function is somewhat flattened, with an elongated right (wet) tail. This distortion arises from the disproportionate contribution to the density function from the wetting in the five CanESM2 ensemble members. Even with this contribution, however, the SM-2m drying in the multimodel ensemble is still significant. Results are nearly identical for the pooled RCP 4.5 multimodel ensemble (fig. S12), which still indicates a significantly drier late 21st century compared to either the historical interval or Medieval megadrought period.

With this shift in the full hydroclimate distribution, the risk of decadal or multidecadal drought occurrences increases substantially. We calculated the risk (*17*) of decadal or multidecadal drought occurrences for two periods in our multimodel ensemble: 1950–2000 and 2050–2099 (Fig. 5). During the historical period, the risk of a multidecadal megadrought is quite small: <12% for both regions and all moisture metrics. Under RCP 8.5, however, there is ≥80% chance of a multidecadal drought during 2050–2099 for PDSI and SM-30cm in the Central Plains and for all three moisture metrics in the Southwest. Drought risk is reduced slightly in RCP 4.5 (fig. S13), with largest reductions in multidecadal drought risk over the Central Plains. Ultimately, the consistency of our results suggests an exceptionally high risk of a multidecadal megadrought occurring over the Central Plains and Southwest regions during the late 21st century, a level of aridity exceeding even the persistent megadroughts that characterized the Medieval era.

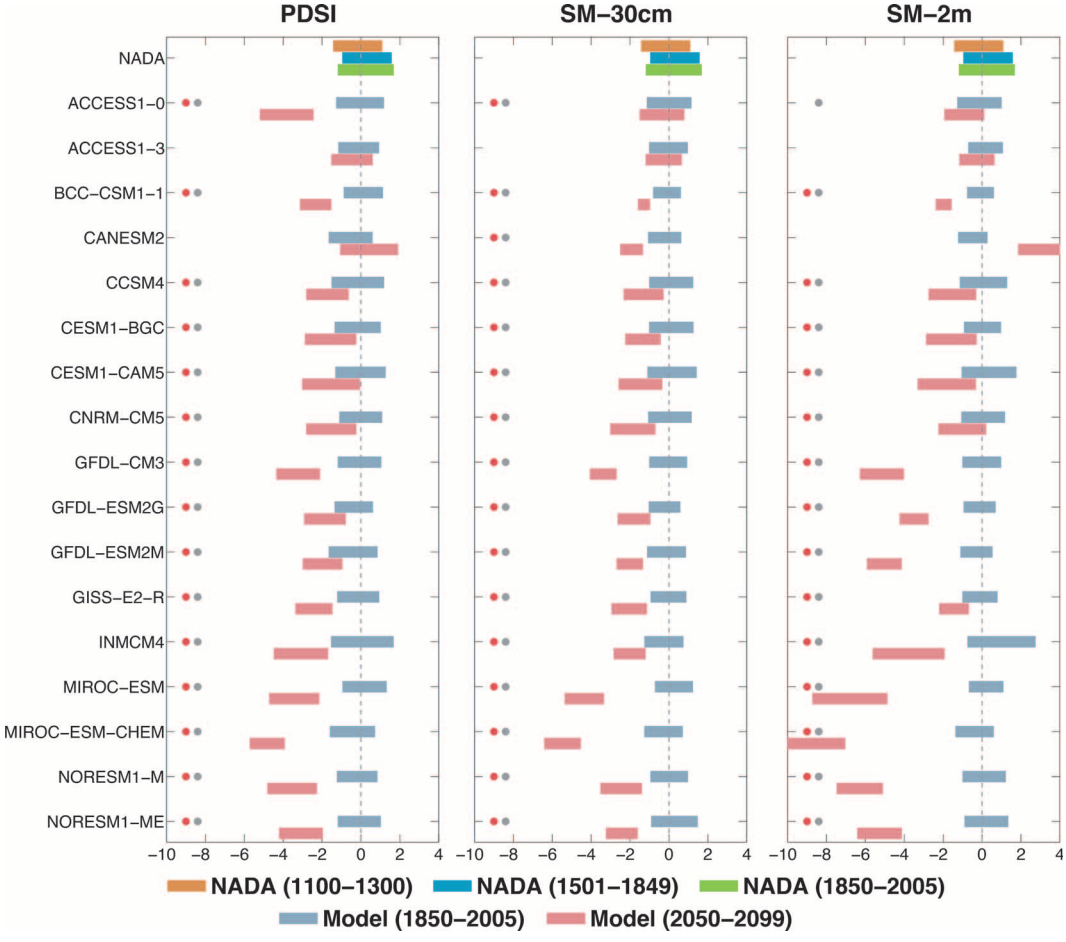


Fig. 3. Same as Fig. 2, but for the Southwest.

DISCUSSION

Within the body of literature investigating North American hydroclimate, analyses of drought variability in the historical and paleoclimate records are often separate from discussions of global warming–induced changes in future hydroclimate. This disconnection has traditionally made it difficult to place future drought projections within the context of observed and reconstructed natural hydroclimate variability. Here,

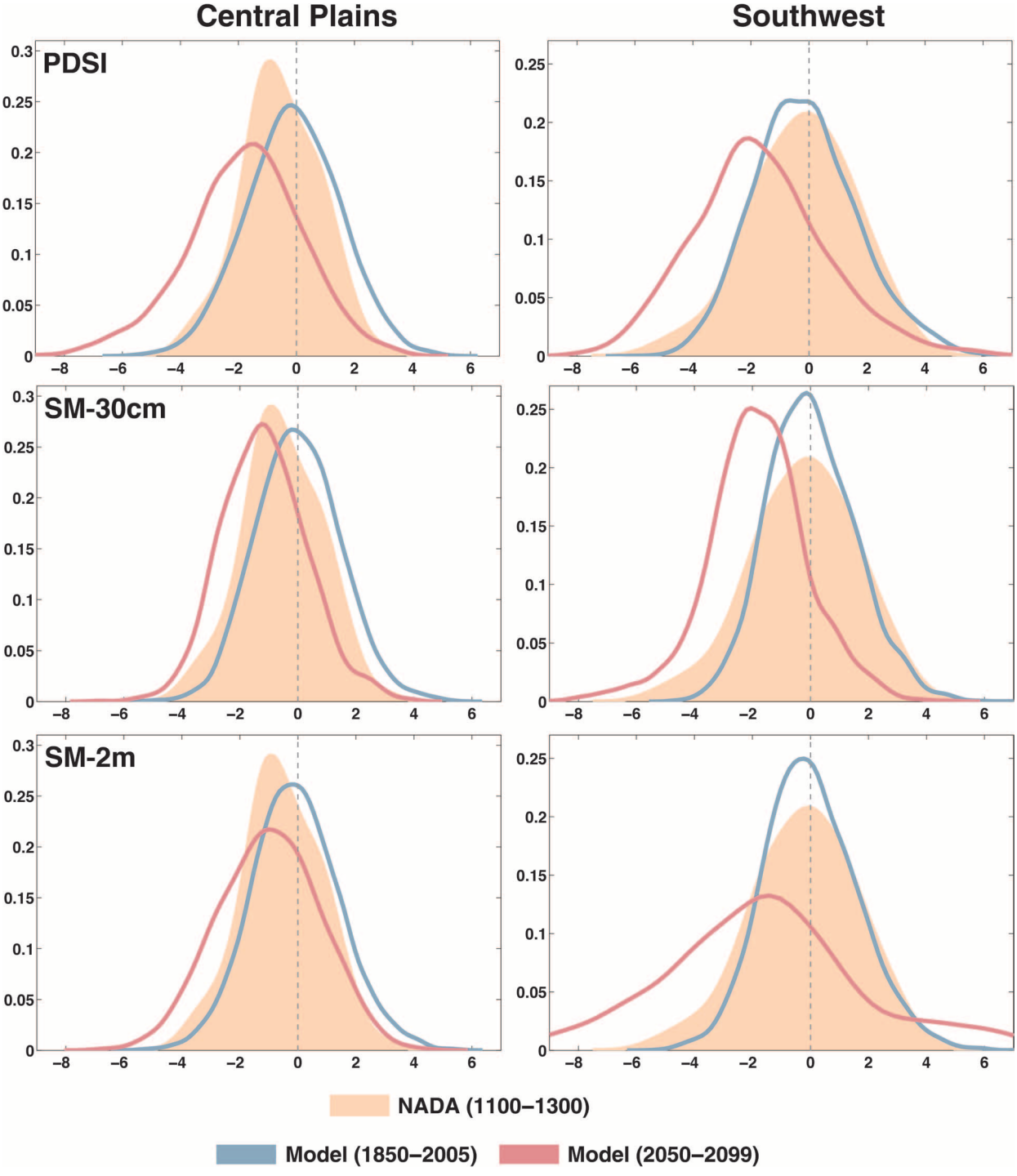


Fig. 4. Kernel density functions of PDSI, SM-30cm, and SM-2m for the Central Plains and Southwest, calculated from the NADA and the GCMs. The NADA distribution (brown shading) is from 1100–1300 CE, the timing of the medieval megadroughts. Blue lines represent model distributions calculated from all years from all models pooled over the historical scenario (1850–2005 CE). Red lines are for all model years pooled from the RCP 8.5 scenario (2050–2099 CE).

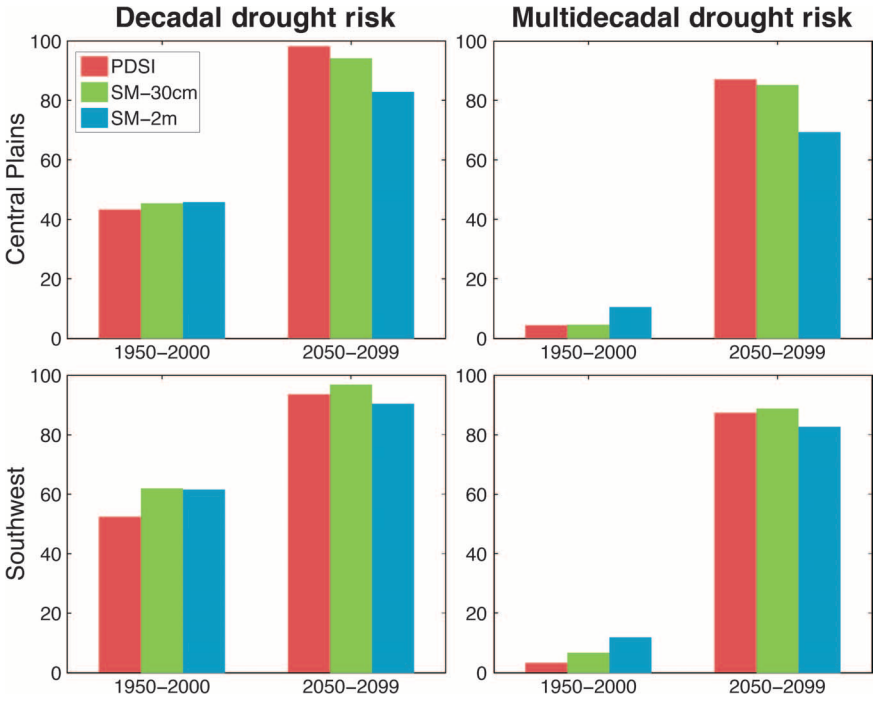


Fig. 5. Risk (percent chance of occurrence) of decadal (11-year) and multidecadal (35-year) drought, calculated from the multimodel ensemble for PDSI, SM-30cm, and SM-2m. Risk calculations are conducted for two separate model intervals: 1950–2000 (historical scenario) and 2050–2099 (RCP 8.5). Results for the Central Plains are in the top row, and those for the Southwest are in the bottom row.

we have demonstrated that the mean state of drought in the late 21st century over the Central Plains and Southwest will likely exceed even the most severe megadrought periods of the Medieval era in both high and moderate future emissions scenarios, representing an unprecedented fundamental climate shift with respect to the last millennium. Notably, the drying in our assessment is robust across models and moisture balance metrics. Our analysis thus contrasts sharply with the recent emphasis on uncertainty about drought projections for these regions (*21*, *27*), including the most recent Intergovernmental Panel on Climate Change assessment report (*28*).

Our results point to a remarkably drier future that falls far outside the contemporary experience of natural and human systems in Western North America, conditions that may present a substantial challenge to adaptation. Human populations in this region, and their associated water resources demands, have been increasing rapidly in recent decades, and these trends are expected to continue for years to come (*29*). Future droughts will occur in a significantly warmer world with higher temperatures than recent historical events, conditions that are likely to be a major added stress on both natural ecosystems (*30*) and agriculture (*31*). And, perhaps most importantly for adaptation, recent years have witnessed the widespread depletion of nonrenewable groundwater reservoirs (*32*, *33*), resources that have allowed people to mitigate the impacts of naturally occurring droughts. In some cases, these losses have even exceeded the capacity of Lake Mead and Lake Powell, the two major surface reservoirs in the region (*34*, *35*). Combined with the likelihood of a much drier future and increased demand, the loss of groundwater and higher temperatures will likely exacerbate the impacts of future droughts, presenting a major adaptation challenge for managing ecological and anthropogenic water needs in the region.

MATERIALS AND METHODS

Estimates of drought variability over the historical period and the last millennium used the latest version of the NADA (*1*), a tree ring–based reconstruction of summer season (JJA) PDSI. All statistics were based on regional PDSI averages over the Central Plains (105°W–92°W, 32°N–46°N) and the Southwest (125°W–105°W, 32°N–41°N). We restricted our analysis to 1000–2005 CE; before 1000 CE, the quality of the reconstruction in these regions declines.

The 21st century drought projections used output from GCM simulations in the CMIP5 database (*22*) (table S1). All models represent one or more continuous ensemble members from the historical (1850–2005 CE) and RCP 4.5 (15 models available) and 8.5 (17 models available) emissions scenarios (2006–2099 CE). We used the same methodology as in (*13*) to calculate model PDSI for the full interval (1850–2099 CE), using the Penman-Monteith formulation of potential evapotranspiration. The baseline period for calibrating and standardizing the model PDSI anomalies was 1931–1990 CE, the same baseline period as the NADA PDSI. Negative model PDSI values therefore indicate drier conditions than the average for 1931–1990.

To augment the model PDSI calculations and comparisons with observed drought variability in the NADA, we also calculated standardized soil moisture metrics from the GCMs for two depths: ~30 cm (SM-30cm) and ~2 to 3 m (SM-2m) (table S2). For these soil moisture metrics, the total soil moisture from the surface was integrated to these depths and averaged over JJA. At each grid cell, we then standardized SM-30cm and SM-2m to match the same mean and interannual SD for the model PDSI over 1931–1990. This allows for direct comparison of variability and trends between model PDSI and model soil moisture and between the model metrics (PDSI, SM-30cm, and SM-2m) and the NADA (PDSI) while still independently preserving any low-frequency variability or trends in the soil moisture that may be distinct from the PDSI calculation. The soil moisture standardization does not impose any artificial constraints that would force the three metrics to agree in terms of variability or future trends, allowing SM-30cm and SM-2m to be used as indicators of drought largely independent of PDSI.

Risk of decadal and multidecadal megadrought occurrence in the multimodel ensemble is estimated from 1000 Monte Carlo realizations of each moisture balance metric (PDSI, SM-30cm, and SM-2m), as in (*17*). This method entails estimating the mean and SD of a given drought index (for example, PDSI or soil moisture) over a reference period (1901–2000), then subtracting that mean and SD from the full record (1850–2100) to produce a modified z score. The differences between the reference mean and SD are then used to conduct (white noise) Monte Carlo simulations of the future (2050–2100) to emulate the statistics of that era. The fraction of Monte Carlo realizations exhibiting a decadal or multidecadal drought are then calculated from each Monte Carlo simulation of each experiment in both regions considered here. Finally, these risks from each model are averaged together to yield the overall risk estimates reported here. Additional details on the methodology can be found in (*17*).

SUPPLEMENTARY MATERIALS

Supplementary material for this article is available at http://advances.sciencemag.org

Fig. S1. For the individual models, ensemble mean soil moisture balance (PDSI, SM-30cm, and SM-2m) for 2050–2099: ACCESS1.0, ACCESS1.3, BCC-CSM1.1, and CanESM2.

Fig. S2. Same as fig. S1, but for CCSM4, CESM1-BGC, CESM-CAM5, and CNRM-CM5.

Fig. S3. Same as fig. S1, but for GFDL-CM3, GFDL-ESM2G, GFDL-ESM2M, and GISS-E2-R.

Fig. S4. Same as fig. S1, but for INMCM4.0,MIROC-ESM, MIROC-ESM-CHEM, NorESM1-M, and NorESM1-ME models.

Fig. S5. Same as Fig. 1, but for the RCP 4.5 scenario.

Fig. S6. Regional average moisture balance time series (historical + RCP 8.5) from the first ensemble member of each model over the Central Plains.

Fig. S7. Same as fig. S6, but for the Southwest.

Fig. S8. Pearson's correlation coefficients for three time intervals from the models over the Central Plains: PDSI versus SM-30cm, PDSI versus SM-2m, and SM-30cm versus SM-2m.

Fig. S9. Same as fig. S8, but for the Southwest.

Fig. S10. Same as Fig. 2, but for the RCP 4.5 scenario.

Fig. S11. Same as Fig. 3, but for the RCP 4.5 scenario.

Fig. S12. Same as Fig.4, but for the RCP 4.5 scenario.

Fig. S13. Same as Fig. 5, but for the RCP 4.5 scenario.

Table S1. Continuous model ensembles from the CMIP5 experiments (1850–2099, historical + RCP8.5 scenario) used in this analysis, including the modeling center or group that supplied the output, the number of ensemble members, and the approximate spatial resolution.

Table S2. The number of soil layers integrated for our CMIP5 soil moisture metrics (SM-30cm and SM-2m), and the approximate depth of the bottom soil layer.

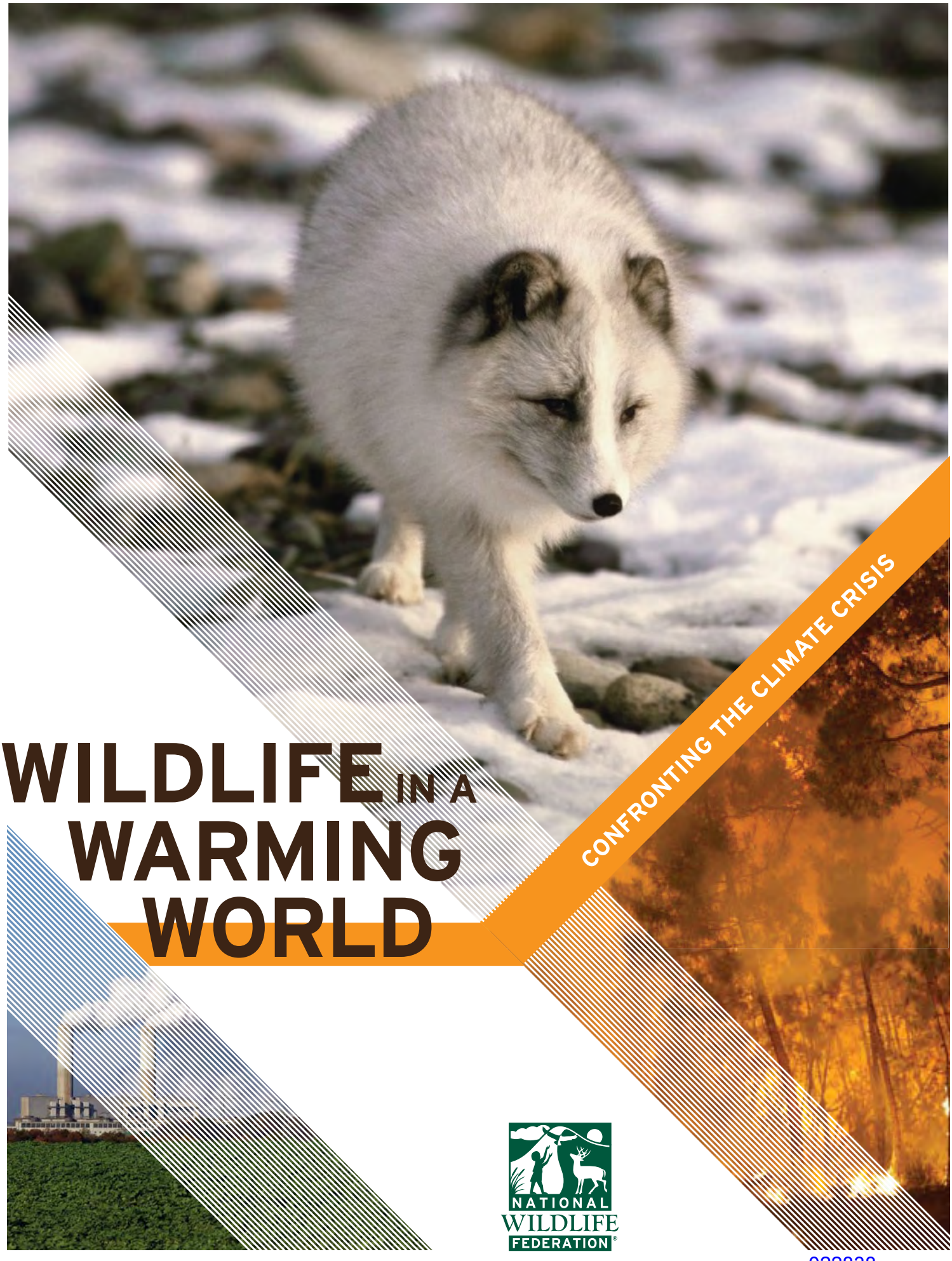
REFERENCES AND NOTES

1. E. R. Cook, R. Seager, M. A. Cane, D. W. Stahle, North American drought: Reconstructions, causes, and consequences. *Earth Sci. Rev.* **81**, 93–134 (2007).
2. E. R. Cook, R. Seager, R. R. Heim Jr., R. S. Vose, C. Herweijer, C. Woodhouse, Megadroughts in North America: Placing IPCC projections of hydroclimatic change in a long-term palaeoclimate context. *J. Quat. Sci.* **25**, 48–61 (2010).
3. D. M. Meko, C. A. Woodhouse, C. A. Baisan, T. Knight, J. J. Lukas, M. K. Hughes, M. W. Salzer, Medieval drought in the upper Colorado River Basin. *Geophys. Res. Lett.* **34**, 10705 (2007).
4. C. A. Woxodhouse, D. M. Meko, G. M. MacDonald, D. W. Stahle, E. R. Cook, A 1,200-year perspective of 21st century drought in Southwester North America. *Proc. Natl. Acad. Sci. U.S.A.* **107**, 21283–21288 (2010).
5. S. Stine, Extreme and persistent drought in California and Patagonia during mediaeval time. *Nature* **369**, 546–549 (1994).
6. C. A. Woodhouse, J. T. Overpeck, 2000 years of drought variability in the Central United States. *Bull. Am. Meteorol. Soc.* **79**, 2693–2714 (1998).
7. M. Hoerling, J. Eischeid, A. Kumar, R. Leung, A. Mariotti, K. Mo, S. Schubert, R. Seager, Causes and predictability of the 2012 Great Plains drought. *Bull. Am. Meteorol. Soc.* **95**, 269–282 (2014).
8. R. Seager, L. Goddard, J. Nakamura, N. Henderson, D. E. Lee, Dynamical causes of the 2010/11 Texas–Northern Mexico drought. *J. Hydrometeor.* **15**, 39–68 (2014).
9. H. Wang, S. Schubert, R. Koster, Y.-G. Ham, M. Suarez, On the role of SST forcing in the 2011 and 2012 extreme U.S. heat and drought: A study in contrasts. *J. Hydrometeor.* **15**, 1255–1273 (2014).
10. D. Griffin, K. J. Anchukaitis, How unusual is the 2012–2014 California drought? *Geophys. Res. Lett.* **41**, 2014GL062433 (2014).
11. R. Seager, M. Hoerling, Atmosphere and ocean origins of North American droughts. *J. Clim.* **27**, 4581–4606 (2014).
12. E. J. Burke, Understanding the sensitivity of different drought metrics to the drivers of drought under increased atmospheric CO_2. *J. Hydrometeor.* **12**, 1378–1394 (2011).
13. B. I. Cook, J. E. Smerdon, R. Seager, S. Coats, Global warming and 21st century drying. *Clim. Dyn.* **43**, 2607–2627 (2014).
14. A. Dai, Drought under global warming: A review. *WIREs Clim. Change* **2**, 45–65 (2011).
15. A. Dai, Increasing drought under global warming in observations and models. *Nat. Clim. Change* **3**, 52–58 (2013).
16. T. R. Ault, J. E. Cole, J. T. Overpeck, G. T. Pederson, S. St. George, B. Otto-Bliesner, C. A. Woodhouse, C. Deser, The continuum of hydroclimate variability in Western North America during the last millennium. *J. Clim.* **26**, 5863–5878 (2013).
17. T. R. Ault, J. E. Cole, J. T. Overpeck, G. T. Pederson, D. M. Meko, Assessing the risk of persistent drought using climate model simulations and paleoclimate data. *J. Clim.* **27**, 7529–7549 (2014).
18. W. C. Palmer, Meteorological Drought (U.S. Weather Bureau, Washington, DC, 1965).
19. J. E. Smerdon, B. I. Cook, E. R. Cook, R. Seager, J. Clim., in press.
20. E. J. Burke, S. J. Brown, Evaluating uncertainties in the projection of future drought. *J. Hydrometeor.* **9**, 292–299 (2008).
21. M. P. Hoerling, J. K. Eischeid, X.-W. Quan, H. F. Diaz, R. S. Webb, R. M. Dole, D. R. Easterling, Is a transition to semipermanent drought conditions imminent in the U.S. Great Plains? *J. Clim.* **25**, 8380–8386 (2012).
22. K. E. Taylor, R. J. Stouffer, G. A. Meehl, An overview of CMIP5 and the experiment design. *Bull. Am. Meteorol. Soc.* **93**, 485–498 (2012).
23. S. Coats, J. E. Smerdon, B. I. Cook, R. Seager, Stationarity of the tropical pacific teleconnection to North America in CMIP5/PMIP3 model simulations. *Geophys. Res. Lett.* **40**, 4927–4932 (2013).
24. R. Seager, D. Neelin, I. Simpson, H. Liu, N. Henderson, T. Shaw, Y. Kushnir, M. Ting, B. Cook, Dynamical and thermodynamical causes of large-scale changes in the hydrological cycle over North America in response to global warming. *J. Clim.* **27**, 7921–7948 (2014).
25. J. Scheff, D. M. W. Frierson, Scaling potential evapotranspiration with greenhouse warming. *J. Clim.* **27**, 1539–1558 (2013).
26. J. D. Neelin, B. Langenbrunner, J. E. Meyerson, A. Hall, N. Berg, California winter precipitation change under global warming in the Coupled Model Intercomparison Project phase 5 ensemble. *J. Clim.* **26**, 6238–6256 (2013).
27. J. Sheffield, E. F. Wood, M. L. Roderick, Little change in global drought over the past 60 years. *Nature* **491**, 435–438 (2012).
28. B. Kirtman, S. B. Power, G. J. Adedoyin, R. Boer, I. Bojariu, F. J. Camilloni, A. M. Doblas-Reyes, A. M. Fiore, M. Kimoto, G. A. Meehl, M. Prather, A. Sarr, C. Schar, R. Sutton, G. J. van Oldenborgh, G. Vecchi, H. J. Wang, Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, Cambridge, UK, and New York, NY, USA, 2013), chap. Near-term Climate Change: Projections and Predictability.
29. G. M. MacDonald, Water, climate change, and sustainability in the southwest. *Proc. Natl. Acad. Sci. U.S.A.* **107**, 21256–21262 (2010).
30. A. P. Williams, C. D. Allen, A. K. Macalady, D. Griffin, C. A. Woodhouse, D. M. Meko, T. W. Swetnam, S. A. Rauscher, R. Seager, H. D. Grissino-Mayer, J. S. Dean, Ed. R. Cook, C. Gangodagamage, M. Cai, N. G. McDowell, Temperature as a potent driver of regional forest drought stress and tree mortality. *Nat. Clim. Change* **3**, 292–297 (2013).
31. D. B. Lobell, M. J. Roberts, W. Schlenker, N. Braun, B.B. Little, R. M. Rejesus, G. L. Hammer, Greater sensitivity to drought accompanies maize yield increase in the U.S. midwest. *Science* **344**, 516–519 (2014).
32. D. Long, B. R. Scanlon, L. Longuevergne, A. Y. Sun, D. N. Fernando, H. Save, GRACE satellite monitoring of large depletion in water storage in response to the 2011 drought in Texas. *Geophys. Res. Lett.* **40**, 3395–3401 (2013).
33. B. R. Scanlon, C. C. Faunt, L. Longuevergne, R. C. Reedy, W. M. Alley, V. L. Mcguire, P. B. McMahon, Groundwater depletion and sustainability of irrigation in the US high plains and Central Valley. *Proc. Natl. Acad. Sci. U.S.A.* **109**, 9320–9325 (2012).
34. S. L. Castle, B. F. Thomas, J. T. Reager, M. Rodell, S. C. Swenson, J. S. Famiglietti, Groundwater depletion during drought threatens future water security of the Colorado River Basin. *Geophys. Res. Lett.* **41**, 5904–5911 (2014).
35. J. S. Famiglietti, M. Lo, S. L. Ho, J. Bethune, K. J. Anderson, T. H. Syed, S. C. Swenson, C. R. de Linage, M. Rodell, Satellites measure recent rates of groundwater depletion in California's Central Valley. *Geophys. Res. Lett.* **38**, L03403 (2011).

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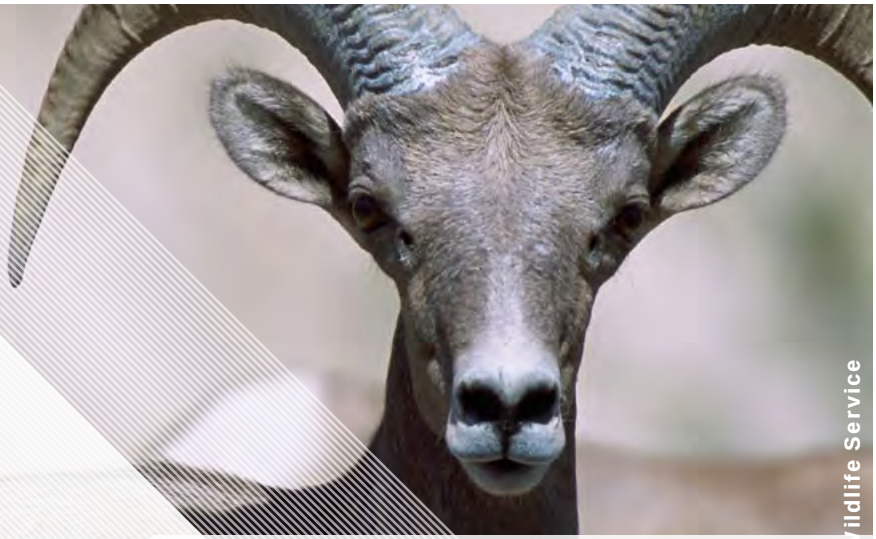


WILDLIFE IN A WARMING WORLD

CONFRONTING THE CLIMATE CRISIS

NATIONAL WILDLIFE FEDERATION®

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Ryan Hagerty, U.S. Fish and Wildlife Service

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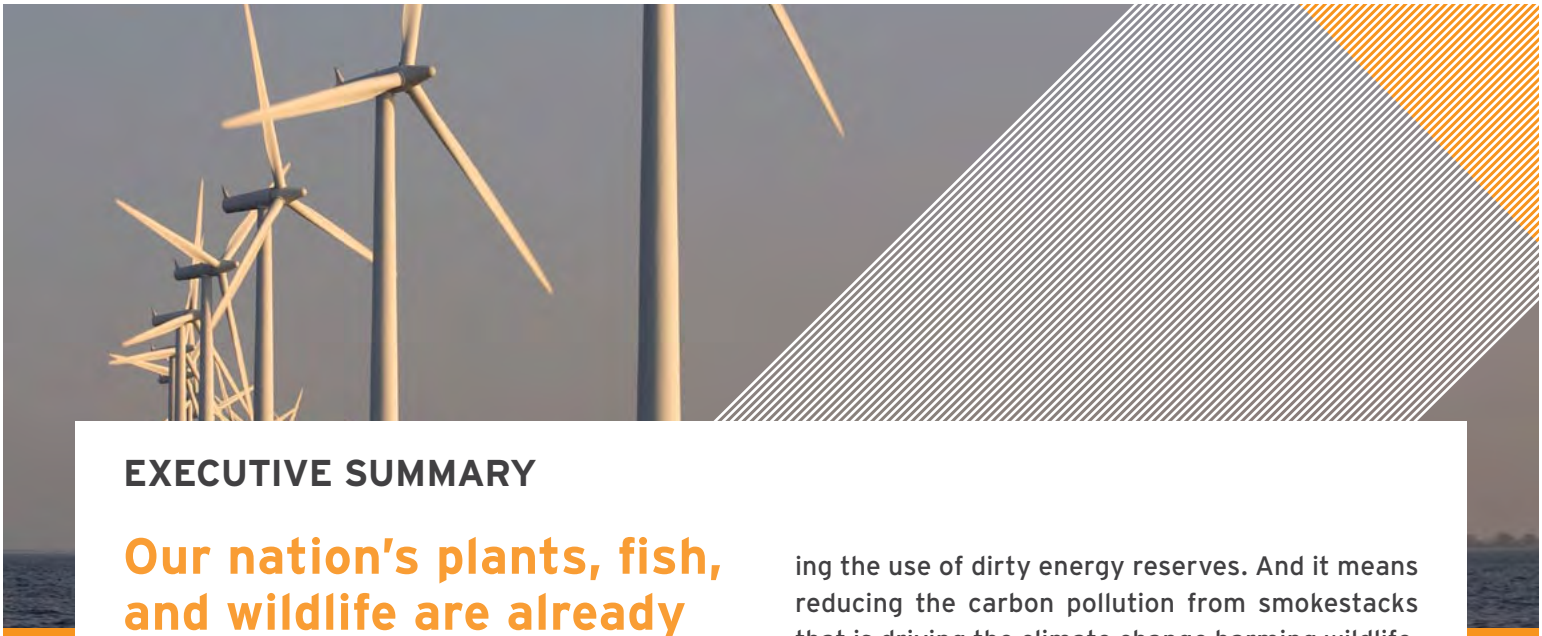
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U.S. Forest Service

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EXECUTIVE SUMMARY

Our nation's plants, fish, and wildlife are already facing a climate crisis.

Pine trees in the Rocky Mountains are being jeopardized by beetle infestations, while new forests are encroaching on the Alaskan tundra. East coast beaches and marshes are succumbing to rising seas, especially in places where development prevents their natural migration landward. Polar bears, seals, and walrus are struggling to survive in a world of dwindling sea ice, which is their required habitat. Birds and butterflies have had to shift their breeding season and the timing of their seasonal migrations. Fish are dying by the thousands during intense and lengthy droughts and heat waves. Many plant and wildlife species are shifting their entire ranges to colder locales, in many cases two- to three-times faster than scientists anticipated.

Now is the time to confront the causes of climate change.

Without significant new steps to reduce carbon pollution, our planet will warm by 7 to 11 degrees Fahrenheit by the end of the century, with devastating consequences for wildlife. America must be a leader in taking swift, significant action to reduce pollution and restore the ability of farms, forests, and other natural lands to absorb and store carbon. This means rapidly deploying clean, renewable energy sources, such as wind, solar, geothermal and sustainable bioenergy, while curbing the use of dirty energy reserves. And it means reducing the carbon pollution from smokestacks that is driving the climate change harming wildlife.

Wildlife conservation requires preparing for and managing climate change impacts.

Because of the warming already underway and the time it will take to transform our energy systems, we will be unable to avoid many of the impacts of climate change. Our approaches to wildlife conservation and natural resource management need to account for the new challenges posed by climate change. We must embrace forward-looking goals, take steps to make our ecosystems more resilient, and ensure that species are able to shift ranges in response to changing conditions. At the same time, we need to protect our communities from climate-fueled weather extremes by making smarter development investments, especially those that employ the natural benefits of resilient ecosystems.

Only by confronting the climate crisis can we sustain our conservation legacy.

The challenges that climate change poses for wildlife and people are daunting. Fortunately, we know what's causing these changes and we know what needs to be done to chart a better course for the future. As we begin to see whole ecosystems transform before our very eyes, it is clear that we have no time to waste.

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A NEW PLAYING FIELD: HOW CLIMATE CHANGE AFFECTS NATURE

Climate change is the biggest threat wildlife will face this century. Wildlife species are already contending with numerous threats, such as major habitat losses, overharvesting of fish and timber, pollution, and invasive species. However, climate change has the potential to alter the playing field itself, leading to significant shifts in the species and habitats that we know today. The underlying climatic conditions to which species have been accustomed for thousands of years are rapidly changing, and we are already witnessing the impacts.

Species and Habitats Are Shifting Location

Climate change is already causing many species to shift to new locations, often at faster rates than scientists previously expected.[1] As temperatures have increased, land-based plants and animals have been moving further north and to higher elevations. For example, 177 of 305 species of birds tracked in North America have expanded their range northward by 35 miles on average during the past four decades.[2] Fourteen species of small mammals in the Sierra Nevada region extended their ranges up in elevation by about 1,640 feet during the past century.[3] Other terrestrial species have been shifting their ranges in response to changes in water availability, rather than temperature.[4] And marine species appear to be shifting ranges even faster.[5]

Not only are individual species relocating, but in some instances major ecological communities are shifting. Forests are moving northward into the Alaskan tundra[6] and upward into the alpine tundra of the Sierra Nevada in California.[7] Broadleaf forests are edging out conifers in Vermont's Green Mountains.[8] In other places, new climate conditions have favored colonization by a new suite of species after wildfires or storms.[9]


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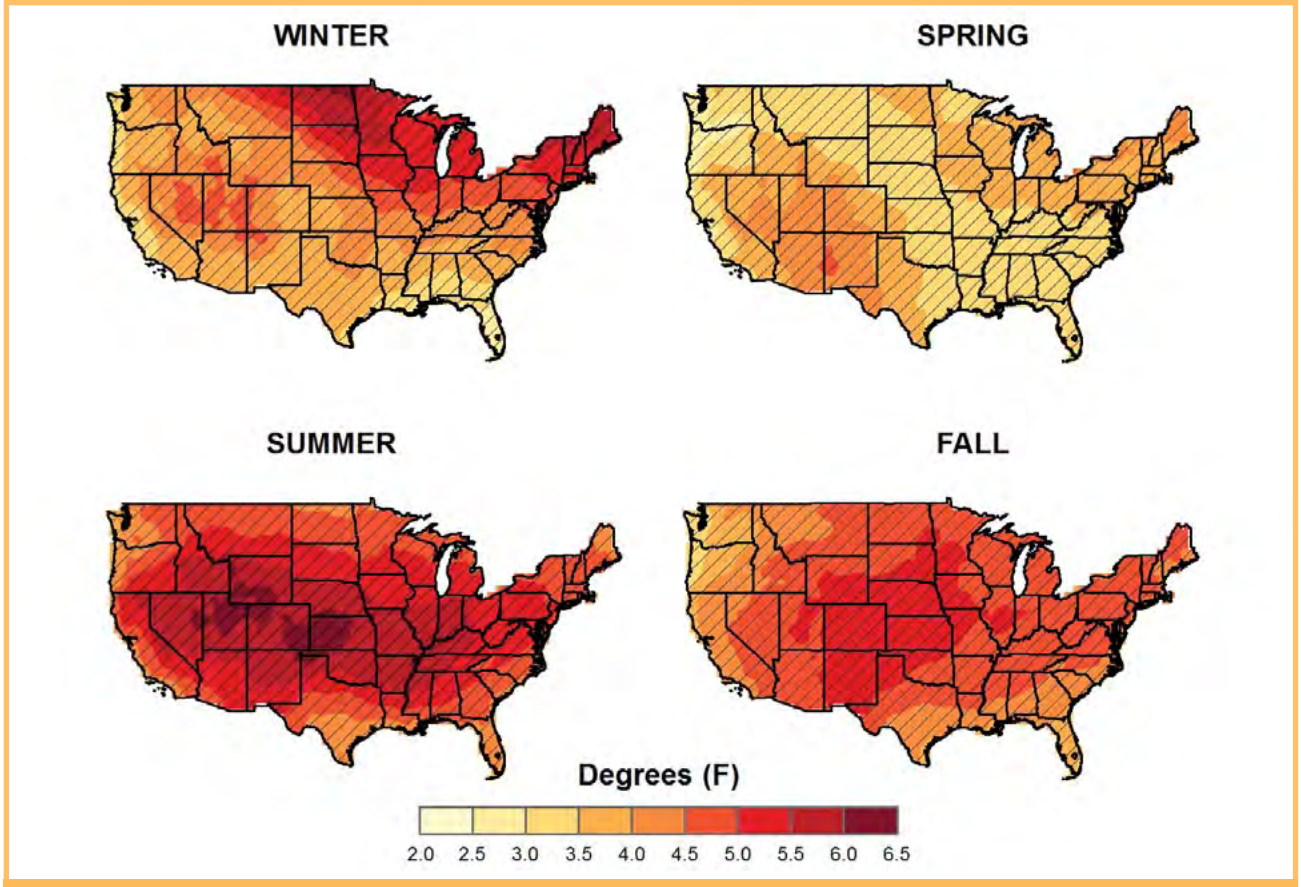
Climate change is the primary driving force of these transitions, which are occurring much faster than they did just a century ago. In parts of Alaska, California, the Midwest, and the Southwest, climate factors associated with species' ranges moved by an average of 12 miles per year since 1990,[10] much more than the average 20th century range shift of about 0.4 miles per year observed for terrestrial plants and animals in North America.[11] Continued climate change this century is projected to cause biome shifts for about 5 to 20 percent of North America.[12]

Missed Connections and New Species Interactions

As climate change alters the playing field, plants, fish, and wildlife face new situations, with sometimes surprising outcomes. Individual species respond differently to changes in the timing of seasons or the frequency of extremes, which can create mismatches between animals and their food sources. At the same time, the ranges of some species are shifting at different rates, creating interactions among species that previously did not coexist. All these shifts will create winners and losers, but ecologists expect that climate change will bring an overall decline in biodiversity.[13]

The earlier arrival of spring has many consequences for nature. For example, as springs in Alaska have become warmer, plants are emerging earlier. As a result, food sources are more limited at the times when caribou are breeding and caribou reproduction has suffered.[14] In Lake Washington near Seattle, warming has caused algal blooms to occur as much as 27 days earlier. However, the tiny water fleas that consume the algae have not responded to warming in the same way, and popula-

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If carbon pollution emissions continue to increase rapidly, all areas of the United States will warm, with the biggest effect in the middle of the country during summer. These maps show the average temperature increases simulated by climate models for 2041-2070 compared to 1971-2000. The warming will mean fewer extremely cold days and more extremely hot days. Source: NOAA NESDIS (2013): Regional Climate Trends and Scenarios for the U.S. National Climate Assessment.

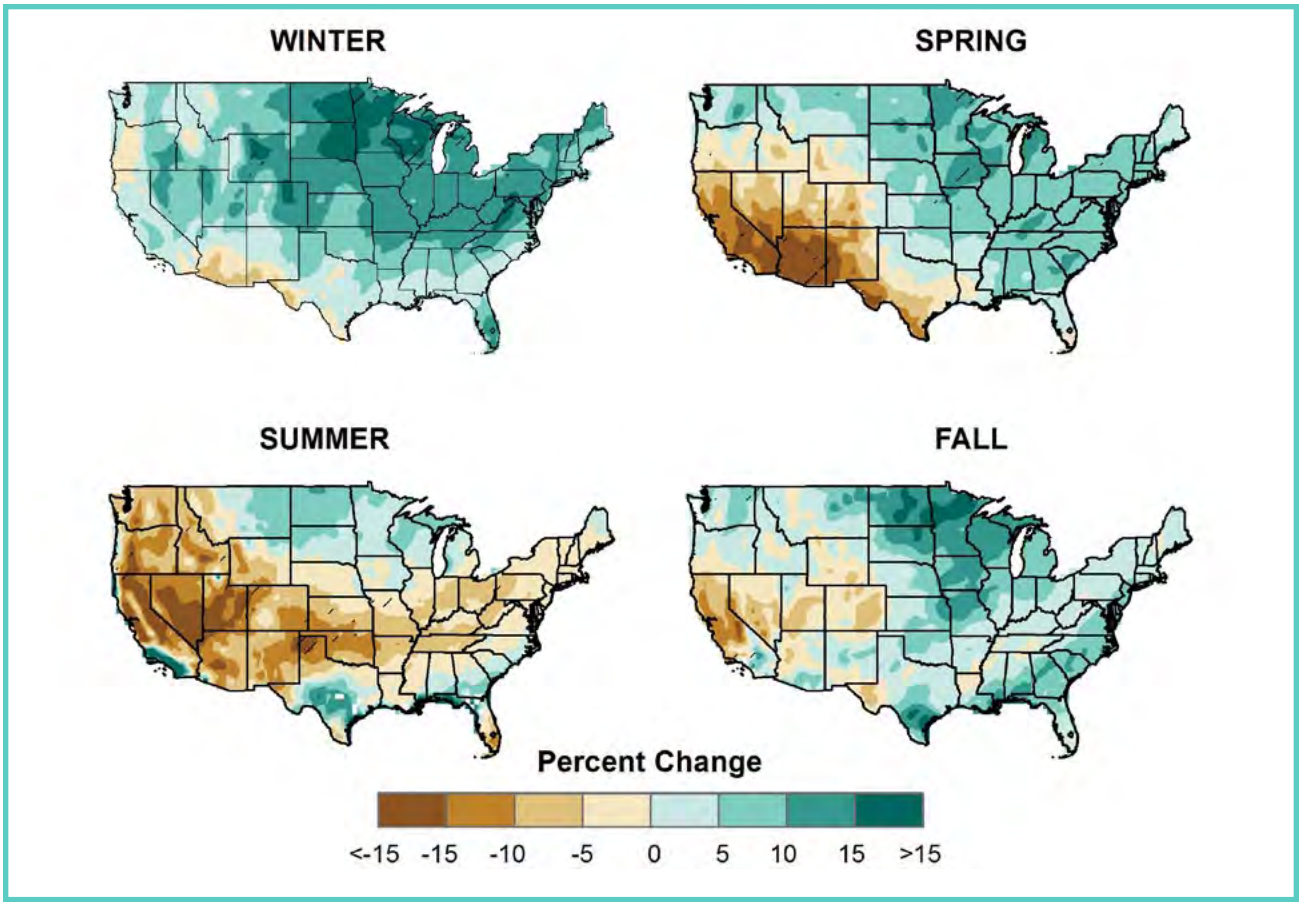
tions have declined due to limited food being available when they need it.[15] In some cases, the earlier spring can help certain wildlife species, as is the case for the yellow-bellied marmot in Colorado. Warmer springs have enabled these animals to emerge from hibernation and give birth earlier, allowing more time for the offspring to grow before hibernating, ultimately leading to increases in the marmot population.[16]

Shifting ranges for pests and disease-causing pathogens may have some of the most devastating impacts for wildlife and habitats. For example, warming ocean waters have enabled the outbreak of microbial disease in reef-building corals[17] and pathogens of the eastern oyster.[18] Mountain pine beetle outbreaks decimated trees on more than 26.8 million acres in western North America from 1997-2010.[19]

Species Are Being Pushed Toward Extinction

Unfortunately, some species have nowhere to go. For example, species found at high elevations or near the poles are already living at the edge of their climate tolerance, and thus are particularly vulnerable to increasing temperature. Other species may have no easy way to move to a more suitable location, perhaps because of natural geography or human-caused barriers, like cities, large agricultural areas, highways or dams.

Already there is evidence that climate change is causing declines in species populations and localized extinctions.[20] For example, local extinctions of desert bighorn sheep populations in California are strongly correlated with climate conditions, especially declines in



While climate change is expected to bring more precipitation on average to the northern and eastern parts of the nation, areas in the southwest are likely to get less precipitation, especially in spring and summer. These maps show the average change in precipitation projected for 2041-2070 compared to 1971-2000 if carbon pollution emissions continue to increase rapidly. Source: NOAA NESDIS (2013).

precipitation that reduce food availability.[21] Four species of amphibians in Yellowstone have experienced significant population declines due to pond drying.[22] The extinction of two populations of checkerspot butterfly, native to grasslands in the San Francisco Bay area, was hastened by increasing variability in precipitation.[23]

Overall, climate change is expected to cause widespread losses in global biodiversity.[24] Exactly how many species go extinct will depend on how much the planet warms during the coming decades, with much higher extinction rates projected for higher temperature increases.[25]

Changes in Winter Driving Year-Round Impacts

Even small changes in winter temperature or precipitation can have marked impacts on ecosystems. Most notably, pests and the pathogens that cause diseases are increasingly able to survive and thrive during the winter, which allows their populations to explode. Longer growing seasons and warmer winters are enhancing bark beetle outbreaks,[26] increasing tree mortality and the likelihood of intense and extensive fires.[27]

Declining snow cover is leaving soils without their normal insulation, leading to colder and more frozen soils. This has been shown to lead to increased root mortality, decreased decomposition, and significant losses of nutrients to runoff.[28] A question remains about how much warming of the atmosphere and reduced reflection of sunlight (due to less snow) might counteract these effects.[29]

Dwindling snowpack accumulation in mountain areas is creating greater risks of winter and springtime floods,

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Lacking sea ice, walrus are forced to rest on beaches.

and depriving downstream areas of valuable snowmelt runoff during the summer and fall. These shifts in the seasonal cycle of stream flow present significant challenges for managing water supply for human consumption and agriculture, in addition to the stresses they put on fish and wildlife. For example, in California's Central Valley, strong winter floods can wash away the gravel beds used by salmon, trout, and steelhead for laying their eggs. Low summer flows when juveniles are growing and traveling downstream are associated with poor survival and return rates.[30] Furthermore, their development, migration timing, and navigation can be disrupted by changes in water flow.[31]

More Severe Droughts and Heavy Rainfall Events Are Stressing Wildlife

Extreme conditions are likely to have some of the biggest impacts on wildlife in the coming decades simply because floods, droughts, frosts, and winter thaws are the sorts of events that exceed normal tolerance levels, directly killing organisms or altering their competitive balance. At the same time, changes in disturbance regimes—often driven by floods, wildfires, and hurricanes—can strongly influence ecosystem functioning. For example, invasive species can take hold when extreme events degrade native habitats.[32] Ecosystems are adapted to historical patterns of disturbances, but changing the climate conditions will drive longer, more frequent and more severe disturbances, with expected major ripple effects on ecosystems.

Many streams and rivers in the Midwest, New England, Mid-Atlantic and south-central United States have experienced increases in stream flow since the 1990s, while some in the Northwest, Southwest, and Southeast have decreased. Changes in precipitation are the most important driver of these changes.[33] One major consequence of increases in heavy precipitation events is the excessive runoff of nutrients from agricultural lands and terrestrial ecosystems, exacerbating harmful algae blooms and dead zones in lakes and rivers. Terrestrial systems in the Northeast,[34] California,[35] and along the Mississippi River[36] have already experienced increased nutrient losses associated with increasing precipitation. Likewise, extreme precipitation events can transport large amounts of sediment downstream, significantly modifying riverbeds and coastal wetlands.[37]

Intensification of the hydrologic cycle is also linked to changes in the width, depth, and velocity of water in streams, as well as the seasonal and year-to-year patterns of high and low stream flow. These changes are altering food-webs and species composition in United States streams and rivers.[38] For example, after a period of extremely low flow in an Arizona desert stream, some small invertebrate species were completely lost while others became more abundant.[39]

What It All Means for Conservation

As the climate continues to change, plants, wildlife, and fish will attempt to do what they normally would under conditions that are far from normal. Whereas human populations can anticipate events and take steps to shield themselves from the impacts, wildlife cannot plan ahead for climate change. This makes our efforts to safeguard wildlife both crucial and much more challenging. We must reduce carbon pollution to limit the extent of impacts, and we must revise and intensify our conservation practices to minimize and avoid climate impacts when possible, and manage climate impacts when unavoidable.

In this report, we examine the challenges faced by wildlife in eight regions spanning the United States. From unprecedented pest outbreaks and catastrophic wildfires in Western pine forests to rapid loss of the sea ice that polar bears, walrus, and seals need to reach their food sources, nature is contending with new challenges.

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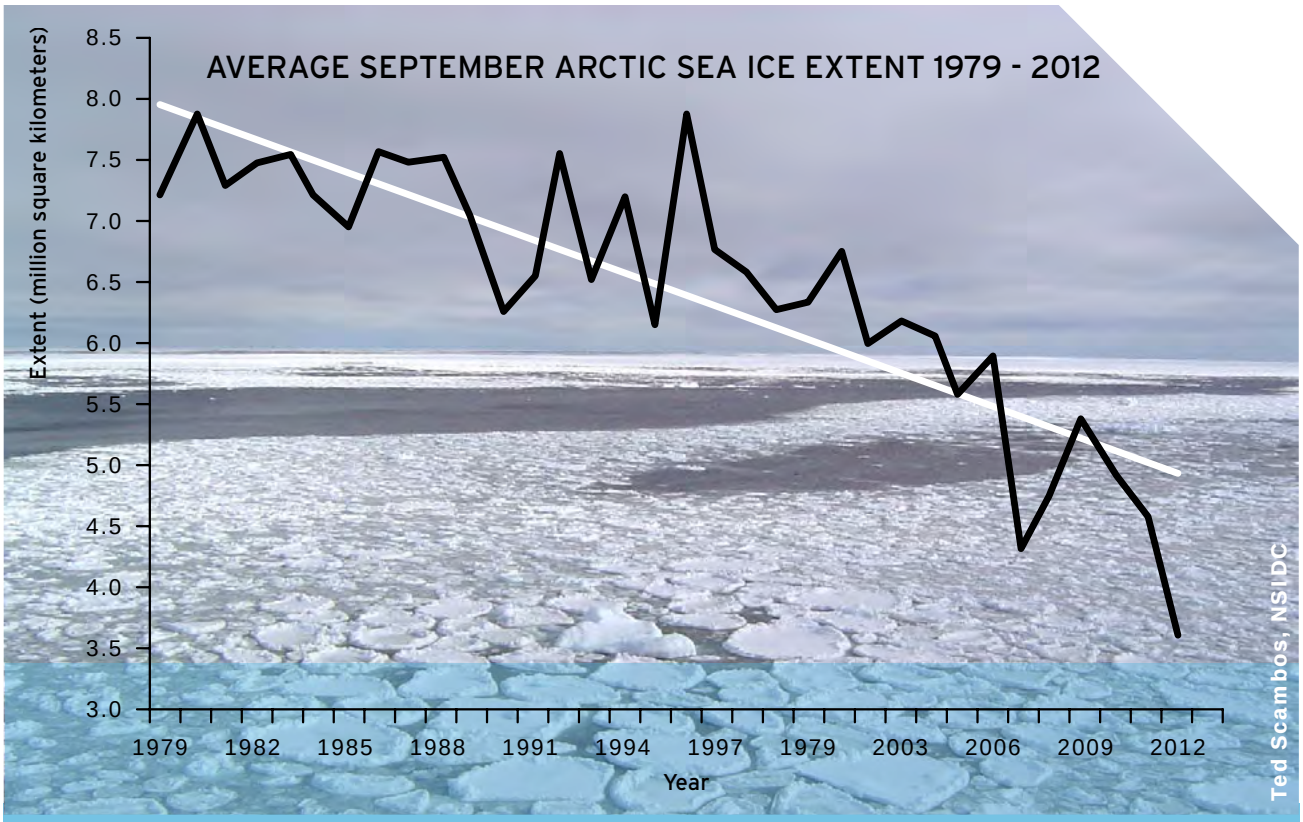
THE ARCTIC:
WILDLIFE FACING RAPID CHANGES

The climate is changing especially fast in the Arctic, and its species and ecosystems are scrambling to keep up. As predicted by climate models, Alaska has warmed about twice as much as the contiguous United States.[40] With so much of the Arctic landscape dominated by snow and ice, this warming is having a big effect on the landscape and seascape. More temperate habitats are encroaching northward, while uniquely polar habitats—like the sea ice that polar bears, seals, and walrus require to hunt—are shrinking fast.

Melting Sea Ice Means Lost Habitat

Perhaps the most dramatic indicator of the changing climate is the dwindling extent of Arctic sea ice, especially when sea ice reaches its annual minimum in September. In 2012, Arctic sea ice reached the smallest extent observed since satellite measurements began in 1979. The extent of sea ice observed in 2012 was 49 percent smaller than the average observed in the 1980s and 1990s.[41] This decline happened much faster than scientists anticipated.[42]

Not only is the sea-ice area much reduced, but its thickness and age have also markedly declined. The amount of sea ice that is at least 5 years old is only a fraction of what it was in the 1980s and 1990s.[43] The problem with this is that polar bears rely upon older, thicker nearshore ice as a platform for hunting seals. [44] Without it,



Arctic sea ice extent has been rapidly declining during the last three decades, reaching an all-time low in September 2012. Source: National Snow and Ice Data Center.

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Susanne Miller, U.S. Fish and Wildlife Service

polar bears must resort to offshore sea ice. But, the increasing distance between land and the offshore sea ice creates a perilously long swim—some as long as 12 excruciating days—that can result in drowning of both adults and their cubs. Scientists are projecting that the Arctic Ocean will have late-summer stretches where it is ice free by the middle of the century, if not sooner.[45]

This sea-ice loss is having profound impacts on the ecosystems it supports, from the sea-ice algae at the base of the food chain to top-level predators such as polar bears, walrus, and seals. As the extent of sea ice has declined, most markedly in the southern portions of their range, so has polar bear body size, reproductive success, and survival of cubs.[46] The same pattern is beginning to be seen in more northern populations. Polar bears have more frequently been denning on land due to the lack of old, stable ice.[47] The grave threats posed by climate change to the critical ice habitat of polar bears led the U.S. Fish and Wildlife Service to designate the polar bear as a threatened species under the Endangered Species Act in 2008.[48]

During summer, walrus typically use the sea-ice platform as a place to raise their young with easy access to food sources. In recent years, however, walrus have been forced to haul out onto coastal beaches, creating dramatic scenes involving thousands of walrus huddled together. Their prey of clams quickly becomes depleted in the vicinity of their alternative haul-outs on shore. These haul-outs can turn deadly when walrus are spooked, causing a massive stampede for the safety of water. About 130 mostly young walrus were crushed to death in just this sort of situation in 2009 at Icy Cape in northwest Alaska.[49]

Rapid Changes on Land Too

Land-based plants and animals are also contending with rapid climate change in the Arctic. Trees and shrubs are shifting northward, modifying the ecosystem dynamics of the Arctic tundra and the species of wildlife than can survive there.[50] Meanwhile, spring is arriving 2 to 3 weeks earlier than it did just a decade ago.[51] The earlier flowering of plants and emergence of invertebrates can create mismatches with animals and their food sources, or plants and their pollinators.

More temperate species are moving northward, sometimes imperiling species adapted to the cold and snowy conditions typical of the past. For example, arctic fox live in the tundra, building underground

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dens and feasting primarily on lemmings and voles. The habitat available for these animals is being lost as warming allows for trees and other plants to colonize the tundra. At the same time, red foxes are venturing further north.[52] With better hunting skills, red foxes can outcompete, and sometimes even kill arctic foxes.[53]

Caribou are struggling to adjust to new climate conditions as well. While warmer springs have caused plants to emerge earlier, caribou calving still happens at the same time. This mismatch with food sources has reduced reproductive success in some caribou populations.[54] Shifts from snow to rain have proved especially challenging for the Peary population of caribou that resides in the far northern parts of Alaska. Their numbers have declined by some 84 percent in the last 40 years, from about 50,000 to just 8,000.[55] As the region gets more freezing rain instead of snow, a hard ice can form over the lichen and other food sources below. One challenge in assessing impacts is that caribou populations are known to experience multi-decadal ebbs and flows, so scientists are still working to determine natural versus climate change impacts on the populations.

Warming in the Arctic Has Far-Ranging Impacts

Although the icescapes of the Arctic may seem far away, the changes underway there are already affecting coasts, habitats, and migratory species in places across the United States. The rapid melting of land-based glaciers and ice caps in Alaska, Greenland, and other places north of the Arctic Circle is already contributing to global sea level rise.[56] Coastal areas are being inundated, forcing refuge managers to consider options for relocating important marshes and other crucial coastal habitats.

The warming in the Arctic can also amplify future warming. The disappearance of sea ice converts large areas of highly reflective snow and ice to areas of dark ocean, which absorb much more energy from the sun. This ice-albedo feedback is self-reinforcing because as the oceans warm, less sea ice forms, which allows the oceans to absorb even more heat. Meanwhile, the changing ice cover is also affecting large-scale weather patterns, creating conditions that have exacerbated recent extreme weather events in the United States, including the severe Texas droughts in 2011 and Hurricane Sandy.[57]

The large reservoirs of carbon locked away in the permafrost also have the potential to create a powerful feedback cycle. With about twice the amount of carbon as is already in the atmosphere,[58] permafrost thawing would release massive amounts of methane—an especially potent greenhouse gas—to the atmosphere. This would create a feedback cycle in which warming leads to more carbon release, which leads to more warming, and so on. [59] Most current climate projections do not account for this possibility, even in their worst-case scenarios.

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Ringed Seal: The Most Recent Species Listed as Threatened Due to Climate Change

Ringed seals are facing an increasingly dire outlook. Ringed seals seldom come ashore, depending almost exclusively on sea ice for their reproduction and livelihood.[60] Arctic sea ice has contracted dramatically over the last decade, and climate models predict that continuing sea ice decline may soon lead to conditions insufficient to support seals.

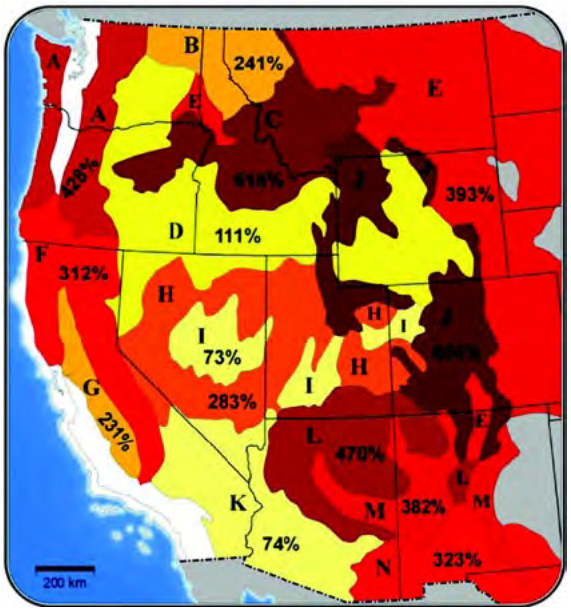
Ringed seals are also threatened by reduced snowfall. Their pups are born and spend the first few weeks of life in snow dens, which protect them from predators and freezing.[61] Diminishing snowfall, earlier snow melt, and winter rains are pushing more pups out of their shelters before they are able to survive in the open. An additional challenge is that ringed seals have only one pup per year, making them especially vulnerable to environmental changes.

In December 2012, the National Oceanic and Atmospheric Administration announced that the ringed seal, as well as the bearded seal, would be listed as a threatened species under the Endangered Species Act because of the risks posed by melting sea ice and reduced snowfall.[62] Fewer ringed seals could have dire consequences for the polar bear, as well. Polar bears hunt seal pups in their maternity dens. However, with pups spending less time in their maternity dens, polar bears are missing an easy and important springtime prey.

WESTERN FORESTS:
CONTENDING WITH MEGAFIRES

Many forest ecosystems in the American West have evolved so that episodic fires are part of their natural rhythms. However, climate change is creating conditions conducive to megafires with the potential to dramatically alter habitat for fish and wildlife. Throughout the American West, wildfires have become increasingly frequent and severe, and 2012 was the third worst wildfire season yet.[63] Hotter, longer-burning, and wider-ranging fires are the new norm and are likely to get worse in the future. Although past suppression of natural fires and the subsequent buildup of tinder have been a contributing factor to the megafires, researchers have shown that climate change is a now a major factor increasing the size and number of forest fires.[64]

The cost of wildfire suppression—about $3 billion a year—has tripled in the United States since the late 1990s.[65] The majority of these expenses are borne by the U.S. Forest Service, which now spends about half of its annual budget just fighting fires. Firefighters are adapting to the new wildfire realities.[66] They are struggling to keep up with these longer fire seasons, which in some places are now effectively year-round, leaving little time to regroup and prepare for the next incident. Moreover, they are finding it harder to control fires, in part because fires are less likely to quiet down at night like they used to. Nighttime conditions are hotter and drier, meaning that fires can stay active around the clock.



A - Cascade Mixed Forest
B- Northern Rocky Mt. Forest
C - Middle Rocky Mt. Steppe-Forest
D - Intermountain Semi-Desert
E - Great Plains-Palouse Dry Steppe
F - Sierran Steppe-Mixed Forest
G - California Dry Steppe
H - Intermountain Semi-Desert / Desert
I - Nev.-Utah Mountains-Semi-Desert
J - South Rocky Mt. Steppe-Forest
K - American Semi-Desert and Desert
L - Colorado Plateau Semi-Desert
M - Ariz-New Mex. Mts. Semi-Desert
N - Chihuahuan Semi-Desert

Wildfire risk is expected to increase significantly across the West. This map shows the percent increase in burned areas for every 1.8 degree Fahrenheit increase in temperature, relative to the median area burned during 1950-2003. Source: National Research Council (2011): Climate Stabilization Targets: Emissions, Concentrations, and Impacts for Decades to Millennia.

Climate Change Sets the Stage for Megafires

Longer, hotter, and drier fire seasons create conditions highly conducive to major fires. Western forests typically become combustible within a month of the snowpack melting, which is now happening 1 to 4 weeks earlier than it did 50 years ago. For example, the June 2012 Colorado snowpack was just 2 percent of its normal extent when the High Park and Waldo Canyon fires—the two most destructive fires in the state's history—occurred. At the same time, the region was in the grips of one of the worst droughts in U.S. history, leaving parched vegetation that was quick to burn.

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U.S. Forest Service

Recent Record-Setting Wildfires in the West

Where	Record	Name	When	Area Burned	Losses
Arizona	Largest fire in state history	Wallow Fire	May-July 2011	538,049 acres	$109 million; 32 homes lost; 6,000 evacuated
California	Largest fire in state history	Cedar Fire	Oct-Dec 2003	280,278 acres	$40 million; 15 people killed; 2,232 homes lost
Colorado	Most destructive	Waldo Canyon Fire	June-July 2012	18,247 acres	Evacuation of over 32,000 residents; $352.6 million in insured losses; 346 homes lost
Idaho	Costliest fire season	2012 wildfire season	June-Oct 2012	1.718 million acres	Over $50 million; over 2000 evacuated
Montana	Worst fire season	2012 wildfire season	July-Nov 2012	1.209 million acres	$113 million; over 80 homes lost
New Mexico	Largest fire in state history	Whitewater-Baldy Complex Fire	May-Oct 2012	297,845 acres	Several towns evacuated; a dozen homes lost; severe damage to Gila National Park
Oregon	Largest fire in 150 years	Long Draw	July 2012	557,648 acres	Hundreds of cattle and farms lost
Texas	Worst fire season	2011 wildfire season	Nov 2010-Oct 2011	Almost 4 million acres in over 21,000 fires, including 6 of the 10 largest in the state's history	2,946 homes lost; 4 people killed; over 1.5 million trees killed
Wyoming	Worst fire season	2012 wildfire season; included over 1,400 fires	June-Oct 2012	560,000 acres	$100 million; 155 homes and buildings destroyed

Sources: http://www.inciweb.org; http://www.wikipedia.org

Widespread beetle infestations have left broad swaths of dead and highly combustible trees in their wake. Higher temperatures enhance winter survival of mountain pine beetles in the Rocky Mountains and allow the beetles to complete their lifecycle in one year, half of the previously recorded rate. Scientists are studying what sort of increased fire risk is posed by these millions of dead trees.

Our Western forests are already feeling the heat and going up in flames. The 2012 wildfire season was only the third time since 1960, when records began to be kept, that burned areas in the United States exceeded 9 million acres.[67] This is larger than the size of Massachusetts and Connecticut combined. The other two wildfire seasons exceeding 9 million acres were within the past decade: 2006 and 2007.

The future outlook isn't any better. The National Research Council projects that for every 1.8 degrees Fahrenheit warming across the West there will be a 2- to 6-fold increase in area burned by wildfire. With at least 3.6 degrees Fahrenheit of warming expected in even the best case scenarios, wildfire will be an increasing threat to wildlife.

More Stress on Wildlife

Most wildlife can escape the immediate effects of wildfires. However, for some animals, like newly hatched, downy chicks that are unable to fly or small mammals that are unable to outrun the blazes, there is simply no way to flee the fire. For others, escape routes can force wildlife across roads, putting them at greater risk of being hit by vehicles, or send them into urban areas.

Larger, more frequent, and more intense fires make it harder for wildlife to recover afterwards. Many animals must move longer distances to find habitat that can support them. The burned soils have lost important nutrients, and even more nutrients wash away in the erosion after the fires. As a result, there can be lower productivity of plants and wildlife for years, if not decades. In the 2012 Waldo Canyon fire nearly 20 percent of the affected area was burned so severely that all vegetation on the surface and the root systems to a depth of about 4 inches were completely killed.[68]

The massive amounts of ash produced by these fires can clog streams, with devastating effects on fish and other aquatic plants and animals, especially if fires are followed quickly by heavy rainfall events. Without trees and other vegetation to retain water and soil, burnt areas are subject to extensive erosion and sedimentation in streams, sometimes for years following a fire. After the 2011 Las Conchas fire in New Mexico, drinking water withdrawals from the Rio Grande were reduced for months because of the additional cost of treatment to remove excess sedimentation.[69] And the Poudre River was running black with ash following the High Park fire in Colorado, putting trout at risk.[70]

Ripple Effects of Losing Whitebark Pine

Mountain pine beetles and white pine blister rust are cutting a swath through the whitebark pine forests of the western United States and Canada, leading to a finding by the U.S. Fish and Wildlife Service that the species merits listing under the Endangered Species Act. As of 2009, aerial surveys showed that about 50 percent of whitebark pine stands in the Yellowstone area had high mortality in the overstory trees.[71] Fire frequency and severity are projected to increase in this area, further imperiling whitebark pine ecosystems. Annual area burned could exceed 247,000 acres by 2050.[72]

The species and ecosystem services supported by whitebark pine forests are feeling the effects. Healthy pine forests help maintain mountain snowpacks by shading the snow. As the tree canopy is lost, the snow is melting more quickly, leading to more flash floods in the spring and less water availability in summer and fall.[73] Many animals utilize whitebark pine nuts as an important food source. Grizzly bears, for example, use these extensively when available in the fall before hibernation. When pine nuts are scarce, bears have fewer cubs, fewer cubs survive, and there are more mortalities from conflicts with humans as bears seek alternative food sources in areas closer to humans. Nearly 300 human-bear conflicts were reported in the Greater Yellowstone Ecosystem during 2010, a year with low cone production.[74] That is more than double the average number reported during 1992-2009.[75]

Forest managers in the Greater Yellowstone area are already taking steps to limit the losses of whitebark pine and help other species adjust to new conditions. For example, trees are being genetically selected to increase their resistance to blister rust disease, forests are being managed to limit the damage from fires and pine bark beetles, and whitebark pine seedlings resistant to disease are being planted to replace lost trees.[76]



Efforts are underway to restore forests devastated by mountain pine beetles.

John Gale

Unprecedented Forest Die-Offs in the Rocky Mountains

Mountain pine beetle epidemics have impacted more than 4 million acres of pine forest in Colorado and Wyoming alone, drastically affecting the heart of the region's tourism industry. These beetles are native insects and outbreaks have occurred for millennia, but in recent years they have become extremely destructive in the Rocky Mountains and in high elevation pine forests. Dr. Barbara Bentz, who studies mountain pine beetles for the U.S. Forest Service Rocky Mountain Research Station, says that the changes are likely "caused by warming temperatures … because this increases their reproductive and development rate and fewer beetles are killed by cold." Scientists worry, however, that high elevation pine forests may not be able to regenerate quickly enough to keep pace with the beetle.

In addition to the unprecedented damage within their historic range, mountain pine beetles are expanding northward in British Columbia and into Alberta, Canada. Mountain pine beetle epidemics are particularly damaging because "they have to kill the tree in order to successfully reproduce," says Bentz. And "once they get going, they are nearly impossible to stop." Worryingly, the mountain pine beetle is now "attacking Jack pine trees, which were not previously known to be a host," which may enable it to further expand its range into the Boreal forests of Canada.

Mountain pine beetle epidemics are a major threat to economic vitality and public safety. Dead trees left behind pose a serious danger to local communities. Not only do dead trees negatively impact home values, but trees have been known to fall on power lines, houses and people. As climate change increases the frequency of extended droughts and warm winters, the unprecedented mountain pine beetle activity is likely to continue, with potentially devastating effects to communities and some of our nation's most prized national parks (e.g., Yellowstone and Rocky Mountain National Parks), as well as numerous national forests.

"Seeing the beetles' impact on natural places they really care about has really brought this issue home for people," says John Gale, the Rocky Mountain regional representative for National Wildlife Federation. "When people go fishing and hiking, they encounter parks and campgrounds that are closed because they are unsafe. The only thing currently making these places safe again is cutting all the trees down. It is really powerful to see – even something small like trying to take your family camping, you can't do anymore," Gale says. He hopes that with better forest management practices we can prevent such widespread destruction in the future.

SOUTHWEST: NATURAL LANDSCAPES AND WILDLIFE IN TRANSITION

Climate change is already transforming natural landscapes in the Southwest, as the region experiences higher temperatures, more severe drought and wildfires, and more severe floods. Some plants and animals are moving northward and upward in elevation, while others are being replaced by non-native species that are better suited to the new climate conditions. Meanwhile, the increasing frequency and severity of wildfires is creating new conservation challenges.

Water Shortages

Increasing temperature is exacerbating droughts. As this trend continues, the impact on southwestern landscapes and wildlife will grow. Southwestern lands and rivers are particularly vulnerable to reductions in precipitation[77] because of their already arid nature. For example, native cottonwood-willow stands along streams continue to be replaced by extensive and dense stands of exotic tamarisk (salt cedar) and other non-native species that have a higher tolerance for drought.[78] This further reduces water availability and completely changes the ecology of these valuable wetlands habitats. To make matters worse, climate models project that the runoff in the region will decline by 20 to 40 percent by mid-century.[79]

Drought combined with increasing temperatures is not only reducing water supply, but also warming rivers and streams, placing fish and other aquatic species at risk. A recent analysis found that 70 percent of the watersheds in Arizona, New Mexico, Colorado, and Utah have experienced warming during the past 55 years.[80]



Invasive tamarisk plants in Utah's Canyonlands National Park

Iconic and Rare Species at Risk

From the well-known and elegant saguaro cactus to striking Joshua trees, the Southwest is home to iconic species found nowhere else. Climate change puts these and other treasured species at risk. For example, woody species from Mexico and invasive red brome and buffel grass species are already taking hold in the Sonoran Desert. These invasive grasses increase fire frequency and intensity, putting saguaro cactus at risk.

Droughts fueled by climate change have been linked to the die-off of more than 2.5 million acres of Piñon pine in the Southwest.[81] Piñon pine are adapted to withstand droughts; however, warmer temperatures and longer droughts are proving too much for them. The hotter it is during a drought, the more quickly the trees succumb. The upshot is that droughts are lasting longer, but trees are dying more quickly. In one experiment, trees exposed to temperatures just 7 degrees Fahrenheit more than their neighbors died 30 percent faster. This sort of sensitivity could lead to a 5-fold increase in regional tree die-off events.[□]


Todd M. Edgar/NPS

The Madrean Pine-Oak Woodlands ecosystem of Mexico and the Southwest is one of 34 biodiversity hot spots identified around the world. Confined to mountainous areas, about 80 percent of the original forest area in the U.S. part of its range has already been lost due to logging, agriculture, and urban development. Only fragments remain in the United States, though they once covered nearly 200 square miles in southern Arizona, New Mexico, and West Texas. These areas are home to at least 44 pine species, more than 150 species of oak, around 6,000 flowering plant species, more than 500 bird species, 384 species of reptile, 328 species of mammals, 84 fish species, and 200 species of butterfly.[83] Now, climate change is further constricting the few remaining areas suitable for this unique ecosystem.


Gary Kramer

Wildfire and Wildlife in the Southwest

The last few years have brought some of the largest wildfires ever witnessed in several southwestern states. The impacts on communities and property have been devastating, with thousands of homes lost and hundreds of millions of dollars in expenses. Such large and intense fires also have significant impacts on fish and wildlife. Although wildfire is a natural feature of many ecosystems in the Southwest, such catastrophic fires combined with other climate changes are setting the stage for wholesale ecosystem transitions and creating new challenges for conserving threatened and endangered species.

Wrecking wildlife-rich sagebrush habitats from Nevada to Montana, cheatgrass is a threat to the well-being of wildlife closely associated with sagebrush habitats, such as pronghorn and sage grouse. This pernicious invasive

species is providing a ready source of tinder for wildfires already on the rise due to increasing drought and temperatures in the West. Cheatgrass has invaded wide expanses of sagebrush habitats, which historically burned infrequently, and are not adapted for surviving frequent fires. In 2007 alone, in the Great Basin where cheatgrass is pervasive, more than 2.7 million acres burned.[84] It is uncertain exactly how climate-driven changes in precipitation and temperature could affect cheatgrass, although one study indicates it could expand the amount of suitable land for cheatgrass by up to 45 percent in many areas.[85]

Species that already are confined to a small geographic area are especially vulnerable to extreme events like fires, especially if their entire habitat is affected. This is exactly what happened to the Mexican spotted owls that reside in the major canyon systems of the Bandelier National Monument in northern New Mexico. The 2011 Las Conchas fire burned more than 60 percent of the protected areas, causing near or complete mortality of trees and shrubs in the owl's nesting and roosting habitat. The following summer, the Whitewater-Baldy Complex fire in the southwestern part of the state forced fish biologists to manually relocate the threatened Gila trout, when ash from the fire entered important river habitat.



Ignacio Peralta

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More Intense Wildfire 'Ups the Ante' for Gila Trout Conservation in New Mexico

On May 9, 2012 lightning struck Whitewater Baldy Mountain in the Gila National Forest of southwestern New Mexico. In two months the fire burned almost 300,000 acres of land, destroying numerous homes in addition to important wildlife habitat. For David Propst, a former fish biologist for the New Mexico Department of Game and Fish, the Whitewater Baldy fire put a special fish—the Gila trout—at risk.

Before the fire hit Langstroth Creek, "the stream was teeming with Gila trout – hundreds and hundreds were captured." But when the crew went back a few days later, "they found that ash-laden water had killed a mess of fish, just devastated them. Only about 65 fish were captured that day."

It was an indication of a larger, worrisome trend: "Climate change has really upped the ante for conservation," says Propst, who has worked on fish recovery efforts since 1984. Over the last decade, warming stream temperatures and a marked rise in severe wildfires have made it clear that climate change is a game changer for endangered species protection. "We were always aware of climate change, but it had not affected us so dramatically before. Climate scientists throughout the Southwest tell us that these big, intense fires are going to become the norm."

Gila trout, one of the first species listed under the Endangered Species Protection Act of 1966, has since been reclassified to "threatened" as a result of dedicated conservation efforts by Propst and others. But extreme fires now pose a big risk to Gila trout and the progress that has been made. When wildfire ash is washed into a stream it undergoes rapid denitrification, which is quite deadly to fish. Ash and sediment from wildfires clog fish gills, essentially suffocating them, while silt deposited on the riverbed kills aquatic invertebrates, the Gila trout's main source of food.

When a fire occurs, fish rescue teams jump into action to identify streams where imperiled populations are likely to be affected. During the Whitewater Baldy fire, rescue teams were able to evacuate and save around 1,000 Gila trout, which were taken to a national fish hatchery in New Mexico and relocated to a stream in Arizona. Returning the fish to streams after a fire can be somewhat problematic, Propst says. "It's kinda dicey, usually we like to wait 3 to 5 years before restoring fish to fire-affected streams; it takes about that long for the stream banks to recover."

In the past, Propst says, the biggest threats to Gila trout and other imperiled fish species were overfishing, poor management practices, and non-native species. Now, he says, fish recovery —and conservation more generally —need to incorporate climate change into management policies. Warmer stream temperatures endanger Gila trout, which typically inhabit cold waters at high elevations. With less snowmelt, "the flow regime will change and the thermal regime will change," says Propst. "We used to have all these things worked out. Now the paradigm has shifted."

GREAT PLAINS:
WILDLIFE IN THE GRIPS OF HEAT WAVES AND DROUGHT

In 2012 the Great Plains experienced blisteringly hot weather and extremely low rainfall, resulting in parched landscapes across America's 'bread basket'. More than two-thirds of the entire Lower 48 experienced drought conditions that summer, making it even worse than the infamous and devastating Dust Bowl of the 1930s.[86] But, climate scientists were not surprised. More intense heat waves and droughts are exactly what they have been projecting for the Great Plains.

The southern areas of the Great Plains are projected to get less rainfall while more northern regions of the Great Plains are likely to see more rainfall on average. That said, what rainfall there is, is more likely to come in heavy downpours in contrast to the historic more-frequent but less-intense rainfall. Thus, the whole region is at risk of more drought, especially when taking into account the enhanced evaporation associated with higher air temperatures.[87]

Habitat Drying Up for Waterfowl and Pheasants

The combination of drought and heat can dry up tens of thousands of playas and prairie potholes that harbor migrating and nesting waterfowl. Waterfowl populations are closely tied to the number of spring breeding ponds in the prairie pothole region of the Northern Great Plains. These seasonal and semi-permanent wetlands are important for breeding mallards and other ducks. During dry years, mallard ducklings have much lower survival rates.[88]

Carter Johnson, a professor of ecology at South Dakota State University, has studied wetlands of the pothole region for over two decades, but says he and his colleagues "were pretty shocked to see" how sensitive they are to increased temperatures of just a few degrees. His work shows that even a 3.6 degree Fahrenheit increase can drastically decrease the ability of a wetland to support waterfowl.[89] "You get a very different wetland and a very different habitat for wildlife," he says.

Severe drought can also affect pheasant populations in the Great Plains, particularly by reducing their food sources and access to vegetative cover, leading to reduced survival rates, especially for chicks.


U.S. Department of the Interior

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Moreover, drought can force farmers to use land previously set aside in the Conservation Reserve Program for emergency haying and grazing, further reducing the birds' habitat. Indeed, a dry winter (2011-2012) followed by a dry, hot summer made for one of the worst pheasant hunting seasons on record in eastern Colorado.[90]

Heat Waves Bring Fish Die-Offs

The combination of heat and drought is particularly challenging for freshwater fish. When streams get too warm, fish growth rates decline and stressed fish become more susceptible to toxins, parasites, and disease. The lower water levels during drought cause the water temperatures to rise more rapidly and reach greater extremes. Warm water holds less oxygen and facilitates the rapid growth of harmful algae. When higher temperatures combined with oxygen depletion exceed tolerance limits, massive fish die-offs are the result.

During the summer 2012 drought, the stench of rotten fish was common across rural and urban areas alike as fish died by the thousands. Nearly 58,000 fish, including 37,000 sturgeon with a market value of nearly $10 million, died along 42 miles of the Des Moines River.[91] Severe fish kills also occurred along the Platte River in Nebraska,[92] where sustained drought caused over 100 miles of river to go completely dry.[93] Fish kills attributable to "hot" water were also reported in areas further east, including Michigan, Minnesota, Pennsylvania, Wisconsin, Ohio, Indiana, and Illinois.[94]

Mammals Feel the Heat Too

Terrestrial wildlife are no less susceptible to heat and drought. Drought can cause important wildlife food sources to produce less fruit or even kill the plant. Forced to range further in search of food, wildlife become more vulnerable to predation. Furthermore, deer and other wildlife have difficulty fattening up for winter and face starvation. Those that do survive are less likely to successfully produce strong and healthy offspring the following spring.[95]

Warming is particularly problematic for moose in northern Minnesota. The moose population in the northwestern part of the state plummeted from about 4,000 animals in the mid-1980s to less than 100 animals by the mid-2000s. Biologists attribute most of this decline to increasing temperatures: when it gets too warm moose typically seek shelter rather than foraging for nutritious


Philippe Henry

foods needed to keep them healthy. They become more vulnerable to tick infestations, which have proliferated as the region has warmed. Ticks leave moose weakened from blood loss and with hairless patches where they tried to rub off the ticks. Without protective hair, these animals can die from cold exposure in the winter. Individual moose infested with 50,000 to 70,000 ticks—ten to twenty times more than normal—have been documented.[96]


Carter Johnson



Uncertain Future for Sandhill Cranes in Nebraska

Each spring, half a million sandhill cranes visit the Central Platte in Nebraska en route to their summer nesting areas in Alaska, Northern Canada and even Siberia. "The cranes are an especially important species for Nebraska," says Duane Hovorka, director of the Nebraska Wildlife Federation and a lifelong Nebraskan. "The Platte River is really a key stopover" for the birds that spend 3 to 4 weeks feeding, resting and socializing before continuing on their long migration north. The birds are also an important game bird in the Great Plains and an economic asset for Nebraska, bringing in "tens of millions of dollars every year from tourism."

More than 80 percent of the North American sandhill crane population visits the Central Platte every year, but it is unclear how much longer the river will be able to sustain them. "About two-thirds of the water in the Platte River starts out in the Rocky Mountains," Hovorka explains, and the river is "very dependent on snowmelt into June and July." Climate models predict reduced snowpack in the Rocky Mountains in coming years, with more precipitation falling as rain instead. Bob Oglesby, a professor of Climate Modeling at the University of Nebraska-Lincoln, says, "In every scenario you could possibly imagine, there will be less water discharged into the Platte and Colorado Rivers over the summer months." Changes in water level and flow timing caused by climate change will make the Platte River a more volatile habitat for sandhill cranes and other species that depend on it for survival.

High river flow, especially in the spring, is important for maintaining a wide channel with open areas containing little vegetation. When water levels are low "plants move in, and you get a narrowing of the river channel," Hovorka explains. The sandhill cranes depend on open areas of the river for protection from predators when roosting; "the river is what keeps them safe at night." In some areas, like Grand Island, "we've seen that the river channel has already shrunk. In many places it has gone from about a mile wide to one or two tenths of a mile." The narrowing of the stream is attributed to the construction of upstream reservoirs and past droughts reducing water flow.[97] Drought scientist Song Feng at the University of Nebraska, Lincoln predicts that "moderate to severe drought will become the norm by the end of the century."[98]

Maintenance of adequate water flow in the Platte River to sustain sandhill cranes has long been controversial and extensively litigated. A non-binding agreement among Nebraska, Colorado, and Wyoming to maintain adequate water flow and restore habitat for sandhill cranes and other wildlife was negotiated in 2007, but the work is not yet complete. With all of the water rights already appropriated, increasing severity of droughts threatens to further reduce flows as well as increase pressure for more water withdrawal for public water supply and irrigation.

Between drought, reduced snowfall and warming temperatures, sandhill cranes are being squeezed on all sides by climate change. As Hovorka says, "If what we're doing is drying up the river and drying up these wetlands, then we'll lose the population. It is a real serious concern for us in Nebraska."


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Ryan Hagerty, U.S. Fish and Wildlife Service

MISSISSIPPI RIVER BASIN:
MORE ERRATIC FLOODING CREATES NEW IMPERATIVES FOR CONSERVATION

The Great Flood of 1993 devastated communities along the Mississippi River and its tributaries in nine Midwestern states. This 500-year flood displaced thousands of Americans, caused 48 deaths, and inflicted damages of an estimated $21 billion.[99] Federal response and recovery costs were $4.2 billion, part of which went to voluntary buyouts, relocations, and flood-proofing of thousands of damaged properties across the Midwest.[100] Yet, just 15 years later, many of these same places experienced another major flood. The Midwest received two to three times more rainfall than average and set more than 1,100 daily precipitation records during May-June 2008.[101] About 30 percent of the nation's corn and soybean crops were lost, damaged, or delayed by these floods.[102] And, just 3 years after that, the Mississippi experienced another 500-year flood in April and May 2011, which led to thousands of evacuations, 14 deaths, and the unusual step of blowing up the New Madrid levee to let water flow into the floodplain.[103]

These three catastrophes, as well as several other dramatic and costly floods across the Midwest in recent years, have cast a spotlight on the flooding risks posed by increasingly heavy rainfall events combined with the ways we have managed our agricultural lands, floodplains, and river channels. Meanwhile, river ecosystems have also been disrupted, even as robust wetland habitats could play a key role in managing our flood risk. To make matters even more challenging, the region is also experiencing severe droughts in some years. Indeed,



the severe 2012 drought, which caused extremely low flows to the Mississippi and major concerns for navigation, came just one year after catastrophic flooding.

Increasing Flood Risk for the Mississippi Basin

More heavy rainfall events caused by climate change is one important factor contributing to higher flood risk along the Mississippi.[104] The frequency of extremely heavy rainfall events has increased by up to 40 percent during the last 31 years for the central United States.[105] Climate projections for this century indicate that those big storms that historically only occurred once every 20 years are likely to happen as much as every 4 to 6 years.[106]

Inadequate floodplain management also contributes to the increasing flood risk. A particular problem is building right up to the river's edge combined with the overreliance on levees, which can give those who live behind them a false sense of security. In fact, about 28 percent of the new development in seven states affected by the 1993 Mississippi floods has been in areas within the flood extent.[107] Yet, natural riparian systems play an important role in absorbing excess flood waters and slowing its movement downstream. A single acre of wetland can store 1 to 1.5 million gallons of flood water,[108] and just a 1 percent loss of a watershed's wetlands can increase total flood volume by almost 7 percent.[109]

Modifications to the river channels have also reduced the rivers' capacity to convey floodwaters downstream. For example, on the Mississippi River, thousands of miles of levees placed near the river's banks create a narrower channel reducing the river's conveyance capacity, while 'river training structures' (rock jetties constructed in the river channel that make the river self-scour its bottom to reduce river navigation dredging costs) act as speed bumps during high water, further increasing flood heights.

Extreme Flooding and Wildlife

In a healthy, functioning river system, floods are vital to sustaining the health of human and natural communities. Floods deposit nutrients along floodplains creating fertile soil for bottomland hardwood forests. Sediment transported by floods form islands and back channels that are home to fish, birds, and other wildlife. By scour-



Bald cypress swamps are vulnerable to more precipitation extremes.

ing out river channels and riparian areas, floods prevent rivers from becoming overgrown with vegetation. Floods also facilitate breeding and migration for a host of fish species. In the deltas at the mouths of rivers, floods release freshwater and sediment, sustaining and renewing wetlands that protect coastal communities from storms and provide nurseries for multibillion dollar fisheries. Floods can also be helpful to fish and wildlife by temporarily restoring connectivity between habitat areas. This allows species from different areas to relocate, creating opportunities for species to find more suitable habitat.[110] The greater connectivity can also provide opportunities for enhancing genetic diversity.

The flip side, however, is the potential for heavy floods to spread pests, disease and invasive species like alligator weed that flourish in high water levels. Alligator weed crowds out native plants like smartweed and duckweed that waterfowl depend on for food in the wintertime. Wildlife refuges and hunters alike worry that a resurgence of alligator weed due to high water levels could lead to conditions that are insufficient to support important game like ducks and geese.[111]

Furthermore, the many plants and animals that depend on episodic flooding for lifecycle events will need to contend with new climate regimes. For example, bald cypress swamps in southern Illinois, Indiana, and Missouri rely on intermittent flooding for seed dispersal. Extreme floods, however, can deposit seeds too far upland, where conditions are not suitable for the trees to grow, or can kill seedlings that are not yet able to withstand flood waters.[112] Managers are particularly concerned about bald cypress regeneration in this northern part of its habitat range because areas further south are projected to become warmer and drier.[113]

Sediment, Nutrients, and Contaminants Washed Downstream

Heavier rainfall events mean that more soil, nutrients and contaminants are being washed into our waterways. Current estimates are that an additional flow equivalent to four Hudson Rivers is originating from farmlands in the Midwest and Great Plains each year.[114] Habitat for local fish and aquatic invertebrates can be drastically degraded following heavy downpours,[115] for example, by the deposit of massive sediment transported in these events or the restructuring of sediments in river-dominated shelves.[116] In addition, areas far downstream are put at higher risk for dead zones due to excessive runoff of fertilizer and other contaminants.

One particular concern is that farmers will aggravate the runoff problem in their efforts to address other impacts of climate change. For example, as heavy rainfall events become more common, farmers may add new drainage systems to quickly move water off the fields, thus promoting flooding problems elsewhere. Farmers may also apply additional fertilizer or pesticide treatments to take advantage of longer growing seasons or to combat new pests and diseases.[117] Thus, it will be even more important for farmers to work together with conservationists to identify ways to support natural floodplains that can protect people and property.[118]

When too many nutrients—especially nitrogen and phosphorus—are present in coastal waters, excessive algae and phytoplankton growth can occur, rapidly depleting oxygen from the local waters. Without oxygen, fish and aquatic invertebrates cannot survive. The Gulf of Mexico is home to the nation's largest dead zone, sometimes extending over 8,400 square miles.[119] Fertilizer washed off of agricultural lands into the Mississippi is the major cause of this dead zone. Past heavy precipitation events in the Mississippi basin have delivered more nitrogen to the Gulf of Mexico,[120] so the trend toward even heavier events is expected to further aggravate this problem. Indeed, one study found that climate change could increase river discharge by 20 percent, leading to higher nitrogen runoff, and decreasing dissolved oxygen in the Gulf of Mexico by 30 to 60 percent.[121]


Chase Fountain, Texas Parks & Wildlife



Jocelyn Augustino/FEMA

Floodplain Management and Agriculture in an Era of Extreme Floods

"I've been working all my life to protect natural habitats, especially along natural corridors like rivers," says Clark Bullard. As a native of Urbana, Illinois, a research professor at the University of Illinois and a board member of Prairie Rivers Network, Bullard is particularly worried that recent climatic changes pose a grave danger for wildlife and communities in the Mississippi River Basin.

Flooding has become more erratic and unpredictable, with devastating effects in a dozen states, including Nebraska, Iowa, Missouri, Illinois, Arkansas and Mississippi. Bullard says, "Rivers have been separated from their natural floodplains by levees, and they have also been channelized into straight canals, increasing water velocity and volume downstream. So now, spring rains that used to trickle out slowly are gushing quickly downstream, creating huge flooding problems for communities along the river." Tragically, historic and expensive efforts, funded largely by the U.S. Army Corps of Engineers to 'control' the river, have increased flooding in some areas.

"Now, climate change is exacerbating flooding due to growing extremes in heavy precipitation events," Bullard says. As a result, during the record-breaking Mississippi and Ohio River flood in 2011 the Army Corps of Engineers used the historic floodplain to reduce floodwater levels by breeching a levee, to save the town of Cairo, Illinois, and reduce pressure on miles of Mississippi River levees protecting communities and farmland.

River management systems are in dire need of being updated to accommodate climate change. Levees, dams, and other structural solutions will continue to play a role in flood protection and navigation, but the time has come for a more balanced approach that recognizes and utilizes the natural defenses afforded by healthy wetlands, floodplains, and even farmland. "Unless there is a new system, towns and farms will be flooded more frequently and more severely," says Bullard. "That new system needs to recognize the importance of natural floodplains and restore them." Instead of plowed crops behind the levees, these historic floodplains can be allowed to periodically flood and grow water-tolerant trees like poplar or willow. This will allow agriculture to continue via the periodic harvesting of trees during dry seasons, to make biofuels. This has the added benefit of providing fantastic habitat for fish spawning during annual flooding. The lowest areas that are always flooded can become permanent wetlands, which are extremely rich in biodiversity, harboring many wildlife and plant species.

Bullard emphasizes that this is a positive picture for the future of our rivers, for more sustainable and less costly agriculture, and for our natural and human communities along the river. And the biofuel production will reduce our dependence on fossil fuels, which is the driving force of climate change. "It is entirely possible to achieve an appealing and sustainable future for the Mississippi River in a changing climate if we remember that the river owns the floodplain," Bullard says. "It all comes down to how you manage it, and how you reduce carbon pollution to minimize the impact of climate change."

GREAT LAKES:
NEW CONSERVATION CHALLENGES FOR AN AMERICAN TREASURE

The Great Lakes contain 21 percent of the world's surface fresh water, with more than 5,000 cubic miles of water.[122] Despite the enormity of the Great Lakes, they are far from immune to climate change. Of particular concern is the potential for climate change to make it even more difficult to address existing environmental problems in the lakes, such as excessive nutrients leading to harmful algal blooms, and invasive species like sea lamprey and common reed.

More Heavy Rainfall Events

Extreme precipitation events have already increased in the last decade for the Great Lakes region, with more increases projected for the future. Average precipitation in the Great Lakes region is projected to increase by about 10 percent in winter, and 30 percent in the spring with increases in both intensity and frequency of heavier precipitation events.[123] In contrast, summer precipitation is trending toward drought, such as experienced in recent years.[124]



More heavy rainfall events are increasing runoff of nutrients from agricultural lands, contributing to harmful algae blooms in Lake Erie and causing oxygen-depleted dead zones.[125] Sadly, this reverses some of the cleanup progress made since the 1980s when Lake Erie was declared "dead."[126] In 2011, Ohio experienced its wettest spring on record. As a consequence of heavy rain and nutrient runoff, a harmful algal bloom covering 3,000 square miles plagued Lake Erie. The dead zones exclude oxygen for fish and other aquatic life, reducing lake productivity for sport and other fish.[127]

Declining Lake-Ice Cover

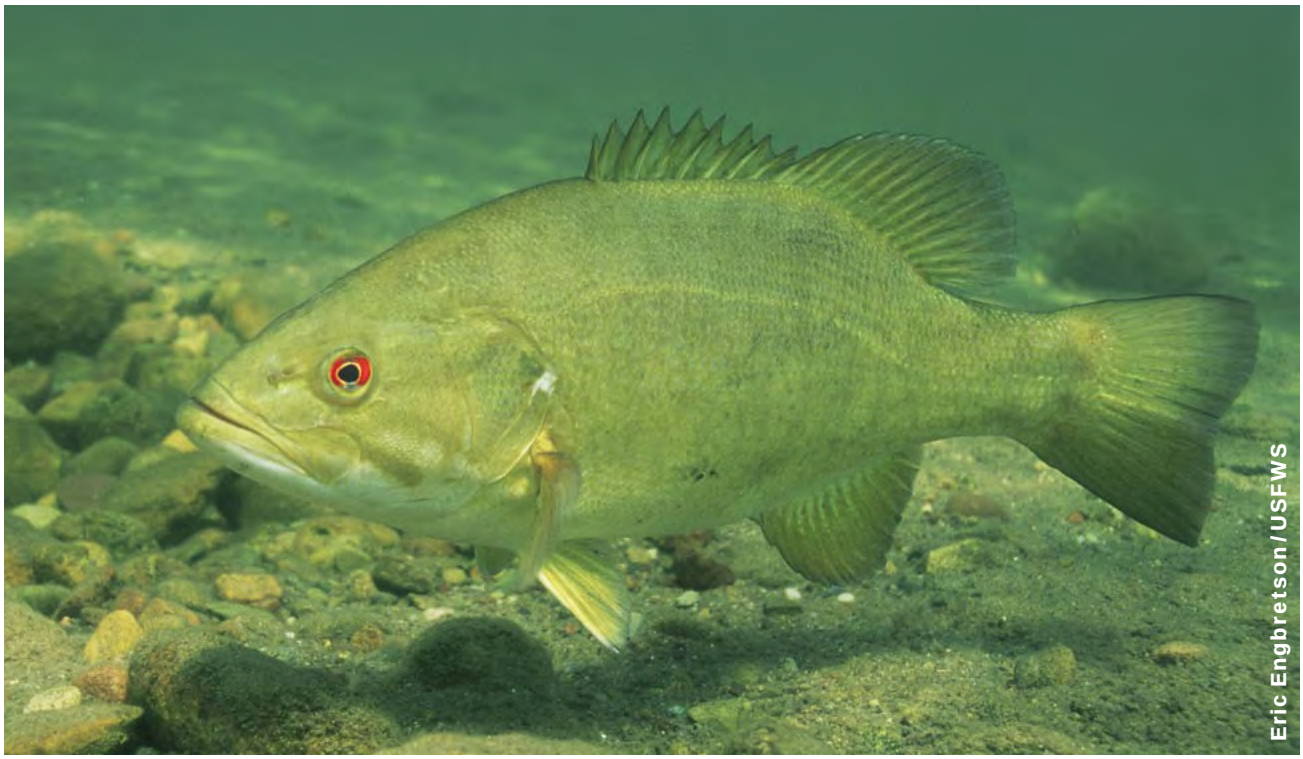
Climate change has already driven a huge decrease in winter ice cover throughout the Great Lakes from the period of 1973 to 2010.[128] Ice cover across the Great Lakes has declined by an average of 71 percent. Lake St. Clair ice cover has declined the least at 37 percent, while Lake Ontario has declined the most at 88 percent. Declining ice cover could benefit the shipping industry, but would leave coastal wetlands and shorelines more vulnerable to erosion.[129]

Reduced ice cover during winter and warmer temperatures in all seasons cause increases in evaporation. While several factors are at play, climate change is expected to cause declines in the Great Lakes water levels of anywhere from a few inches to several feet.[130] More evaporation during winter also pumps moisture into the atmosphere, creating conditions favorable for heavy lake-effect snow storms.[131]

The synergy between lake-level changes and invasive species has important implications for lakeshores. Fluctuating water levels facilitate establishment of the highly invasive common reed (commonly called phragmites, its genus name) in the coastal wetlands,[132] potentially forming a band of undesirable vegetation along the shoreline like a bathtub ring. The dense stands of phragmites are large and extremely difficult to control, have little wildlife value, and drive out native species such as cattails and the waterfowl and wildlife that use them.

Warming Lake Waters

Lake Superior is one of the fastest warming lakes in the world.[133] By mid-century the average air temperature in the Great Lakes region is projected to increase 5.4 (±1.8) degrees Fahrenheit with summer temperatures increasing more than winter.[134] A substantial increase in frequency and temperature of extreme heat events is also expected.[135] The summer heat wave in 2012, when historic high temperature records for Lake Superior water were shattered,[136] was a window into this future.





Great Lakes ice coverage has declined significantly since the 1970s. With more open water comes more evaporation, causing lake levels to drop more rapidly, providing more moisture for extreme lake-effect snow events, and leaving coasts more vulnerable to erosion. Source: USGCRP (2009).

Increasing water temperature in Lake Superior is expected to challenge fish populations by increasing sea lamprey populations.[137] This invasive species grows more rapidly in warmer water and also benefits from a longer warm season. The larger the sea lamprey, the more eggs it lays. The sea lamprey has already been enormously destructive to the once thriving fisheries in the Great Lakes.[138] Climate change will increase the difficulty of managing and controlling this destructive species.

As water temperatures increase, the Great Lakes will become more suitable for warm-water fish such as smallmouth bass and bluegill, but less suitable for cool-water and cold-water species such as northern pike and whitefish, respectively.[139] Streams flowing into the Great Lakes, such as the Black River in northern Ohio, could lose a third of their fish species by mid-century, including popular sport fish such as pumpkinseed, smallmouth bass and yellow perch, as increasing air temperatures cause water temperatures to exceed their thermal thresholds of reproduction and survival.[140] Streams throughout the Great Lakes watershed will face the challenge of rising temperatures.

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Chad Kettlewell, Coldwater Consulting, LLC

Ohio's Black River: Climate-Smart Conservation

The Black River outside Lorain, Ohio is designated an Area of Concern (AOC) by the Environmental Protection Agency (EPA)[141] because of the severe degradation of its water quality and riparian habitats over the past century. Steel mills and other large industry were the dominant feature along the river since the late 1800s, leaching toxic heavy metals and polycyclic aromatic hydrocarbons (PAHs) into the water. In addition, millions of tons of steel by-products, especially slag, buried large areas of riparian habitat and even spilled into the river itself.

Once known as the "River of Fish Tumors,"[142] water quality in the Black River has been improving for the past couple of decades thanks to the Clean Water Act and extensive restoration efforts. Recently, the city of Lorain has been implementing on-the-ground restoration of the Black River, supported by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) and others. Chad Kettlewell of Coldwater Consulting says, "Conditions have definitely improved" in areas that had been nearly devoid of in-stream fish habitat before. "Biologists are seeing very good reactions from fish communities," including popular sport fish like smallmouth bass, white crappie and yellow perch.

In 2011, National Wildlife Federation began identifying how restoration might be modified to account for climate change. These new "climate-smart" restoration projects are important because absent consideration of climate, the success and longevity of restoration could be compromised. "One of the most useful things," Chad says, "was a chart NWF gave us of current and projected tree species ranges," which led the City of Lorain to plant species that are likely to do well both now and in a warmer climate.

Water level in the river is projected to have more extreme fluctuations due to increasing incidence of both droughts and floods. Kettlewell reports that recommendations to account for climate change by "varying the height of fish habitat shelves will help ensure continued availability of good fish habitat even as the river level changes become more extreme." Furthermore, Lorain is now "using larger rocks, to withstand higher stream velocities" that will occur with increased rainfall and more extreme flooding.

Climate-smart recommendations, Kettlewell says, "were fairly easy to incorporate into the project and did not add a lot of cost." Preparing the river for climate change "definitely made the project better and more beneficial to the city and the river in the future."

APPALACHIAN MOUNTAINS:
FORESTS AND WILDLIFE ON THE MOVE

The vast Appalachian mountain range stretches some 1,500 miles from Newfoundland to Alabama, varies from 100 to 300 miles in width, and rises to nearly 7,000 feet above sea level.[143] Its diverse habitats include high elevation coniferous forests, mid-elevation deciduous forests, mountain balds devoid of trees, alpine tundra, cold-water streams, wetlands and many others. Nowhere will the Appalachian habitats and wildlife be left untouched by climate change.

Not surprisingly, climate change and its effects will vary considerably across the broad geographic range and ecological diversity of the Appalachian Mountains. While temperature increases are expected throughout the entire range, the degree and seasonality of temperature change will vary by latitude, altitude and local geography. Precipitation in the form of rain will increase at the expense of snow, due to rising temperatures.

Changing Forests

Changing climate will shift the locations of the suitable zones for many tree species. Extensive modeling for 134 tree species in the eastern United States, including many in the Appalachian Mountains, suggests that 66 of the species will experience a 10 percent or more increase in the area of suitable habitat, while approximately 54 species would see a 10 percent or more decline in area of suitable habitat.[144] The zones of suitable climate for these trees will generally move in a northeasterly direction and upslope.

Overall, suitable zones for spruce-fir and northern hardwood forests are projected to decline while zones for southern oaks and southern pines are likely to increase.[145] The projections are consistent with observed changes in the forests of New England. Already, deciduous forests are increasing at the expense of coniferous forests.[146] Iconic species such as the dogwood and sugar maple are at risk in their historical ranges.

Wildlife Responses

Wildlife in northeastern forests is already being affected by climate change.[147] Species dependent on mountaintops and their predominantly coniferous habitats will be particularly at risk, due to limited opportunity to move upward in elevation. Furthermore, they are inhibited from northward movement by low elevation areas of unsuitable habitat between mountaintops. These isolated mountaintops, often called 'sky islands,' are expected to experience greater loss of species than low elevation localities.

Among the high elevation wildlife at increased risk are snowshoe hare, Cheat Mount salamander, Shenandoah salamander, southern red-backed vole and northern flying squirrel. Brook trout that inhabit cold Appalachian streams are also at risk. As air and water temperatures rise, areas of suitable water temperatures are projected to recede from the lower elevations into the higher elevations, resulting in more isolated and smaller populations.

Finding Scarce Food

Wildlife cannot go into the pantry when their food crops fail. Increasing extremes in weather, especially drought, are likely to pose greater challenges for wildlife. Many wildlife food sources—vegetation, nuts and seeds—die or simply do not bear fruit due to extreme drought. Acorns, in particular, are an important food source for squirrels, mice, jays, woodpeckers, bears and deer.

Although warmer spring temperatures tend to increase acorn production, summer drought reduces acorn production.[148] In fact, acorn production can be 100 times greater in good years than poor years,[149] with weather being an important factor.[150] Climate change affects on acorn crops and production of other wildlife foods will be diverse, although difficult to project.

022869



More Frequent Human Contact with Black Bears

"I was New Hampshire's first bear biologist, starting in 1978," says Eric Orff. "While I was there, for about the next two decades, we hardly ever had complaints about bears during the winter. But now they are getting bear complaints year-round. I know of people near Concord, near where I live, that have had their bird feeders taken down by bears in December and January, when they should be hibernating."

Warmer winters the last few years have changed black bear hibernation patterns. Orff notes that "last winter was very mild, and bears were much more active than we're used to." The usual black bear hibernation period in New Hampshire, Orff says, "goes from about the first or second week in November into mid-April. Most bears will continue to hibernate, but probably the males, who are less dormant, start to look for food in the middle of winter" if it is unusually mild.

Another potentially larger problem is warmer and drier summers. Orff says that "last summer, we had very dry, drought-like conditions here in New Hampshire," with devastating effects on wild bear foods. Andy Timmins, New Hampshire's current bear biologist, says that because of the drought in 2012 "soft-mass species, like strawberries and blackberries, didn't get the moisture they needed. The blackberries, which are an important source of food for the bears, ended up just drying up and falling off the vine."

"When food is scarce bears become very vulnerable," says Timmins. Bears must travel further to forage and will often supplement their diet with food sources common in more residential areas, which leads to an increase in bear-human conflicts.

With bears active longer and searching for food over wider areas, both humans and bears are at greater risk. 2012 set the record for bear conflicts with people. According to Timmins, in an average year New Hampshire has about 600 reports of bear conflicts with humans. Last year there were over 900. As current warming trends are expected to continue and even accelerate, the number of human/bear conflicts is likely to grow. That's bad news for bears.

ATLANTIC COASTS:
CLIMATE CHANGE SQUEEZING HABITATS

The U.S. Atlantic Coast is blessed with an amazing diversity of habitats, from the rocky coasts and barrier islands of New England to the extensive marshes and seagrass beds in the Chesapeake Bay and the sandy beaches and coral reefs of Florida. Together, these habitats support numerous species of fish and wildlife and are a linchpin for the economy, culture, and quality of life among the most populated and rapidly growing regions in America. Yet, the Atlantic coast will experience some of the most direct and costly impacts of climate change, including rising sea levels, warming ocean waters, enhanced coastal storms, and ocean acidification, all of which place both natural systems and coastal communities at risk.[151]

Sea Level Rise

Inundation of habitats and communities by rising seas and more exposure to intense storms are among the most immediate concerns for coastal areas. During the last century, sea level has increased by approximately 8 inches on average around the globe. Scientists project that the global mean sea level could increase by an additional 1 to 4 feet by the end of the century, and maybe by as much as 6.6 feet.[152]

Importantly, sea-level rise is not uniform across the globe; it can vary based on a range of factors, such as ocean circulation patterns, variations in temperature and salinity, and the earth's rotation and shape. New science suggests that the area off the Atlantic Coast is a "hot spot" for a relatively higher rate of sea-level rise than the global average.[153] In addition, because coastal lands in some areas, such as the Chesapeake Bay, are subsiding, relative sea-level rise will occur even faster.



Coastal inundation and erosion will surely increase as sea-level rise accelerates. However, communities and their natural habitats on America's coasts are ill-prepared to deal with sea level rise, putting these communities and their natural habitats at significant risk.

Marine Wildlife Sensitive to Warming

Tropical and subtropical sea surface temperatures increased by an average of 0.5 degrees Fahrenheit between the 1950s and 1990s, and this trend is projected to continue.[154] This warming is causing some fish species along the Atlantic Coast to shift their ranges northward by as much as 200 miles since 1968.[155] Several commercially important species now present off the New England coast, such as cod, haddock, winter flounder and yellowtail flounder, are particularly vulnerable to temperature increases because they are at the southern end of their ranges.[156] On the other hand, some subtropical species, such as croaker, are likely to shift northward and increase in abundance in the Northeast.[157]

Along the northern Atlantic Coast, there is considerable concern about lobster. In 2012, University of Maine marine researcher Rick Wahle said: "We have this surge in lobster population we've never seen before in the Gulf of Maine; as you go to southern New England, it's a collapsing fishery—and the causes may be the same."[158] Wahle noted that warming water temperature is impossible to ignore, but that many other factors are certainly involved as well. Warmer water in the cold Gulf of Maine may benefit lobsters, while more southerly lobster habitats become too warm. Although the Gulf of Maine 2012 harvest may exceed the 2011 record-breaking harvest,[159] the western Long Island lobster harvest has declined 99 percent since 1998.[160]

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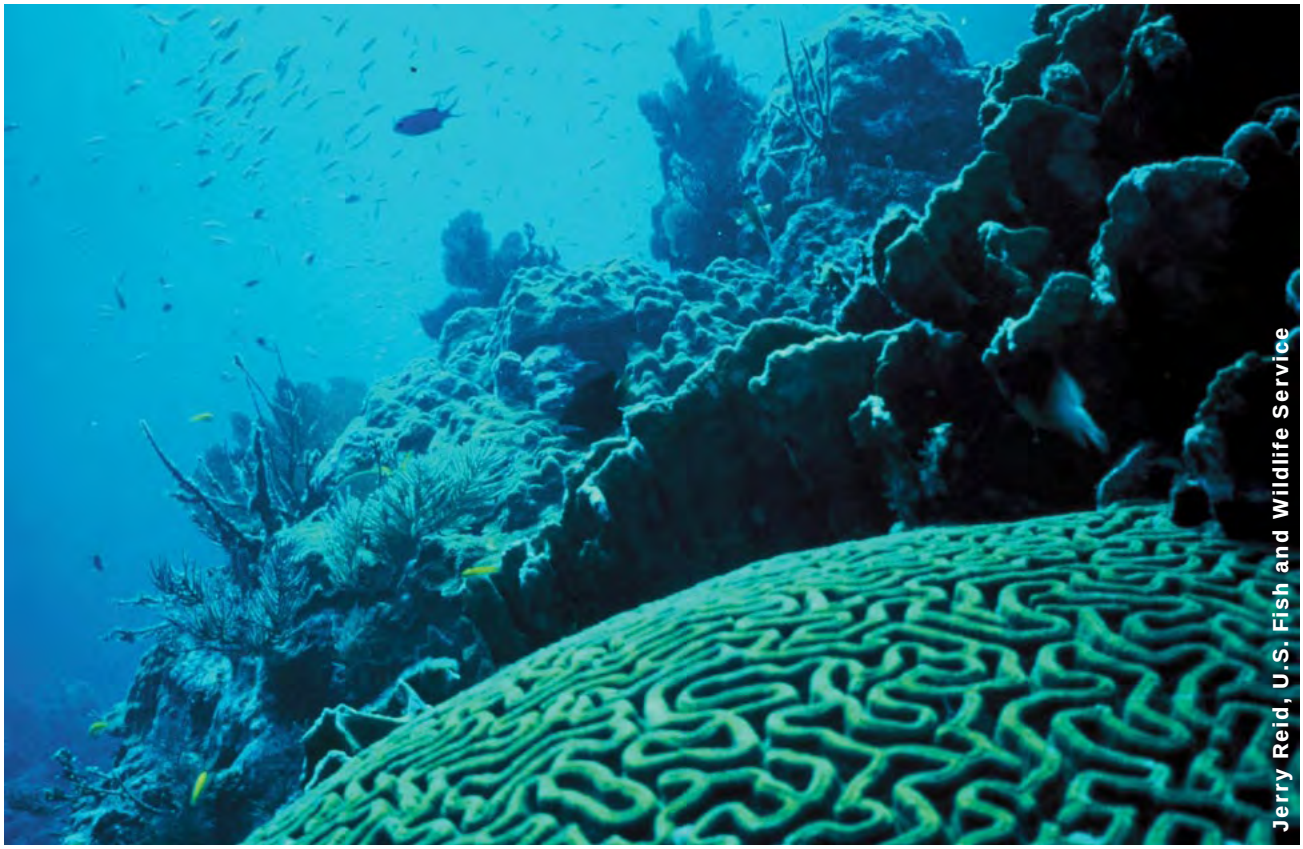
Sea turtle egg clutches face another challenge: rising temperatures. The gender of sea turtle hatchlings is highly sensitive to temperature.[161] Embryos incubating above about 88 degrees Fahrenheit are more likely to become females, while those incubating below about 82 degrees Fahrenheit are more likely to become males. Especially on our southern Atlantic coasts, studies suggest that populations of loggerhead sea turtles could become almost all female in some areas.[162] Unless nesting areas farther north continue to produce sufficient numbers of male sea turtle offspring, scientists worry that there could be a reduction in the reproductive success of loggerheads. In areas where average temperatures are already close to the upper threshold for incubation, including southern Florida, increased temperatures could also lead to higher rates of egg mortality.

Ocean Acidification Threatens Corals and Shells

Higher concentrations of carbon dioxide (CO_2) in the atmosphere are causing acidification of ocean waters. If CO_2 concentrations continue to increase at the current rate, the oceans will become more acidic (will have a lower pH) than they have been in millions of years.[163]



Acidification of ocean waters erodes the basic mineral building blocks for the shells and skeletons of calcareous and reef-building organisms such as shellfish and corals.[164] Although scientists are still in the early stages of understanding the consequences of ocean acidification for marine ecosystems, among the systems that appear at greatest risk are coral reefs. Coral reefs are already declining due to excessively high water temperatures causing coral bleaching events, from which they are often unable to recover.



Jerry Reid, U.S. Fish and Wildlife Service



Hurricane Sandy devastated coastal communities in New Jersey.

More Devastating Hurricanes

Atlantic hurricanes have increased in power since 1970, correlated with an increase in sea surface temperature in the region where hurricanes initiate.[165] Hurricanes are fueled by warm ocean waters, hence the intensity of hurricanes is likely to further increase during this century, bringing higher peak wind speeds, greater rainfall intensity, and higher storm surge heights and strength.[166] The increase in average summer wave heights along the U.S. Atlantic coastline since 1975 has been attributed to a progressive increase in hurricane power.[167]

Hurricane Sandy in October 2012 was a disastrous example of what climate change means for the future of America's coastlines. Coastal communities in New York and New Jersey experienced impacts never before seen, causing more than $60 billion in damages[168] and leaving an estimated 40,000 people in New York City still homeless nearly a week after the storm.[169]

Superstorm Sandy's powerful winds and storm surge reconfigured shorelines along much of the Mid-Atlantic coast, with particularly devastating effects from North Carolina to New York.[170] In many National Wildlife Refuges, the dikes of freshwater impoundments were breached by the storm surge and pounding waves. Of the 72 refuges in the region, thirty-five were temporarily closed.

022873



Gary Appelson

Sea Turtle Habitat on Florida Beaches Threatened By Sea Level Rise

The southern Atlantic shores of the United States are highly vulnerable to sea level rise, which could be devastating for sea turtles. Gary Appelson, policy director at the Sea Turtle Conservancy in Florida, says that "sea level rise is one of the biggest threats" facing sea turtles. Along Florida's central Atlantic Coast, parts of the region could see a 49 to 80 percent decline in the area of ocean beach with just a 15-inch rise in sea level, which is well within the range projected during this century.[171]

Unhindered, beaches would naturally migrate inland. But "in Florida, the beachfront development line means that the beach cannot move inland as it would naturally," Appelson says. People try to protect ocean front properties by building sea walls, "but this only increases the erosion around them and has devastating impacts on turtles and their nesting habitat." Florida has "the most aggressive beach renourishment program in the country" and spends tens of millions of dollars every year adding sand to the beach. This is economically unsustainable because "the cost of doing this in perpetuity will be unbelievable."

Florida's beaches host 90 percent of all the sea turtle nesting in North America, as well as approximately 80 million tourists every year.[172] Sea level rise is already a problem. "The beaches are eroding, Appelson says. "They have been eroding for decades." Furthermore, sea turtles "depend on the in-shore marine environment" of barrier islands, bays and inlets. "Sea turtles use in-shore grass beds for extensive foraging habitat and depend on near-shore reefs for refuge. And they come from all over. Sea turtles leave their nesting areas far, far away to come to Florida's grass beds." These critical habitats will also be impacted by rising seas and increasing temperatures.

"Florida's beaches are ground zero for sea level rise," says Appelson, posing a huge threat not only to sea turtles but to Florida's coastal economy and residents. "One of the most important things we can do to protect sea turtles, and people, is to reform coastal management … to incorporate climate change and sea level rise into planning, in addition to reducing carbon emissions."

CONCLUSION AND RECOMMENDATIONS

Confronting the climate crisis requires that we both address the underlying cause of climate change—by reducing our carbon pollution and transitioning to cleaner, more secure sources of energy—and that we consciously prepare for and adapt to current and future impacts of climate change and extreme weather events. Given the increasingly severe impacts of climate change, as documented in this report, aggressive action on both fronts is essential and must be a principle driver of U.S. energy policy and conservation practice.

Protect People and Wildlife from the Worst-Case Climate Change Scenarios

U.S. Leadership on Reducing Carbon Pollution

The latest science on climate change is sobering news: Recent reports find that without significant new steps to reduce carbon pollution the world is on track for global temperature increases of at least 7 degrees Fahrenheit by the end of the century.[173] Such a scenario will guarantee that future generations will inherit a world fundamentally different than the one we know today, one in which scientists predict that almost half of wildlife species would suffer mass extinction. While the climate crisis is a problem that ultimately requires global action, America can be a leader in driving forward policies here at home that reduce the threat of catastrophic climate change. We can do this by taking swift, significant action to reduce carbon pollution and restore our natural systems that absorb carbon from the atmosphere.

We must:

- **Create a national climate change action plan** that establishes a clear path for the United States to reduce its carbon pollution 50 percent by the year 2030.
- **Put a price on carbon pollution** so that the fossil fuel industries responsible for the climate change impacts threatening our communities and wildlife pay the full cost of their pollution.
- **Use and protect the laws we have** on the books to limit carbon pollution from major air pollution sources like coal-fired power plants, oil refineries, and cars.


Larry Schweiger/NWF

- **Prioritize energy policies** that support a rapid transition away from fossil fuels and advance the renewable energy sources needed to build a clean energy economy here at home.
- **Promote wise management** of grasslands, forests and agricultural lands as part of real-world strategies to remove excess carbon from the air and enhance wildlife habitat.

022875



A Whale of a Tale for Offshore Wind Power

Clean energy development is a critical part of cutting carbon pollution and reducing the impact of climate change on wildlife. To protect wildlife from the dangers of a warming world, we must take appropriate, responsible action to replace as much of our dirty fossil fuel use with clean renewable energy sources as possible.

For example, ocean biodiversity is at risk from ocean acidification, rising water temperatures, and sea level rise caused by carbon pollution that fuels climate change. At the same time, the ocean offers a tremendous opportunity to reduce the carbon pollution threatening the ocean: offshore wind power..

Like any energy development—if done without proper planning, siting, risk assessment and design— there is a potential for clean energy to negatively affect wildlife. National Wildlife Federation (NWF) takes this issue seriously. That is why we are actively engaged with a number of stakeholders to ensure clean energy development—whether wind, solar, or bioenergy—first avoids, then minimizes and ultimately compensates for unavoidable impacts to wildlife.

With the long-awaited arrival of this massive source of clean energy comes the obligation to do it correctly for wildlife. NWF worked closely with major offshore wind industry leaders and marine conservation organizations to forge an agreement that will protect the critically endangered North Atlantic right whale, helping to ensure wind power in the ocean can both stem the impacts of climate change and minimize its own impacts on marine wildlife.

Scientists estimate that less than 500 North Atlantic right whales are currently roaming our Atlantic shorelines. The whales are sensitive to underwater noises, and there is concern that the early survey activities of offshore wind developers could disturb migrating whales and divert them off their typical course into areas where they may be more vulnerable to predation from sharks and orcas or collision with ocean vessels. With so few individuals left, scientists have suggested that the loss of even one female right whale poses a threat to the population as a whole.

We need rapid, responsible wind energy development in the Atlantic that avoids these types of unacceptable impacts. The exciting news is that the leaders in the U.S. offshore wind industry agree.

With colleagues at the Conservation Law Foundation, Natural Resources Defense Council, New England Aquarium, and companies like Deepwater Wind, NRG Bluewater, and Energy Management Inc., NWF helped forge a first-of-its kind agreement that balances the needs of industry, the conservation community and the right whale. For more details on this exciting work to protect wildlife while advancing critically needed clean energy, visit www.nwf.org/offshorewind

Invest in Smart Energy Choices that Protect Wildlife and Promote Economic Growth

A serious effort to reduce carbon pollution will require smart energy choices at every level—from our households to the national policy choices we make as a country—that reduce dependence on fossil fuels and move us quickly towards a future powered by clean energy. Rejecting dirty fuels and embracing responsible clean energy development are essential for protecting people and wildlife from the dangers of climate change while spurring economic development.

We must:

- **Promote a rapid transition to clean energy sources**, such as wind, solar, geothermal, and sustainable bioenergy, by establishing national and state energy standards that ensure America is getting at least 50 percent of our electricity from clean, responsibly-sited renewable energy.
- **Stop the expansion of new dirty energy reserves**—like the massive coal fields in North America and the tar sands oil fields in Canada—and end federal subsidies that support fossil fuels, so that America is not locked into more carbon pollution for decades to come.
- **Ensure that all federal and state permitting decisions on energy projects are informed** by a thorough assessment of the resulting wildlife, water, land, and climate impacts, guided by smarter upfront planning, and maximize opportunities to reinvest revenue to address impacts to communities and natural resources.
- **Advance currently untapped, underutilized, and wildlife-friendly clean energy sources** such as offshore wind, distributed renewable generation, energy efficient buildings, and sustainable transportation options.
- **Promote truly sustainable biofuels and biomass energy production**, here at home and abroad, that not only ensures long-term economic viability of the industry but also protects and enhances native habitats and ecosystems.

Safeguard Wildlife and Natural Systems from the Impacts of Climate Change



Sustain Our Conservation Legacy through Safeguarding Wildlife and Their Habitats

The past century of conservation achievements are now at risk from the pervasive effects of climate change. Although climate change is global in nature, its effects are acutely local. Climatic shifts are amplifying the effect of a host of existing threats to our species and ecosystems, and undermining the ability of natural systems to provide for both people and wildlife. To sustain our rich legacy of conservation achievements, and ensure the survival of cherished wildlife species, policies and practices will have to embrace climate-smart approaches to conservation. Preparing for and managing these changes—climate adaptation—increasingly will need to serve as the basis for wildlife conservation and natural resource management.

Actions that can be taken now to prepare for and cope with the new conservation challenge include:

- Aggressively implement the forthcoming National Fish, Wildlife, and Plants Climate Adaptation Strategy, which represents a shared federal, state, and tribal vision for 21st century conservation.
- Promote the practice of "climate-smart conservation" by encouraging forward-looking conservation goals and by designing conservation actions to reduce climate vulnerabilities and enhance ecosystem resilience.
- Provide adequate space for wildlife to shift ranges in response to changing climatic conditions through strategic expansion of parks and refuges, enhancing connectivity among these protected habitats, and encouraging wildlife-friendly practices on lands and waters for agriculture, ranching, and other human uses.
- Provide adequate funding for federal and state programs critical to advancing climate science and adaptation, such as the Department of the Interior's Climate Science Centers and Landscape Conservation Cooperatives, and the U.S. Fish and Wildlife Service's State Wildlife Grants program.
- Ensure that actions taken to reduce carbon pollution are designed to minimize impacts on wildlife and their habitats, and encourage approaches for sequestering carbon in natural ecosystems that enhance habitat values.

Make Communities and Wildlife Safer from Extreme Weather

We live in a new era of extreme weather, driven in large part by climate change, and it is therefore critical to prepare people, property, and communities for a future of stronger, more damaging storms, flooding, heat waves, prolonged drought, and other extremes. We must make smarter development and infrastructure investments that reduce our risks from future extreme weather impacts, specifically by re-thinking where and how we build, and by increasing the resilience and adaptive capacities of ecological systems to help safeguard communities.

When natural disasters strike, rebuilding and recovery efforts should prioritize nature-based approaches, like restoring floodplains, to mitigate future risks.

Business as usual is no longer an option and we must work across sectors and scales of government to anticipate and prepare for extreme weather in the following ways:

- Promote climate readiness by supporting local, state, and federal agency efforts to develop climate adaptation plans that help communities understand their vulnerability to extreme weather and help them prepare for and cope with its impacts in ways that are beneficial for both people and wildlife.
- Prioritize and promote the use of non-structural, nature-based approaches, like living shorelines, to prepare for extreme weather; although hard armoring, like sea walls, may sometimes be necessary, climate adaptation planning should emphasize approaches that enhance ecosystems and habitats while providing natural protection against extreme weather.
- Require all federal, state, and local government agencies, service providers, and emergency responders to incorporate best-available climate change science into long-term disaster risk reduction and hazard mitigation activities and planning.
- Direct development and infrastructure away from environmentally sensitive and climate-vulnerable areas by using land-use planning tools, like zoning and comprehensive plans; by incentivizing development in less vulnerable areas; and by acquiring land in vulnerable areas better suited for wildlife habitat than for development.
- Build productive, sustainable urban landscapes through smarter planning and design choices that use green infrastructure, including landscape features (open space, parks, tree canopy) and low-impact development, to build resilience to climate impacts and reduce carbon pollution, while also providing wildlife habitat.

NOW IS THE TIME
TO CONFRONT THE CLIMATE CRISIS

Our nation's plants, fish, and wildlife are already facing a climate crisis with many changes happening faster than scientists anticipated, putting America's people and wildlife at risk. Extreme weather is devastating communities and habitats; species' range shifts are happening two to three times faster than previous estimates; and more and more wildlife species are on the brink of extinction due to human-caused climate change. Now is the time for America to take swift, bold action to reduce carbon pollution that is heating the planet and properly deal with the unavoidable impacts of an already changing climate.

The rest of the world has already begun to address the risks presented by the rapidly warming planet and are moving ahead with action to address the challenge. The clean energy sector is growing rapidly—global investments have increased by more than 600 percent in the past seven years[174]—and the United States is losing out.[175] For example, China and Germany have long-term, national, clean energy policies to attract investment and spur job creation, quickly leaving the United States behind. America needs to recognize that inaction is not a viable climate change policy and prevents us from taking advantage of the opportunities to create jobs and economic prosperity in concert with bold, swift action to reduce the carbon pollution that is heating our planet.

By harnessing America's spirit of ingenuity and leadership, we can confront the climate crisis and sustain our nation's conservation legacy. The challenges that climate change poses for wildlife and people are daunting. Fortunately, we know what's causing these changes, and we know what needs to be done to chart a better course for the future. As we begin to see whole ecosystems transform before our very eyes, we also know that we have no time to waste.


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Learn more & act!

www.nwf.org/climatecrisis

References

1. Chen IC, Hill JK, Ohlemuller R, Roy DB, and Thomas CD. 2011. Rapid range shifts of species associated with high levels of climate warming. *Science* 333: 1,024-1,026.
2. National Audubon Society. 2009. Birds and Climate Change: Ecological Disruption in Motion. National Aududon Society, New York.
3. Moritz C, Patton JL, Conroy CJ, Parra JL, White GC, and Beissinger SR. 2008. Impact of a century of climate change of small-mammal communities in Yosemite National Park, USA. Science 322: 261-264.
4. Crimmins SM, Dobrowski SZ, Greenberg JA, Abatzoglou JT, and Mynsberge AR. 2011. Changes in Climatic Water Balance Drive Downhill Shifts in Plant Species' Optimum Elevations. Science 331: 324-327.
5. Burrows MT, Schoeman DS, et al. 2011. The pace of shifting climate in marine and terrestrial ecosystems. Science 334: 652-655.
6. Dial RJ, Berg EE, Timm K, McMahon A, and Geck J. 2007. Changes in the alpine forest-tundra ecotone commensurate with recent warming in southcentral Alaska: Evidence from orthophotos and field plots. Journal of Geophysical Research-Biogeosciences 112: G04015, 15 p.
7. Millar CI, Westfall RD, Delany DL, King JC, and Graumlich LJ. 2004. Response of subalpine conifers in the Sierra Nevada, California, USA, to 20th-century warming and decadal climate variability. Arctic Antarctic and Alpine Research 36: 181-200.
8. Beckage B, Osborne B, Gavin DG, Pucko C, Siccama T, and Perkins T. 2008. A rapid upward shift of a forest ecotone during 40 years of warming in the Green Mountains of Vermont. Proceedings of the National Academy of Sciences USA 105: 4,197-4,202.
9. Turner MG. 2010. Disturbance and landscape dynamics in a changing world. Ecology 91: 2833-2849.
10. Burrows MT, Schoeman DS, et al. 2011. The pace of shifting climate in marine and terrestrial ecosystems. Science 334: 652-655.
11. Chen IC, Hill JK, Ohlemuller R, Roy DB, and Thomas CD. 2011. Rapid range shifts of species associated with high levels of climate warming. Science 333: 1,024-1,026.
12. Gonzalez P, Neilson RP, Lenihan JM, and Drapek RJ. 2010. Global patterns in the vulnerability of ecosystems to vegetation shifts due to climate change. Global Ecology and Biogeography 19: 755-768.
13. Staudinger MD, Grimm NB, Staudt A, Carter SL, Chapin FS, Kareiva P, Ruckelshaus M, Stein BA. 2012. Impacts of Climate Change on Biodiversity, Ecosystems, and Ecosystem Services: Technical Input to the 2013 National Climate Assessment. Cooperative Report to the 2013 National Climate Assessment. 296 p. Available at: http://assessment.globalchange.gov
14. Post E, Pedersen C, Wilmers CC, and Forchhammer MC. 2008. Warming, plant phenology and the spatial dimension of trophic mismatch for large herbivores. Proceedings of the Royal Society B-Biological Sciences 275: 2,005-2,013.
15. Winder M, and Schindler DE. 2004. Climate change uncouples trophic interactions in an aquatic ecosystem. Ecology 85: 2,100-2,106.
16. Ozgul A, Childs DZ, Oli MK, Armitage KB, Blumstein DT, Olson LE, Tuljapurkar S, and Coulson T. 2010. Coupled dynamics of body mass and population growth in response to environmental change. Nature 466: 482-485.
17. Bruno JF, Selig ER, Casey KS, Page CA, Willis BL, Harvell CD, Sweatman H, and Melendy AM. 2007. Thermal stress and coral cover as drivers of coral disease outbreaks. PLoS ONE Biology 5: 1,220-1,227.
18. Ford SE, and Smolowitz R. 2007. Infection dynamics of an oyster parasite in its newly expanded range. Marine Biology 151: 119-133.
19. Meddens AJH, Hicke JA, and Ferguson CA. 2012. Spatiotemporal patterns of observed bark beetle-caused tree mortality in British Columbia and the western United States. Ecological Applications 22: 1,876-1,891.
20. Cahill AE, Aiello-Lammens ME, et al. 2012. How does climate change cause extinction? Proc. R. Soc. B published online.
21. Epps CW, McCullough D, Wehausen JD, Bleich VC, and Rechel JL. 2004. Effects of climate change on population persistence of desert-dwelling mountain sheep in California. Conservation Biololgy 18: 102-113.
22. McMenamin SK, Hadley EA, and Wright CK. 2008. Climatic change and wetland desiccation cause amphibian decline in Yellowstone National Park. Proceedings of the National Academy of Sciences USA 105: 16,988-16,993.
23. McLaughlin JF, Hellmann JJ, Boggs CL, and Ehrlich PR. 2002. Climate change hastens population extinctions. Proceedings of the National Academy of Sciences USA 99: 6,070-6,074.
24. Harte J, and Kitzes J. 2011. The use and misuse of species area relationships in predicting climate driven extinction. In Hannah L (Ed.), Saving a million species: Extinction risk from climate change. Island Press, Washington, DC.
25. Thomas CD, Cameron A, et al. 2004. Extinction risk from climate change. Nature 427: 145-148.
26. Bentz BJ, Jacques R, et al. 2010. Climate change and bark beetles of the Western United States and Canada: Direct and indirect effects. BioScience 60(8): 602-613.
27. van Mantgem PJ, Stephenson NL, et al. 2009. Widespread increase of tree mortality rates in the western United States. Science 323: 521-524.
28. Brooks PD, Grogan P, Templer PH, Groffman PM, Oquist MG, and Schimel J. 2011. Carbon and nitrogen cycling in snow-covered environments. Geography Compass 5: 682-699.
29. Staudinger et al., 2012.
30. Lindley ST, Schick RS, et al. 2007. Framework for Assessing Viability of Threatened and Endangered Chinook Salmon and Steelhead in the Sacramento-San Joaquin Basin. San Francisco Estuary and Watershed Science 5: Art. 4.
31. Williams, J. 2006. Central Valley Salmon: A Perspective on Chinook and Steelhead in the Central Valley of California. San Francisco Estuary and Watershed Science 4: Art. 2.
32. Diez JM, D'Antonio CM, et al. 2012. Will extreme climatic events facilitate biological invasions? Frontiers in Ecology and the Environment 10(5): 249-257.
33. Groisman PY, Knight RW, Karl TR, Easterling DR, Sun BM, and Lawrimore JH. 2004. Contemporary changes of the hydrological cycle over the contiguous United States: Trends derived from in situ observations. Journal of Hydrometeorology 5: 64-85.
34. Howarth RW, Swaney DP, Boyer EW, Marino R, Jaworski N, and Goodale C. 2006. The influence of climate on average nitrogen export from large watersheds in the Northeastern United States. Biogeochemistry 79: 163-186.
35. Sobota DJ, Harrison JA, and Dahlgren RA. 2009. Influences of climate, hydrology, and land use on input and export of nitrogen in California watersheds. Biogeochemistry 94: 43-62.
36. McIsaac GF, David MB, Gertner GZ, and Goolsby DA. 2002. Relating net nitrogen input in the Mississippi River basin to nitrate flux in the lower Mississippi River: A comparison of approaches. Journal of Environmental Quality 31: 1,610-1,622.
37. Allison MA, Dellapenna TM, Gordon ES, Mitra S, and Petsch ST. 2010. Impact of Hurricane Katrina (2005) on shelf organic carbon burial and deltaic evolution. Geophysical Research Letters 37: L21605, 5 p. Castaneda-Moya E, Twilley RR, Rivera-Monroy VH, Zhang K, Davis SE, III, and Ross M. 2010. Sediment and nutrient deposition associated with Hurricane Wilma in mangroves of the Florida coastal Everglades. Estuaries and Coasts 33: 45-58.
38. Sabo JL, Finlay JC, Kennedy T, and Post DM. 2010. The role of discharge variation in scaling of drainage area and food chain length in rivers. Science 330: 965-967. Carlisle DM, Wolock DM, and Meador MR. 2011. Alteration of streamflow magnitudes and potential ecological consequences: a multiregional assessment. Frontiers in Ecology and the Environment 9: 264-270.
39. Sponseller RA, Grimm NB, Boulton AJ, and Sabo JL. 2010. Responses of macroinvertebrate communities to long-term variability in a Sonoran Desert stream. Global Change Biology 16: 2,891–2,900.
40. Markon CJ, Trainor SF, and Chapin FS, III, (Eds.). 2012. The United States National Climate Assessment—Alaska Technical Regional Report. U.S. Geological Survey Circular 1379: 148 pp.
41. http://nsidc.org/arcticseaicenews/2012/09/

022880



42. Stroeve J, Holland MM, Meier W, Scambos T, Serreze M. 2007. Arctic sea ice decline: faster than forecast. Geophysical Research Letters 34(9): L09501.

43. http://www.climatewatch.noaa.gov/article/2012/arctic-sea-ice-getting-thinner-younger

44. http://alaska.usgs.gov/science/biology/polar_bears/pbear_sea_ice.html#shift

45. Wang MY, and Overland JE. 2009. A sea ice free summer Arctic within 30 years? Geophysical Research Letters 36: L07502.

46. Rode KD, Amstrup SC, and Regehr EV. 2010. Reduced body size and cub recruitment in polar bears associated with sea ice decline. Ecological Applications 20: 768-782.

47. Fischbach AS, Amstrup SC, and Douglas DC. 2007. Landward and eastward shift of Alaskan polar bear denning associated with recent sea ice changes. Polar Biology. published online.

48. U.S. Fish and Wildlife Service (USFWS). 2008. Determination of Threatened Status for the Polar Bear.

49. http://www.ryot.org/melting-sea-ice-affecting-walrus-behavior/19514

50. Post E, Pedersen C, Wilmers CC, and Forchhammer MC. 2008. Warming, plant phenology and the spatial dimension of trophic mismatch for large herbivores. Proceedings of the Royal Society B-Biological Sciences 275: 2,005-2,013. Danby RK, Hik DS. 2006. Variability, contingency and rapid change in recent subarctic alpine tree line dynamics. Journal of Ecology 95: 352-363. Tape K, Sturm M, and Racine C. 2006. The evidence for shrub expansion in Northern Alaska and the Pan-Arctic. Global Change Biology 12: 686-702.

51. Høye TT, Post E, Meltofte H, Schmidt NM, and Forchhammer MC. 2007. Rapid advancement of spring in the High Arctic. Current Biology 17: R449-R451.

52. Killengreen ST, Ims RA, Yoccoz NG, Brathen KA, Henden J-A, and Schott T. 2007. Structural characteristics of a low Arctic tundra ecosystem and the retreat of the Arctic fox. *Biological Conservation* 135: 459-472.

53. http://cmsdata.iucn.org/downloads/fact_sheet_red_list_arctic_foxes.pdf

54. Post et al., 2008.

55. http://www.fws.gov/policy/library/2011/2011-7653.pdf

56. Shepherd A, Ivans ER, et al. 2012. A Reconciled Estimate of Ice-Sheet Mass Balance. *Science* 338(6111): 1,183-1,189.

57. Francis JA, and Vavrus SJ. 2012. Evidence Linking Arctic Amplification to Extreme Weather in Mid-Latitudes, *Geohpysical Research Letters* 39: L06801.

58. Schuur EAG, Abbott B, and Network PC. 2011. High risk of permafrost thaw. *Nature* 480: 32-33.

59. Koven CD, Ringeval B, *et al*. 2011. Permafrost carbon-climate feedbacks accelerate global warming. Proceedings of the National Academy of Sciences USA 108: 14,769-14,774.

60. http://www.afsc.noaa.gov/nmml/species/species_ringed.php

61. http://www.noaanews.noaa.gov/stories2010/20101203_sealsesa.html

62. http://alaskafisheries.noaa.gov/protectedresources/seals/ice.htm

63. Rice D. 2012. U.S. endures near-record wildfire season. USA Today. 12 Nov. 2012. http://www.usatoday.com/story/weather/2012/11/11/wildfire-season-destruction/1695465/

64. Westerling AL, Hidalgo HG, Cayan DR, and Swetnam TW. 2006. Warming and Earlier Spring Increases Western U.S. Forest Wildfire Activity, Science 313: 940-943.

65. Gorte RG. 2011. *Federal Funding for Wildfire Control and Management* Congressional Research Service 7-5700: RL33990.

66. Keys J. 2012. Climate Change Boulder Fires Show Local Impact. *Alliance for Sustainable Colorado*. http://www.sustainablecolorado.org/blog/climate-change/climate-change-boulder-fires-show-local-impact

67. Rice D, 2012.

68. Waldo Canyon Burned Area Emergency Response Report Overview. 2012. *InciWeb: Incident Information System*. http://www.inciweb.org/incident/article/2929/16628/

69. Staudinger et al., 2012.

70. http://www.coloradoan.com/VideoNetwork/1724011281001/Poudre-River-runs-black

71. MacFarlane WW, Logan JA, and Kern WR. 2009. Using the landscape assessment system (LAS) to assess mountain pine beetle-caused mortality of whitebark pine, Greater Yellowstone Ecosystem, 2009. Jackson, Wyoming.

72. Westerling AL, Turner MG, Smithwick EAH, Romme WH, and Ryan MG. 2011. Continued warming could transform Greater Yellowstone fire regimes by mid-21st century. *Proceedings of the National Academy of Sciences USA* 108: 13,165-13,170.

73. Ellison AM, Bank MS, *et al*. 2005. Loss of foundation species: consequences for the structure and dynamics of forested ecosystems. *Frontiers in Ecology and the Environment* **3**: 479-486.

74. Gunther KA, Aber B, Bruscino MT, Cain SL, Frey K, Haroldson MA, and Schwartz CC. 2011. Grizzly Bear-Human Conflicts in the Greater Yellowstone Ecosystem. In Schwartz CC, Haroldson MA, and West K. *Yellowstone Grizzly Bear Investigations: Annual Report of the Interagency Grizzly Bear Study Team, 2010.* U.S. Geological Survey, Bozeman, MT, USA.

75. Gunther et al., 2011.

76. Greater Yellowstone Coordinating Committee Whitebark Pine Subcommittee (GYCC). 2011. Whitebark pine strategy for the greater Yellowstone area. 41 p. http://www.fedgycc.org/documents/WBP-StrategyFINAL5.31.11.pdf

77. Peters DPC, Yao J, Sala OE, and Anderson JP. 2012. Directional climate change and potential reversal of desertification in arid and semiarid ecosystems. *Global Change Biology* 18: 151-163.

78. Rood SB, Pan J, Gill KM, Franks CG, Samuelson GM, and Shepherd A. 2008. Declining summer flows of Rocky Mountain rivers: Changing seasonal hydrology and probable impacts on floodplain forests. *Journal of Hydrology* 349: 397-410. Stromberg JC, Lite SJ, and Dixon MD. 2010. Effects of stream flow patterns on riparian vegetation of a semiarid river: Implications for a changing climate. *River Research and Applications* 26: 712-729.

79. Palmer MA, Lettenmaier DP, Poff NL, Postel SL, Richter B, and Warner R. 2009. Climate Change and River Ecosystems: Protection and Adaptation Options. Environmental Management 44: 1,053-1,068.

80. Robles MD and Enquist C. 2010. Managing changing landscapes in the Southwestern United States. The Nature Conservancy, Tucson, AZ.

81. Breshears DD, Cobb NS, et al. 2005. Regional vegetation die-off in response to global-change-type drought. Proceedings of the National Academy of Sciences USA 102 (42): 15,144-15,148.

82. Adams HD, Guardiola-Claramonte M, et al. 2009. Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global change-type drought. Proceedings of the National Academy of Sciences USA 106: 7,063-7,066.

83. Overpeck J, Garfin G, et al. 2012. Chapter 1: Summary for Decision Makers. In: Assessment of Climate Change in the Southwest United

States: a Technical Report Prepared for the U.S. National Climate Assessment. A report by the Southwest Climate Alliance [Gregg Garfin, Angela Jardine, Robert Merideth, Mary Black, and Jonathan Overpeck (Eds.)]. Southwest Climate Alliance, Tucson, AZ. June 2012 Southwest Climate Summit Draft.

84. USDA Forest Service. 2008. Challenging cheatgrass: Can tools like the 'black fingers of death' fight this formidable invasive species? Rocky Mountain Research Laboratory. http://www.fs.fed.us/rmrs/docs/rmrs-science/cheatgrass-challenge-2008-04.pdf

85. Bradley BA. 2009. Regional analysis of the impacts of climate change on cheatgrass invasion shows potential risk and opportunity. *Global Change Biology* 15: 196-208.

86. National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC). 2012. State of the Climate, Drought, June 2012. http://www.ncdc.noaa.gov/sotc/drought/2012/6

87. U.S. Global Change Research Program (USGCRP). 2009. *Global Climate Change Impacts in the United States*. Cambridge University Press.

88. Krapu GL, Pietz JP, Brandt DA, and Cox RR. 2006. Mallard Brood Movements, Wetland Use, and Duckling Survival During and Following a Prairie Drought. *Journal of Wildlife Management* 70: 1,436-1,444.

89. Johnson WC, Werner B, *et al*. 2010. Prairie Wetland Complexes as Landscape Functional Units in a Changing Climate. *Bioscience* 60(2): 128-140.

90. Voggesser G. 2012. Drought, Climate Change Hit Home for Hunters. *Sportsmen for Responsible Energy Development*. http://sfred.org/blog/drought-climate-change-hits-home-for-hunters

91. Telegraph-Herald Online. 2012. Outdoors: Heat wave thinning Iowa's fish population. http://www.thonline.com/sports/local_sports/article_777aa3f1-f987-5084-b8d0-3830d8e5eee9.html

92. Zelman J. 2012. Midwest Heat Wave 2012: Thousands Of Fish Die In Hot Weather. *The Huffington Post*. http://www.huffingtonpost.com/2012/08/05/midwest-heat-wave-2012_n_1744504.html

93. Llanos M. 2012. Drought Dries up Stretch of Platte River, Slows Barges on Lower Mississippi. *U.S. News NBC*. http://usnews.nbcnews.com/_news/2012/08/03/13090325-drought-dries-up-stretch-of-platte-river-slows-barges-on-lower-mississippi?lite.

94. Kalish J. 2012. Record summer heat killing more fish. *Great Lakes Echo*. http://greatlakesecho. org/2012/07/31/record-summer-heat-killing-more-fish/

95. Ozoga J. 2012. The Easy Season for Deer…sometimes. *Whitetail News*. http://www.whitetailinstitute.com/info/news/jun04/8.html

96. Cusick D and Climatewire. 2012. Rapid Climate Changes Turn North Woods into Moose Graveyard. *Scientific American*. http://www.scientificamerican.com/article.cfm?id=rapid-climate-changes-turn-north-woods-into-moose-graveyard

97. United States Department of the Interior. 2006. Sandhill Cranes Appendix. *Platte River Recovery Implementation Program*. Bureau of Reclamation and U.S. Fish and Wildlife Service.

98. Fang Y. 2011. Presentation: *Observed and projected future drought variability in the Great Plains*. School of Natural Resources, University of Nebraska-Lincoln. http://watercenter.unl.edu/climate2011/PresentationsBreakout3/Feng.pdf

99. NOAA NCDC. 2009. *Billion Dollar U.S. Weather Disasters*. http://www.ncdc.noaa.gov/oa/reports/billionz.html.

100. Johnson GP, Holmes, Jr. RR, and Waite LA. 2004. The Great Flood of 1993 on the Upper Mississippi River—10 Years Later. USGS Fact Sheet 2004-3024. Available at: http://il.water.usgs.gov/pubs/fs2004-3024.pdf

101. NOAA NCDC, 2009.

102. NOAA NCDC, 2009.

103. Gast P. 2011. Levee Breach Lowers River, but Record Flooding Still Forecast. *CNN*. http://www.cnn.com/2011/US/05/03/missouri.levee.breach/index.html?hpt=Sbin

104. Groisman PY, Knight RW, and Karl TR. 2001. Heavy precipitation and high streamflow in the contiguous United States: trends in the 20th century. *Bulletin of the* American Meteorological Society 82(2): 219-246.

105. Groisman PY, Knight RW, and Karl TR. 2012. Changes in Intense Precipitation over the Central United States. Journal of Hydrometeorology 13: 47–66.

106. U.S. Climate Change Science Program (CCSP). 2008. Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. [Thomas R. Karl, et al. (Eds.)]. Department of Commerce, NOAA's National Climatic Data Center, Washington, D.C.: 164 pp.

107. Hipple JD, Drazkowski B, and Thorsell PM. 2005. Development in the Upper Mississippi Basin: 10 years after the Great Flood of 1993. Landscape and Urban Planning 72(4): 313-323.

108. Environmental Protection Agency (EPA). 2001. Functions and Values of Wetlands. EPA 843-F-01-002c. http://water.epa.gov/type/wetlands/outreach/upload/functions-values.pdf

109. Demissie M. and Khan A. 1993. *Influence of Wetlands on Streamflow in Illinois*. Illinois State Water Survey, Contract Report 561, Champaign, IL: 44-45.

110. Staudinger *et al.,* 2012.

111. http://www.fws.gov/southeast/2011floodsfires_states.html

112. http://www.nwrc.usgs.gov/factshts/2004-3053.pdf

113. Middleton BA. 2006. Baldcypress swamp management and climate change: U.S. Geological Survey Open-File Report 2006-1269: 3 p.

114. Staudinger et al., 2012.

115. Sowa SP, Annis G, Morey ME, and Diamond DD. 2007. A gap analysis and comprehensive conservation strategy for riverine ecosystems of Missouri. *Ecological Monographs* 77: 301-334.

116. Allison MA, Dellapenna TM, Gordon ES, Mitra S, and Petsch ST. 2010. Impact of Hurricane Katrina (2005) on shelf organic carbon burial and deltaic evolution. *Geophysical Research Letters* **37**: L21605.

117. Hall K. 2012. Climate Change in the Midwest: Impacts on Biodiversity and Ecosystems. In: *U.S. National Climate Assessment Midwest Technical Input Report*. J. Winkler, J. Andresen, J. Hatfield, D. Bidwell, and D. Brown (coordinators). http://glisa.msu.edu/docs/NCA/MTIT_Biodiversity.pdf.

118. Opperman JJ, Galloway GE, Fargione J, Mount JF, Richter BD, and Secchi S. 2009. Sustainable floodplains through large-scale reconnection to rivers. *Science* 326: 1,487-1,488.

119. http://www.usgs.gov/blogs/features/usgs_top_story/dead-zone-the-source-of-the-gulf-of-mexicos-hypoxia/

120. Justic D, Rabalais NN, and Turner RE. 2005. Coupling between climate variability and coastal eutrophication: Evidence and outlook for the northern Gulf of Mexico. *Journal of Sea Research* **54**: 25-35.

121. Justic D, Rabalais NN, and Turner RE. 1996. Effects of climate change on hypoxia in coastal waters: a doubled CO_2 scenario for the northern Gulf of Mexico. *Limnology and Oceanography* 41: 992-1,003.

122. http://en.wikipedia.org/wiki/Great_Lakes

123. Hayhoe KJ, VanDorn T, Croley II N, Schlegal and Wuebbles D. 2010. Regional Climate change projections for Chicago and the US Great Lakes. Journal of Great Lakes Research 36: 7-21.

124. U.S. Drought Monitor: http://www.droughtmonitor.unl.edu/

125. http://www.ns.umich.edu/new/releases/20750-climate-change-likely-to-increase-lake-erie-algae-blooms-and-dead-zones-according-to-u-michigan-ecologist

126. http://www.ns.umich.edu/new/releases/20750-climate-change-likely-to-increase-lake-erie-algae-blooms-and-dead-zones-according-to-u-michigan-ecologist

127. http://www.dispatch.com/content/stories/local/2012/11/25/algae-invaders-threaten-lake-erie.html

128. Wang J, Bai S, Hu H, Clintes A, Colton M, Lofgren B. 2012. Temporal and Spatial Variability of Great Lakes Ice Cover, 1973-2010. Journal of Climate 25: 1,318-1,329.

129. http://www.glerl.noaa.gov/pubs/brochures/ice/ice.pdf

130. http://news.medill.northwestern.edu/chicago/news.aspx?id=208920

131. USGCRP, 2009.

132. Wilcox KL, Petrie SA, Maynard LA, and Meyer SW. 2003. Historical distribution and abundance of Phragmites australis at Long Point, Lake Erie, Ontario. Journal of Great Lakes Research 29: 664-680.

133. Kitchell J. Interview on Wisconsin Public Radio September 17, 2012. http://news.wpr.org/term/lake-superior

134. Hayhoe K, VanDorn J, Croley II T, Schlegal N and Wuebbles D. 2010. Regional Climate change projections for Chicago and the US Great Lakes. Journal of Great Lakes Research 36: 7-21.

135. Wuebbles DJ, Hayhoe K, and Parzen J. 2010. Introduction: Assessing the effects of climate change on Chicago and the Great Lakes. Journal of Great Lakes Research 36: 1-6.

136. http://www.climatecentral.org/news/great-lakes-water-temperatures-at-record-levels

137. http://www.lakescientist.com/2010/sea-lamprey-increase-could-be-due-to-rising-lake-superior-temperatures

138. http://www.glfc.org/sealamp/#damage

139. Kling GW, Hayhoe K, et al. 2003. Confronting Climate Change in the Great Lakes Region: Impacts on our Communities and Ecosystems. Union of Concerned Scientists, Cambridge, Massachusetts, and Ecological Society of America, Washington, D.C.

140. Inkley DB. 2012. Climate-Smart Restoration for the Black River in Lorain County, Ohio. National Wildlife Federation, Washington, D.C.

141. http://www.epa.gov/greatlakes/aoc/blackriver.html

142. http://www.epa.gov/greatlakes/aoc/blackriver.html

143. http://en.wikipedia.org/wiki/Appalachian_Mountains

144. Iverson LR, Prasad AM, Matthews SN, and Peters M. 2008. Estimating potential habitat for 134 eastern US tree species under six climate scenarios. Forest Ecology and Management 254: 390–406.

145. Rustad L, Campbell J, Dukes J., Huntington T, Lambert KF, Mohan J, and Rodenhouse N. 2012. Changing Climate, Changing Forests: The Impacts of Climate Change on Forests of the Northeastern United States and Eastern Canada. USDA Forest Service, Northern Research Station, General Technical Report NRS-99.

146. Beckage B, Osborne B, Gavin DG, Pucko C, Siccama T, and Perkins T. 2008. A rapid upward shift of a forest ecotone during 40 years of warming in the Green Mountains of Vermont. *Proceedings of the National Academy of Sciences USA* 105: 4,197-4,202.

147. Rodenhouse NL, Christenson LM, Parry D, and Green LE. 2009. Climate change effects on native fauna of northeastern forests. *Canadian Journal of Forest Research* 39(2): 249-263.

148. Sork VL, Bramble J, and Sexton O. 1993. Ecology of Mast-Fruiting in Three Species of North American Deciduous Oaks. *Ecology* 74: 528-541.

149. Healy WM, Lewis AM, and Boose EF. 1999. Variation of red oak acorn production. *Forest Ecology and Management* 116(1-3): 1-11.

150. http://nrs.fs.fed.us/pubs/other/oak_sym/oak_symposium_proceedings_044.pdf

151. Burkett VR and Davidson MA (Eds.). 2012. *Coastal Impacts, Adaptation and Vulnerability: A Technical Input to the 2012 National Climate Assessment*. Cooperative Report to the 2013 National Climate Assessment, pp. 150.

152. Parris A, Bromirski P, *et al.* 2012. *Global Sea Level Rise Scenarios for the United States National Climate Assessment.*

153. Sallenger, Jr. AH, Doran KS, and Howd PA. 2012. Hotspot of accelerated sea level rise on the Atlantic Coast of North America. *Nature Climate Change* 2: 884-888.

154. Florida Oceans and Coastal Council. 2009. *The Effects of Climate Change on Florida's Ocean and Coastal Resources.* A special report to the Florida Energy and Climate Commission and the people of Florida. Tallahassee, FL.

155. Nye JA, Link JS, Hare JA, and Overholtz WJ. 2009. Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States continental shelf. *Marine Ecology-Progress Series* 393: 111-129.

156. Staudinger et al., 2012.

157. Hare JA, Alexander MA, Fogarty MJ, Williams EH, and Scott JD. 2010. Forecasting the dynamics of a coastal fishery species using a coupled climate-population model. Ecological Applications 20: 452-464.

158. Richardson W. 2012. Portland symposium addresses climate change's effects on lobster fishery. Bangor Daily News. http://bangordailynews.com/2012/11/29/business/climate-changes-effects-on-lobster-fishery-among-topics-addressed-in-portland-symposium/

159. Richardson, 2012.

160. http://bigstory.ap.org/article/conn-studies-lobster-deaths-long-island-sound

161. Hawkes LA, Broderick AC, Godfrey MH, and Godley BJ. 2009. Climate change and marine turtles. Endangered Species Research 7: 137-154.

162. Hawkes LA, Broderick AC, Godfrey MH, and Godley BJ. 2007. Investigating the potential impacts of climate change on a marine turtle population. Global Change Biology 13: 923-932.

163. Orr JC, Fabry VJ, et al. 2005. Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms. Nature 437: 681-686.

164. Kuffner I, and Tihansky A. 2008. Coral Reef Builders Vulnerable to Ocean Acidification. U.S. Geological Survey, Reston, VA.

165. Emanuel K. 2007. Environmental Factors Affecting Tropical Cyclone Power Dissipation. Journal of Climate 20: 5,497-5,509.

166. Knutson TR, McBride J, et al. 2010. Tropical cyclones and climate change. *Nature Geoscience* 3: 157-163.

167. Komar PD, and Allan JC. 2007. Higher Waves Along U.S. East Coast Linked to Hurricanes. *Eos* 88: 301.

168. The National Association of State Budget Officers. 2012. Hurricane Sandy Preliminary Cost Estimates Released; Outlook for Supplemental Appropriation. http://www.nasbo.org/publications-data/washington-report/hurricane-sandy-preliminary-cost-estimates-released-outlook-supp

169. http://www.hispanicbusiness.com/2012/11/5/tens_of_thousands_remain_homeless_after.htm

170. Fears D. 2012. Sandy's Damage to Wildlife Refuges Adds to Questions about Federal Spending. The Washington Post. 18 Nov. 2012.

171. Glick P, and Clough J. 2006. An Unfavorable Tide: Global Warming, Coastal Habitats and Sportfishing in Florida. National Wildlife Federation, Reston, VA and Florida Wildlife Federation, Tallahassee, FL.

172. http://media.visitflorida.org/research.php

173. Potsdam Institute for Climate Impact Research and Climate Analytics. 2012. *Turn Down Heat: Why a 4°C Warmer World Must Be Avoided.* A report for the World Bank. http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf

174. Schrader S. 2012. Renewable Energy Investment Increases to $263 Billion. *Green Chips Stocks.* 16 Apr. 2012.

175. The Pew Charitable Trusts. 2012. *Who's Winning the Clean Energy Race? 2011 Edition.* http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/FINAL_forweb_WhoIsWinningTheCleanEnergyRace-REPORT-2012.pdf

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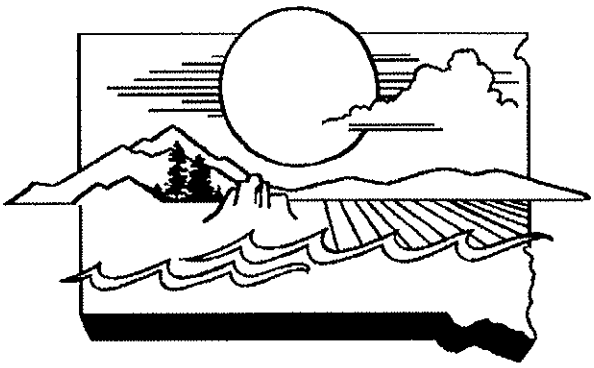
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THE 2012 SOUTH DAKOTA INTEGRATED REPORT FOR SURFACE WATER QUALITY ASSESSMENT



Protecting South Dakota's Tomorrow...Today

Prepared By
SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

STEVEN M. PIRNER, SECRETARY

Exhibit 8013

Bad River Basin (Figure 10, Table 24)

The Bad River basin lies in west-central South Dakota between the Cheyenne and White River basins and drains approximately 3,175 square miles. Historically, a main characteristic of the basin has been a general lack of constant river flow. The upper portion of the Bad River receives water from the Badlands and artesian wells in the Phillip area. These wells contribute minimal flow to the upper portion of the Bad River. There are prolonged periods of low flow in the Bad River reach from Midland to the Missouri River.

DENR has assessed four lakes within the basin and also has one water quality monitoring site located on the Bad River. During the 2010 reporting cycle EPA added Lake Waggoner to the 303(d) list for not supporting the designated warmwater fish life and recreation beneficial uses due to chlorophyll-*a*. This listing was based strictly on ad hoc criteria developed by EPA to address narrative standards associated with eutrophication. EPA's methodology and justification for this listing is defined in the 2010 Integrated Report.

The USGS has water quality monitoring sites on the Bad River and on some of the intermittent streams in the basin on Plum Creek, the South Fork Bad River, and an unnamed tributary of Cottonwood Creek. However, the data are very limited, and for most sites, the only parameters that were measured were specific conductance and water temperature.

The Bad River, from the Stanley County line to the mouth, is currently not supporting its designated beneficial uses due to exceedances of TSS. A TMDL was approved for TSS in 2001. The Bad River, from its north and south forks to the Stanley County line has not been assessed. There are no current watershed assessment or implementation projects ongoing in the Bad River Basin.

022887

Grand River Basin (Figure 16, Table 28)

The Grand River basin covers 4,596 square miles in northwest South Dakota and southwest North Dakota. This is a sparsely populated region with a population density of approximately one person per square mile. The major income is derived from agriculture; however, this basin possesses energy resources in commercial quantities.

DENR has assessed five lakes and maintains nine water quality monitoring sites within the Grand River basin.

The USGS data are limited in the Grand River basin; however, USGS data were used for segments of the Grand River, South Fork Grand River, and North Fork Grand River. BOR submitted water quality data for Shadehill Reservoir.

Due to historic uranium mining in the Grand River basin, DENR maintains four water quality monitoring sites that are monitored for uranium and other associated parameters. For this reporting cycle, there are no surface water quality exceedances for uranium or other parameters associated with uranium mining.

Elevated specific conductance, pH, TSS, and sodium adsorption ratios (SAR) are typical of the entire basin. The North Fork watershed drains the southern periphery of the North Dakota badlands which may be a major source of high levels of specific conductance and SAR. The South Fork drainage contains erosive soils, which contribute sediment and suspended solids that often produce high TSS, pH, and SAR levels in the South Fork.

Shadehill Reservoir and the Grand River are considered impaired for irrigation use due to natural limitations imposed by local soil-water incompatibility. High sodium concentration, combined with the clay characteristics of most soils in this region, significantly reduce the acreages suitable for continuous irrigation. This condition is measured by the sodium adsorption ratio (SAR). A SAR value of 10 or greater indicates that a buildup of sodium will break down soil structure and cause serious problems for plant growth.

During the 2010 reporting cycle EPA added Lake Isabel to the 303(d) list for not supporting the designated warmwater fish life and recreation beneficial uses due to chlorophyll-*a*. This listing was based strictly on ad hoc criteria developed by EPA to address narrative standards associated with eutrophication. EPA's methodology and justification for this listing is defined in the 2010 Integrated Report.

There are no on-going assessment or implementation projects occurring within the basin at this time.

DENR has referred TMDL development for all waterbodies in the Grand River basin to EPA. Therefore, TMDL priority and schedule have not been populated in the basin table. DENR is currently in discussions with EPA to determine next steps regarding TMDL development and prioritization for the Grand River Basin.

022888

Cheyenne River Basin (Figures 14 and 15, Table 27)

The portion of the Cheyenne River basin that lies in southwestern South Dakota drains about 9,732 square miles within the boundaries of the state. The area in this basin is very diverse. It includes part of the Black Hills and Badlands, rangeland, irrigated cropland, and some mining areas. The Cheyenne River originates in Wyoming, flows through the southern Black Hills, and enters Lake Oahe near the center of the state.

DENR has assessed 17 lakes and maintains 29 water quality monitoring sites within the Cheyenne basin. Eight monitoring sites are located on the Cheyenne River, three are located on French Creek, and five are located on Rapid Creek. The other sites are located on various other streams in the basin. In addition, available data from DENR watershed assessment projects were also used to determine waterbody support. All DENR data, including WQM, assessment projects, implementation projects, special assessments, and other DENR funded projects, are all labeled as DENR as the basis in the basin tables.

The USGS also maintains a number of water quality monitoring sites located along streams in the Cheyenne River Basin including: Battle Creek, Bear Gulch, Hat Creek, Highland Creek, Rapid Creek, Sunday Gulch, Cheyenne River, and others. The USGS data are limited for most sites and mostly includes specific conductance and water temperature information. Data collected on all USGS sites were analyzed for this report. BOR submitted water quality information for Angostura Reservoir, Deerfield Reservoir, and Pactola Reservoir.

The Cheyenne River basin is home to deposits of natural uranium and historic uranium mining activities. With the increasing price of uranium compounded with rising energy needs, uranium exploration drilling has resumed. DENR maintains five water quality monitoring locations within the basin to monitor for uranium and other associated parameters. For this 2012 reporting cycle, there are no surface water quality exceedances for any parameters associated with past uranium mining or current explorations.

The Cheyenne River water quality continues to be generally poor due to both natural and agricultural sources. The lower Cheyenne drainage, in general, contains highly erodible soils. The landscape contributes considerable amounts of eroded sediment during periods of heavy rainfall. Segments downstream of the Fall River remain nonsupporting for fecal coliform and/or *E.coli* bacteria; however these segments have approved TMDLs.

Water quality in Rapid Creek for reaches above Rapid City meets water quality standards for designated beneficial uses. Rapid Creek segments from Canyon Lake to the Cheyenne River continue to display poor water quality due to excessive fecal coliform and/or *E. coli* bacteria levels. Bacteria TMDLs for these lower reaches were approved in 2010.

The Black Hills region traditionally has some of the best surface water quality in the state. This is due in a large part to a cooler climate and higher precipitation than the surrounding plains as a result of greater elevation and forest cover. Also contributing to the water quality in this region are the local bedrock formations which are much less erodible than the highly erosive and leachable marine shales and badlands on the surrounding plains. However, the Black Hills streams are vulnerable to losses of flow exacerbated by periodic droughts. In addition, high summer ambient air temperature causes elevated water temperature and results in temperature impairments for coldwater fisheries. Grazing of

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streamside vegetation, which increases stream bank erosion, water temperature, and nutrient loading, also continues to be a problem in some streams in this area.

There are currently twelve coldwater rivers and streams in the Cheyenne River basin that are on the 303(d) list for not supporting temperature water quality standards. The *Black Hills Regional Stream Temperature Assessment* conducted by RESPEC will be used to re-evaluate the current beneficial use attainment and to determine future impairments based on recommended temperature standards.

The Lower Cheyenne River Assessment project and the French Creek Assessment project were both completed during this reporting period. No other assessment projects are currently ongoing in the Cheyenne River basin. The Spring Creek Implementation Project is the only implementation project being conducted in the Cheyenne River basin.

022890

Little Missouri River Basin (Figure 19, Table 30)

The Little Missouri River basin is a small basin located in the northwestern corner of the state. The river enters the state from southeastern Montana and drains 583 square miles before exiting into North Dakota. The basin's economy is dominated by agriculture with approximately 90% of the land being used for agricultural production. The majority of this land is rangeland due to limited rainfall.

There are no monitored lakes within this basin and DENR has one water quality monitoring station located on the Little Missouri River.

The USGS provided water quality data from a station on the Little Missouri River at Camp Crook.

The Little Missouri River is listed as impaired for TSS. There are currently no watershed assessment or implementation projects in the basin.

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White River Basin (Figure 27, Table 37)

The White River basin is the most southern of the five major drainages in South Dakota that enters the Missouri River from the west. The total drainage area of the basin in the state is 8,246 square miles. Agriculture dominates the basin's economy, with the majority of the land used as rangeland or cropland.

DENR maintains six water quality monitoring sites within this basin. Four of the six monitoring sites are located on the White River, one is located on Cottonwood Creek, and the other is located on the Little White River.

The USGS has water quality monitoring sites in the basin, including sites on the White River, Little White River, Black Pipe Creek, Lake Creek, Rosebud Creek and others. The data are limited, and the only parameters that were measured were specific conductance and water temperature.

DENR has increased sampling parameters to include uranium, and others associated with uranium mining, at an ambient monitoring location on the White River near Oglala. This location was selected due to in-situ uranium mining upstream in Nebraska and the naturally occurring uranium in the highly erodible soils in the White River basin. Support determinations were based on all parameters; however, there were no surface water quality exceedances for uranium or other parameters associated with uranium mining.

The White River basin receives the majority of the runoff and drainage from the western Badlands. The exposed Badlands are a major natural source of both suspended and dissolved solids to the river. Severe erosion and leaching of soils occurs in the Badlands and throughout the entire length of the basin. Site specific water quality standards for total suspended solids (TSS) were established by DENR in 2009 for the White River and Little White River. The White River is listed as impaired for SAR, fecal coliform, and *E. coli.*

Assessment projects have been completed for the White River, Little White River, and Cottonwood Creek watersheds. There are currently no on-going implementation projects in the White River basin.

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Oil Sands and the Keystone XL Pipeline: Background and Selected Environmental Issues

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Exhibit 8014

Properties of Oil Sands-Derived Crudes Compared to Other Crudes

Crude oil is a complex mix of hydrocarbons, ranging from simple compounds with small molecules and low densities to very dense compounds with extremely large molecules. Three key properties of crude oils include the following:

- **API Gravity.** API[33] Gravity measures the weight of a crude oil compared to water. It is reported in degrees (°) by convention. API gravities above 10° indicate crude oils lighter than water (they float); API gravities below 10° indicate crude oils heavier than water (they sink). Although the definition of "heavy" crude oil may vary, it is generally defined by refiners as being at or below 22.3° API gravity.[34]
- **Sulfur Content.** Sulfur content in crude oil is an indication of potential corrosiveness due to the presence of acidic sulfur compounds. Sulfur content is measured as an overall percentage of free sulfur and sulfur compounds in a crude oil by weight. Total sulfur content in crude oils generally ranges from below 0.05% to 5.0%. Crudes with more than 1.0% free sulfur or other sulfur-containing compounds are typically referred to as "sour," below 0.5% sulfur as "sweet."[35]
- **Total Acid Number.** Total Acid Number (TAN) measures the composition of acids in a crude which can gauge its potential for corrosion, particularly in a refinery. TAN value is measured as the number of milligrams (mg) of potassium hydroxide (KOH) needed to neutralize the acids in one gram of oil. As a rule-of-thumb, crude oils with a TAN greater than 0.5 are considered to be potentially corrosive due to the presence of naphthenic acids.[36]

Table 1 compares Alberta's different oil sands crudes with other crude oils extracted in the United States and around the world. The data indicate that all oil sands crudes would be considered heavy crudes. Heavy crudes are found throughout the world, including the United States. The data indicate that oil sands crudes resemble other heavy crudes in terms of sulfur content and TAN.

[33] American Petroleum Institute.

[34] U.S. Energy Information Administration, Crude Oil Input Qualities, "Definitions, Sources and Explanatory Notes," web page, July 28, 2011, http://www.eia.gov/dnav/pet/TblDefs/pet_pnp_crq_tbldef2.asp. In the marine tanker industry, heavy grade crudes are defined as crudes with an API below 25.7 , as bitumen emulsions, or as certain viscous fuel oils. See McQuilling Services, LLC, "Carriage of Heavy Grade Oil," Garden City, NY, 2011, http://www.meglobaloil.com/MARPOL.pdf.

[35] JDL Oil and Gas Exploration, Inc., "Crude Oil Basics," web page, July 28, 2011, http://www.jdloil.com/oil_basics.htm.

[36] R.D. Kane and M.S. Cayard, "A Comprehensive Study of Naphthenic Acid Corrosion," Paper No. 02555, Corrosion 2002, http://www.icorr.net/wp-content/uploads/2011/01/napthenic_corrosion.pdf.

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Table 1. Selected Global Crude Oil Specifications

Source	Crude Oil Name	°API Gravity	Sulfur (Weight %)	TAN (mgKOH/g)
	Alberta Oil Sands Crude Oils			
- Dilbits	Access Western Blend	21.9	3.94	1.70
	Cold Lake	20.9	3.78	0.97
	Peace River Heavy	20.8	4.97	2.49
	Seal Heavy	20.5	4.64	1.86
	Smiley Coleville	20.0	2.98	0.97
	Wabasca Heavy	20.3	4.10	1.03
	Western Canadian Select	20.6	3.46	0.92
- DilSynBit	A bian Heavy	19.1	2.42	0.51
	Selected Heavy Crude Oils			
Western Canada	Western Canadian Blend	20.7	3.16	0.71
U.S. (California)	Hondo Monterey	19.4	4.70	0.43
	Kern River	13.4	1.10	2.36
Venezuela	Pilon	16.2	2.47	1.60
	Bachaquero	13.5	2.30	2.63
	Tia Juana Heavy	12.3	2.82	3.90
	Laguna	10.9	2.66	2.82
	Boscan	10.1	5.40	0.91
Mexico	Maya	21.5	3.31	0.43
Italy	Tempa Rossa	20.4	5.44	0.05
United Kingdom	Captain	19.2	0.70	2.40
Indonesia	Duri (Sumatran Heavy)	20.8	0.20	1.27
	Selected Medium and Light Crude Oils (> 22.3° API)			
U.S. (Alaska)	Alaskan North Slope	32.1	0.93	0.12
U.S. (Texas)	West Texas Intermediate	40.8	0.34	0.10
U.S. (Gu f of Mexico)	Hoops Blend	31.6	1.15	1.07
	Thunderhorse	28.3	0.64	0.47
	Poseidon Heavy-sour	29.7	1.65	0.41
	Mars Heavy-sour	28.9	2.05	0.51
	Southern Green Canyon Heavy-Sour	28.4	2.48	0.17
Nigeria	Bonga	30.2	0.25	0.55
Norway	Statfjord	28.3	0.64	0.47
Dubai	Dubai Fateh Heavy	30.8	2.07	0.05
Saudi Arabia	Arabian Heavy	27.5	2.95	0.40
	Arabian Light	33.7	1.96	0.05

Sources: Canadian crude data from Crude Quality Inc., Canadian Crude Quick Reference Guide, Updated June 2, 2011, at http://www.crudemonitor.ca; Other crude oil data from: Capline, Crude Oil Assays, at http://www.cap inepipe ine.com; BP Crude Assays, at http://www.bp.com; ExxonMobil, at http://www.exxonmobil.com/crudeoil/about_crudes_region.aspx; "Benchmark West Texas Intermediate Crude Assayed," *Oil and Gas Journal*, 1994; McQuilling Services, LLC, "Carriage of Heavy Grade Oil," Garden City, NY, 2011, http://www.meglobaloil.com/MARPOL.pdf; Hydrocarbon Pub ishing Co., *Opportunity Crudes Report II*, Southeastern, PA, 2011, p. 5, http://www.hydrocarbonpublishing.com/ReportP/Prospectus-Opportunity%20Crudes%20II_2011.pdf.

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Notes: The crude oils listed above are not an exhaustive list, nor do they represent a specific percentage of global consumption. The crudes listed above are selected examples of different crude oils from around the world. Multiple crude oils from Venezuela are included to indicate the range of parameters in different heavy crude oils.

Section 2: Keystone XL Pipeline—Overview

As originally proposed by TransCanada in September 2008,[37] the Keystone XL pipeline would involve two major segments (**Figure 6**). The first segment—approximately 850 pipeline miles in the United States[38]—would cross the U.S.-Canadian border into Montana, pass through South Dakota, and terminate in Steele City, Nebraska. The second segment—approximately 480 miles and labeled as the "Gulf Coast Project" in **Figure 6**—would connect an existing pipeline in Cushing, Oklahoma with locations in southern Texas.[39]

As discussed below, the Department of State (DOS) announced its denial of the Keystone XL permit in January 2012. In February 2012, TransCanada announced that it would proceed with development of the southern pipeline segment as a separate proposal. As this segment is within the United States, it does not require a Presidential Permit (discussed below). Thus, the revised permit, which TransCanada submitted on May 12, 2012, only applies to the first segment that connects Canada with the United States.

The Keystone XL pipeline would have the capacity to deliver 830,000 barrels per day (bpd), a substantial flow rate compared to other U.S.-Canada import pipelines (**Table 3**).The 36-inch-diameter pipeline would require a 50-foot-wide permanent right-of-way along the route. Approximately 95% of the pipeline right-of-way would be on privately owned land, with the remaining 5% almost equally state and federal land. Private land uses are primarily agricultural—farmers and cattle ranchers. Above ground facilities associated with the pipelines include pump stations (with associated electric transmission interconnection facilities), mainline valves, and delivery metering facilities.

The Keystone XL pipeline and the "Gulf Coast Project" would combine with two existing pipeline segments to complete TransCanada's Keystone Pipeline System. This system is depicted in **Figure 6**. These existing segments include:

- The Keystone Mainline: A 30-inch pipeline with a capacity of nearly 600,000 bpd that connects Alberta oil sands to U.S. refineries in Illinois. The U.S. portion runs 1,086 miles and begins at the international border in North Dakota. The Keystone Mainline began operating in June 2010.
- The Keystone Cushing Extension: A 36-inch pipeline that runs 298 miles from Steele City, Nebraska to existing crude oil terminals and tanks farms in Cushing, Oklahoma. The Cushing Extension began operating February 2011.

[37] The original application and related documents are available at the Department of State Keystone XL website, at http://keystonepipeline-xl.state.gov/archive/index.htm.

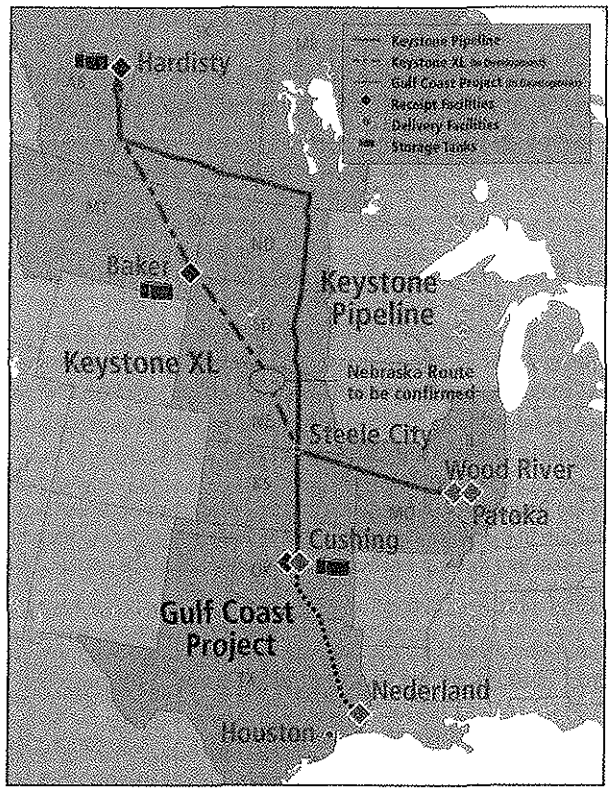
[38] 1,183 miles from its origin in Alberta, Canada. See U.S. Department of State, *Final Environmental Impact Statement for the Proposed Keystone XL Project*, August 2011.

[39] An additional 50-mile segment would connect to additional locations in Texas. For further details, see U.S. Department of State, *Final Environmental Impact Statement for the Proposed Keystone XL Project*, August 2011.

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Figure 6. The Keystone Pipeline System

Completed and Proposed Segments of the Keystone and Keystone XL Pipelines



Source: TransCanada.

Federal Requirements to Consider the Pipeline's Environmental Impacts

When considering a Presidential Permit application, the DOS must conduct an environmental review of its actions pursuant to the National Environmental Policy Act (NEPA, 42 U.S.C. §4321 et seq.). This process highlighted many environmental impacts associated with the construction, operation, and maintenance of the pipeline system and associated facilities.

Issues that arose and environmental impacts identified during DOS efforts to process TransCanada's application for a Presidential Permit ultimately resulted in the denial of its permit application. With TransCanada's May 4, 2012 reapplication for a permit to construct the Keystone XL pipeline project, the Presidential Permit process and NEPA compliance process begin anew.

Generally, federal agencies have no authority to control siting of oil pipelines, even interstate pipelines.[40] Instead, the primary siting authority for oil pipelines generally would be established

[40] This is in contrast to interstate natural gas pipelines, which, under Section 7(c) (15 USC §717f(c)) of the Natural Gas Act, must obtain a "certificate of public convenience and necessity" from the Federal Energy Regulatory Commission.

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under applicable state law (which may vary considerably from state to state).[41] However, in accordance with Executive Order 13337, a facility connecting the United States with a foreign country, including a pipeline, requires a Presidential Permit from DOS before it can proceed.[42]

Key elements of the Presidential Permit process, including DOS efforts to identify environmental impacts associated with the TransCanada's 2008 permit application are discussed below. Included in that discussion are relevant activities and requirements associated with DOS compliance with NEPA and its obligation to determine whether the proposed pipeline would serve the national interest.

Presidential Permit Requirements for Cross-Border Pipelines

A decision to issue or deny a Presidential Permit application is based on a determination that the proposed project would serve the "national interest." This term is not defined in the Executive Orders. In the course of making that determination, DOS may consider a wide range of factors such as the project's potential impacts to the environment, economy, energy security, foreign policy, and others. Regarding its determination, DOS has stated:

> Consistent with the President's broad discretion in the conduct of foreign affairs, DOS has significant discretion in the factors it examines in making a National Interest Determination. The factors examined and the approaches to their examination are not necessarily the same from project to project.[43]

However, the Department has identified the following as key factors it considered in making *previous* national interest determinations for oil pipeline permit applications:

- Environmental impacts of the proposed projects;
- Impacts of the proposed projects on the diversity of supply to meet U.S. crude oil demand and energy needs;
- The security of transport pathways for crude oil supplies to the United States through import facilities constructed at the border relative to other modes of transport;
- Stability of trading partners from whom the United States obtains crude oil;

[41] Federal laws and regulations address other matters, including worker safety and environmental concerns. See CRS Report R41536, *Keeping America's Pipelines Safe and Secure: Key Issues for Congress*, by Paul W. Parfomak and CRS Report RL33705, *Oil Spills in U.S. Coastal Waters: Background and Governance*, by Jonathan L. Ramseur.

[42] This authority was originally vested in the U.S. State Department with the promulgation of Executive Order 11423, "Providing for the performance of certain functions heretofore performed by the President with respect to certain facilities constructed and maintained on the borders of the United States," in 1968. Executive Order 13337, "Issuance of Permits With Respect to Certain Energy-Related Facilities and Land Transportation Crossings on the International Boundaries of the United States," of April 30, 2004, amended this authority and the procedures associated with permit review for energy-related projects, but did not substantially alter the exercise of authority or the delegation to the Secretary of State in E.O. 11423. Due to the particular significance to Presidential Permit issuance for pipelines, provisions in E.O 13337 will be cited in this report. For further information on the Executive Order authority and related issues, see CRS Report R42124, *Proposed Keystone XL Pipeline: Legal Issues*, by Adam Vann et al.

[43] The U.S. State Department, *Final Environmental Impact Statement for the Keystone XL Project*, August 2011, "Introduction" (as amended September 22, 2011), p. 1-4, available at http://keystonepipeline-xl.state.gov/archive/dos_docs/feis/index.htm#.

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- Relationship between the United States and various foreign suppliers of crude oil and the ability of the United States to work with those countries to meet overall environmental and energy security goals;
- Impact of proposed projects on broader foreign policy objectives, including a comprehensive strategy to address climate change;
- Economic benefits to the United States of constructing and operating proposed projects; and
- relationships between proposed projects and goals to reduce reliance on fossil fuels and to increase use of alternative and renewable energy sources.[44]

DOS may consider additional factors to inform its national interest determination for a given project. However, pursuant to E.O. 13337, for each permit application it receives for an energy-related project, DOS must request the views of the Attorney General, Administrator of the Environmental Protection Agency (EPA), and Secretaries of Defense, the Interior, Commerce, Transportation, Energy, and Homeland Security (or the heads of those departments or agencies with relevant authority or responsibility over relevant elements of the proposed project). DOS may request the views of additional federal department and agency heads, as well as additional local, state, or tribal agencies, as it deems appropriate for a given project. DOS must also invite public comment on the proposed project.

If, after considering the views and assistance of various agencies and the comments from the public, DOS finds that issuance of a permit would serve the national interest, then a Presidential Permit may be issued. Specific to the Keystone XL pipeline, in its May 2012 Presidential Permit application, TransCanada states

> The project will serve the national interest of the United States by providing a secure and reliable source of Canadian crude oil to meet the demand from refineries and markets in the United States, by providing critically important market access to developing domestic oil supplies in the Bakken formation in Montana and North Dakota, and by reducing U.S. reliance on crude oil supplies from Venezuela, Mexico, the Middle East, and Africa. The project will also provide significant economic and employment benefits to the United States, with minimal impacts on the environment.[45]

It is during the NEPA process that DOS will determine the degree to which the proposed pipeline project may impact the environment, as well as identify potential mitigation measures or protections necessary to reduce the potential for adverse environmental impacts. When the NEPA process is complete, DOS may use that assessment of environmental impacts, with other factors, to determine if the project does, in fact, serve the national interest.

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[44] Ibid.

[45] TransCanada Keystone Pipeline, L.P., "Application of TransCanada Keystone Pipeline L.P. for a Presidential Permit Authorizing the Construction, Operation, and Maintenance of Pipeline Facilities for the Importation of Crude Oil to be Located at the United States-Canada Border," U.S. Dept. of State, May 4, 2012, pp. 1-2, available at http://www.keystonepipeline-xl.state.gov/.

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Identification of Environmental Impacts During the NEPA Process[46]

The DOS review of a Presidential Permit application explicitly requires compliance with multiple federal environmental statutes.[47] Environmental requirements identified within the context of the NEPA process has drawn considerable attention.

Pursuant to NEPA, in considering an application for a Presidential Permit, DOS must take into account environmental impacts of a proposed facility and directly related construction. In complying with NEPA, federal agencies must prepare an Environmental Impact Statement (EIS) for projects determined to have "significant" environmental impacts. DOS concluded that issuance of a Presidential Permit for the proposed construction, connection, operation, and maintenance of the Keystone XL Pipeline and its associated facilities at the United States border may have a significant impact on the environment within the meaning of NEPA.[48] As a result, DOS prepared an EIS to identify the reasonably foreseeable impacts from the proposed Keystone XL pipeline.[49] Similarly, an EIS will likely be required for the pipeline project for which the May 4, 2012 permit application was filed.

EIS preparation is done in two stages, resulting in a draft and final EIS. NEPA regulations require the draft EIS to be circulated for public and agency comment, followed by a final EIS that incorporates those comments.[50] The agency responsible for preparing the EIS, in this case DOS, is designated the "lead agency." In developing the EIS, DOS must rely on information provided by TransCanada. For example, TransCanada's original permit application included an Environmental Report which was intended to provide the State Department with sufficient information to understand the scope of potential environmental impacts of the project.[51]

In preparing the draft EIS, the lead agency must request input from "cooperating agencies," which include any agency with jurisdiction by law or with special expertise regarding any environmental impact associated with the project.[52] The original Keystone XL permit process involved 11 federal cooperating agencies, including the Environmental Protection Agency (EPA),

[46] For more detailed NEPA information, see CRS Report RL33152, *The National Environmental Policy Act (NEPA) Background and Implementation*, by Linda Luther.

[47] DOS is explicitly directed to review the project's compliance with the National Historic Preservation Act (16 U.S.C. §470f), the Endangered Species Act (16 U.S.C. §1531 et seq.), and Executive Order 12898 of February 11, 1994 (59 *Federal Register* 7629), concerning environmental justice.

[48] U.S. Department of State, "Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Scoping Meetings and Notice of Floodplain and Wetland Involvement and to Initiate Consultation under Section 106 of the National Historic Preservation Act for the Proposed TransCanada Keystone XL Pipeline," 74 *Federal Register* 5020, January 28, 2009.

[49] In preparing an EIS associated with a Presidential Permit application, NEPA regulations promulgated by both the Council of Environmental Quality (CEQ) and the State Department would apply to the proposed project. CEQ regulations implementing NEPA (under 40 C.F.R. §§1500-1508) apply to all federal agencies. NEPA regulations applicable to State Department actions, which supplement the CEQ regulations, are found at 22 C.F.R. §161.

[50] For information regarding NEPA requirements, see CRS Report RL33152, *The National Environmental Policy Act (NEPA) Background and Implementation*, by Linda Luther.

[51] Documents submitted by TransCanada for its initial 2008 Presidential Permit application, now archived by DOS, are available at http://keystonepipeline-xl.state.gov/archive/proj_docs/index.htm.

[52] 40 C.F.R. §1508.5. Also, Executive Order 13337 directs the Secretary of State to refer an application for a Presidential Permit to other specifically identified federal departments and agencies on whether granting the application would be in the national interest.

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as well as state agencies. **Table A-1** (in the **Appendix**) provides a list of various agencies and their roles in the pipeline permitting process.

In addition to its role as a cooperating agency, EPA is also required to review and comment publicly on the EIS and rate both the adequacy of the EIS itself and the level of environmental impact of the proposed project.[53] EPA's role in rating draft EISs for the Keystone XL pipeline project had a significant impact on the NEPA process for TransCanada's 2008 Presidential Permit application.

The State Department released its draft EIS for the proposed Keystone XL Pipeline project for public comment on April 16, 2010.[54] On July 16, 2010, EPA rated the draft EIS "Inadequate."[55] EPA found that potentially significant impacts were not evaluated and that the additional information and analysis needed was of such importance that the draft EIS would need to be formally revised and again made available for public review. DOS issued a supplemental draft EIS on April 15, 2011.[56] In addition to addressing issues associated with EPA's inadequacy rating, the supplemental draft EIS addressed comments received from other agencies and the public. On June 6, 2011, EPA sent a letter to the State Department that rated the supplemental draft EIS as having "Insufficient Information" and having "Environmental Objections" to the proposed action.[57] EPA acknowledged that DOS had "worked diligently" to develop additional information in response to EPA's comments on the draft EIS, but additional analysis was needed on several points, including potential oil spill risks and lifecycle greenhouse gas emissions associated with the proposed project.

In its June 6, 2011 letter, EPA refers to agreements with DOS that certain deficiencies identified in the supplemental draft EIS would be addressed in the final EIS. On August 26, 2011, DOS did issue the final EIS for the proposed Keystone XL Pipeline (hereafter referred to as 2011 FEIS).[58] Although DOS addressed stakeholder comments, including those of EPA, in its 2011 FEIS,[59] it is unknown whether EPA made any additional comments to DOS during the 90-day public review period marking the national interest determination (discussed below). Regardless, EPA will have

[53] Rating the EIS takes place after the draft is issued. The EIS could be rated either "Adequate," "Insufficient Information," or "Inadequate." EPA's rating of a project's environmental impacts may range from "Lack of Objections" to "Environmentally Unsatisfactory." In rating the impact of the action itself, EPA would specify one of the following: "Lack of Objections," "Environmental Concerns," "Environmental Objections," or "Environmentally Unsatisfactory." The federal agency would then be required to respond to EPA's rating, as appropriate. For more information, see the U.S. Environmental Protection Agency's "Environmental Impact Statement (EIS) Rating System Criteria" at http://www.epa.gov/compliance/nepa/comments/ratings.html.

[54] EISs prepared by DOS for TransCanada's 2008 Presidential Permit application, now archived by DOS, are available at http://keystonepipeline-xl.state.gov/archive/dos_docs/index.htm.

[55] U.S. Environmental Protection Agency's July 16, 2010, letter to the U.S. Department of State commenting on the draft EIS for the Keystone XL project is available at http://yosemite.epa.gov/oeca/webeis.nsf/%28PDFView%29/20100126/$file/20100126.PDF.

[56] See footnote 54.

[57] U.S. Environmental Protection Agency's June 6, 2011 letter to the U.S. Department of State commenting on the supplemental draft EIS for the Keystone XL project is available at http://yosemite.epa.gov/oeca/webeis.nsf/%28PDFView%29/20110125/$file/20110125.PDF?OpenElement.

[58] U.S. Department of State, *Final Environmental Impact Statement for the Proposed Keystone XL Project*, August 26, 2011 (with portions amended September 22, 2011), available at http://keystonepipeline-xl.state.gov/archive/dos_docs/feis/index.htm.

[59] 2011 final EIS, "Appendix A, Responses to Comments and Scoping Summary Report," available at http://keystonepipeline-xl.state.gov/archive/dos_docs/feis/vol3and4/appendixa/index.htm.

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an opportunity to comment on NEPA documentation prepared for TransCanada's May 2012 permit application.

Identification of Environmental Impacts During the National Interest Determination

Generally, the NEPA review is considered complete when (or if) the federal agency issues a final Record of Decision (ROD), formalizing the selection of a project alternative. However, for a project subject to a Presidential Permit, issuance of a final EIS marks the beginning of a 90-day public review period during which DOS gathers additional information necessary to make its national interest determination. For previous Presidential Permits, a ROD and National Interest Determination were issued as the same document.[60]

Issuance of the ROD and National Interest Determination involve distinctly different, yet interrelated requirements. Under NEPA, DOS must fully assess the environmental consequences of an action and potential project alternatives *before* making a final decision. NEPA does not prohibit a federal action that has adverse environment impacts; it requires only that a federal agency be fully *aware of* and *consider* those adverse impacts before selecting a final project alternative. That is, NEPA is intended to be part of the decision-making process, not dictate a particular outcome.

The DOS's national interest determination, however, does dictate a particular outcome—approval or denial of a Presidential Permit. Issuance of a Presidential Permit is predicated on the finding that the proposed project would serve the national interest. While NEPA does not prohibit federal actions with adverse environmental impacts, a project's adverse environmental impacts may lead the DOS to determine that the project is not in the national interest.

Table 2 summarizes milestones in the national interest determination for TransCanada's initial permit application.[61]

[60] U.S. Department of State, *Department of State Record of Decision and National Interest Determination, TransCanada Keystone Pipeline, LP Application for Presidential Permit*, February 25, 2008.

[61] A more comprehensive timeline is provided in CRS Report R41668, *Keystone XL Pipeline Project Key Issues*, by Paul W. Parfomak, Linda Luther, and Adam Vann.

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Oil Spills

A primary environmental concern of any oil pipeline is the risk of a spill. The impacts of an oil spill depend on multiple factors, including: the type of oil spilled and the size and location of the spill.[75] Location is generally considered the most important factor, as highlighted by DOS:

> The greatest concern would be a spill in environmentally sensitive areas, such as wetlands, flowing streams and rivers, shallow groundwater areas, areas near water intakes for drinking water or for commercial/industrial uses, and areas with populations of sensitive wildlife or plant species.[76]

Location-specific concerns played a key role in DOS's November 2011 decision to obtain additional information before making its national interest determination for TransCanada's 2008 Presidential Permit application. Regarding its decision, DOS stated:

> [P]articularly given the concentration of concerns regarding the environmental sensitivities of the current proposed route through the Sand Hills area of Nebraska, the Department has determined it needs to undertake an in-depth assessment of potential alternative routes in Nebraska.[77]

In part as a result of DOS's decision, TransCanada announced that it would work with the Nebraska Department of Environmental Quality to identify a potential pipeline route avoiding the Nebraska Sand Hills (**Table 2**).

Pipeline integrity concerns—whether real or perceived—were magnified by a 2010 oil sands crude pipeline spill in Michigan. On July 26, 2010, a 40-year old pipeline, operated by Enbridge, released approximately 800,000 gallons of oil sands crude oil[78] into Talmadge Creek, a waterway that flows into the Kalamazoo River (Michigan).[79] The National Transportation Safety Board (NTSB) issued a synopsis of its upcoming investigatory report in July 25, 2012.[80] The synopsis did not include a probable cause analysis, but it concluded that internal corrosion was not a factor in the incident.

Based on experience with pipelines historically, the Keystone XL pipeline will likely lead to some number of oil spills over the course of its operating life, regardless of design, construction, and safety measures. However, the frequency, volume, and location of spills are unknown. Some contend that proponents of the pipeline understate oil spill risks; others contend that pipeline opponents overstate the risks.

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[75] See CRS Report RL33705, *Oil Spills in U.S. Coastal Waters Background and Governance*, by Jonathan L. Ramseur.

[76] 2011 FEIS, "Executive Summary," p. ES-9, available at http://keystonepipeline-xl.state.gov/archive/dos_docs/feis/vol1/index.htm.

[77] U.S. Department of State, "Keystone XL Pipeline Project Review Process: Decision to Seek Additional Information," Media Note, PRN 2011/1909, Office of the Spokesperson, November 10, 2011.

[78] See the Enbridge response website "Frequently Asked Questions" at http://www.response.enbridgeus.com/response/main.aspx?id=12783#Type_of_oil.; and *Tar Sands Pipelines Safety Risks* (citing a conference call with Enbridge CEO).

[79] For more up-to-date information, see EPA's Enbridge oil spill website at http://www.epa.gov/enbridgespill/index.html.

[80] See http://www.ntsb.gov/news/events/2012/marshall_mi/index.html. The final report is expected in the Fall of 2012 (personal communication with the NTSB, March 19, 2012).

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A key question for policymakers is whether the Keystone XL proposed pipeline is different from other pipelines. For example, would the project impose a greater or lesser risk of an oil spill than another oil pipeline?

Oil Sands Crudes—Characteristics

Some environmental groups have argued that the pipeline would pose additional oil spill risks due to the material being transported.[81] They have asserted that diluted bitumen (Dilbit) poses particular concerns of volatility and corrosivity that may pose additional risks to the pipeline's integrity. Whether or not these issues warrant concern is debatable. Regardless, the concerns led Congress to enact provisions in P.L. 112-90 calling for further study. These issues are discussed below.

Volatility

According to a 2011 environmental groups' report, "at high temperatures, the mixture of light, gaseous condensate, and thick, heavy bitumen, can become unstable."[82] It is uncertain what constitutes a high temperature in this context. For example, would the temperature be within the range of the pipeline's operating parameters? Regardless, some have questioned this conclusion.[83]

One of the citations in the 2011 report that is cited as support for the above statement is an "expert viewpoint"[84] that does not specifically address pipeline transportation, but seems to discuss behavior of oil sands in the reservoir. The other is a study modeling liquid-column separation in oil pipelines—perhaps a relevant issue (discussed below)—but this study does not appear to distinguish between different crude oil types.[85]

Related to the assertion of volatility, the 2011 report highlights a process—described as liquid-column separation—that could potentially occur in pipelines when changes in pipeline pressure causes some of the natural gas liquid component to change into a gas bubble. According to the report, when these gas bubbles burst they release high pressure that can damage a pipeline (a process described as cavitation). The report states that "instability of DilBit can render pipelines particularly susceptible to ruptures caused by pressure spikes."[86]

However, DOS countered this assertion stating that it:

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[81] Anthony Swift et al, *Tar Sands Pipelines Safety Risks*, Joint Report by Natural Resources Defense Council, National Wildlife Federation, Pipeline Safety Trust, and Sierra Club, February 2011 (hereafter *Tar Sands Pipelines Safety Risks*); see also Anthony Swift et al, *Pipeline and Tanker Trouble The Impact to British Columbia's Communities, Rivers, and Pacific Coastline from Tar Sands Oil Transport*, Joint Report by Natural Resources Defense Council, Pembina Institute, and Living Oceans Society, November 2011 (hereafter *Pipeline and Tanker Trouble*).

[82] *Tar Sands Pipelines Safety Risks*.

[83] See Crude Quality Inc., *Report regarding the U.S. Department of State Supplementary Draft Environmental Impact Statement*, May 2011; and Energy Resources Conservation Board, Press Release, "ERCB Addresses Statements in Natural Resources Defense Council Pipeline Safety Report," February 2011.

[84] As cited by *Tar Sands Pipelines Safety Risks*: Expert Viewpoint (John Shaw, University of Alberta) – Phase Behaviors of Heavy Oils and Bitumen," Schlumberger Ltd., 2011. The cited website no longer leads to this source, but CRS located the material using the Internet "Wayback Machine," at http://web.archive.org.

[85] Changjun Li et al., *Study on Liquid-Column Separation in Oil Transport Pipeline*, American Society of Civil Engineers, International Conference on Pipelines and Trenchless Technology 2009.

[86] *Tar Sands Pipelines Safety Risks*.

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> contacted the author [that NRDC cited to support the above statement]... to address this concern and determined that it would not be valid to infer from this research that dilbits are any more or less stable than other crude oils, or that they are more likely to cause pressure spikes during transport in pipelines or otherwise pose an increased risk to pipeline safety.[87]

Corrosivity

Some argue that DilBit pipelines may be more likely to fail than other crude oil pipelines because the bitumen mixtures they carry are "significantly more corrosive to pipeline systems than conventional crude."[88] Three DilBit properties of particular interest are acidity, sulfur content, and solids content, all of which may influence the overall corrosiveness of a given blend of crude oil. The 2011 report also focuses on these specific DilBit properties and their potential influence on pipeline corrosion, asserting:

> Compared to "conventional" crudes, DilBit blends are thicker and more acidic, and contain more sulfur, chloride salts, and quartz sand particles. These characteristics create a "combination of chemical corrosion and physical abrasion [that] can dramatically increase the rate of pipeline deterioration."[89]

To what extent these claims may be correct is the subject of debate. Alberta's Energy Resources Conservation Board (ERCB), among other stakeholders, has rejected the claims from the 2011 report, stating that "there is no reason to expect this product to behave in any substantially different way than other oil...."[90] Additional background on the specific DilBit characteristics of concern may offer a greater understanding of the corrosion mechanisms at issue, but not necessarily resolve the debate.

Total Acid Number

As indicated in **Table 1** (above) Canadian DilBit total acid numbers (TANs) range between 0.92 to 2.49. This range is generally higher than lighter crude oils, but comparable with other heavy oils. It is well-established that the presence of naphthenic acids in high TAN crudes can considerably increase corrosion potential in the parts of refinery distillation units operating at high temperature—above 400°F.[91] However, pipeline transportation of DilBit is expected to occur at much lower temperatures: the maximum operating temperature for Keystone XL is 150°F. Moreover, DilBit pipeline corrosion rates may not have a direct correlation with TAN values. There is evidence of more than 1,000 napthenic acid varieties with varying corrosivity, which may comprise a single TAN number.[92] TAN values depend upon the specific content and types of

[87] 2011 FEIS, "Potential Releases," p. 3-13.45, available at http://keystonepipeline-xl.state.gov/archive/dos_docs/feis/vol2/env/index.htm.

[88] *Tar Sands Pipelines Safety Risks.*

[89] *Tar Sands Pipelines Safety Risks.*

[90] Canadian Energy Resources Conservation Board (ERCB), "ERCB Addresses Statements in Natural Resources Defense Council Pipeline Safety Report," Press release, Calgary, Alberta, February 16, 2011.

[91] Dennis Haynes, *Naphthenic Acid Bearing Refinery Feedstocks and Corrosion Abatement*, Presentation to the AIChE Chicago Symposium, 2006, p. 7; Bruce Randolph, James Scinta, Eric Vetters, et al., *Challenges in Processing Canadian Oilsands Crude – A US Refiners' Perspective,* Canadian Crude Quality Technical Association, June 25, 2008.

[92] See Anne Shafizadeh et al., "High Acid Crudes," Presentation to the Crude Oil Quality Group New Orleans Meeting, January 30, 2003, http://www.coqa-inc.org/20030130High%20Acid%20Crudes.pdf.

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compounds in specific crudes—which may vary significantly from crude to crude.[93] Some testing of pipeline steels has shown that Canadian oil sands crudes exhibit "very low corrosion rates" despite high TAN numbers, in part because they contain other "inhibitor" compounds that reduce the corrosivity of the bitumen.[94] Therefore, it is uncertain whether refiners' experiences with corrosion from high TAN crudes can be directly extended to DilBit transmission pipelines.

Sulfur Content

Another factor in crude oil corrosivity is sulfur content. Crude oils sent to U.S. refineries typically contain 0.5% to 2.5% sulfur.[95] As indicated in **Table 1**, DilBits have sulfur content substantially above this range—between 3% and 5%. In sour crudes (> 1% sulfur content), sulfur is present as hydrogen sulfide (H_2S),[96] which can combine with water to form sulfuric acid (H_2SO_4), a strongly corrosive acid. Like napthenic acid corrosion (discussed above), sulfidic corrosion is a high temperature phenomenon, beginning above 500°F.[97] In pipelines, H_2S can also interact with napthenic acids, carbon dioxide (CO_2) and solids, complicating the possible corrosion processes at work. Research and refiner experience suggest that sulfuric and napthenic acid corrosivity can be inhibited or augmented by the presence of specific sulfur compounds depending upon the chemical characteristics of those compounds (e.g., how readily they decompose into H_2S), whether they are in liquid or vapor phase, and other factors.[98] In some cases, H_2S can form a protective sulfide coating that actually prevents corrosion.[99] Thus, as in the case of TAN levels, sulfur content in crude oil may not accurately reflect corrosivity, notwithstanding the common use of sulfur content to indicate sulfidic corrosion potential in refinery equipment.[100] For these reasons, the direct application of sulfidic corrosion experience in refineries to lower temperature crude oil pipelines may be inconsistent with chemical processes involved.

[93] Canadian Crude Quality Technical Association, TAN Phase III Project, Meeting Minutes of June 23, 2009, http://www.ccqta.com/docs/documents/Projects/TAN_Phase_III/TAN%20Phase%20III%20March%202009%20Minutes.pdf.

[94] Rena Liviniuk, et al., "Organic Acid Structure – A Correlation With Corrosivity," AM-09-20, Presented to the National Petrochemical and Refiners Association, Annual Meeting, March 22-24, 2009, San Antonio, TX, p. 9.

[95] U.S. Energy Information Administration, "Crude Oil Input Qualities: Sulfur Content, Annual," Internet table, June 29, 2011, http://www.eia.gov/dnav/pet/pet_pnp_crq_a_EPC0_YCS_pct_a.htm.

[96] H_2S is generated at temperatures greater than 392 F (200 C) through a reaction between carbon-containing and sulfur-containing compounds in the crude. Thus, H_2S can be generated during the oil sands thermal extraction process. See: G.G. Hoffmann, et al., "Thermal Recovery Processes and Hydrogen Sulfide Formation," Presented at the Society of Petroleum Engineers International Symposium on Oilfield Chemistry, San Antonio, Texas, February 14-17, 1995.

[97] H.M. Shalaby, "Refining of Kuwait's Heavy Crude Oil: Materials Challenges," Workshop on Corrosion and Protection of Metals, Arab School for Science and Technology, Kuwait, December 3-7, 2005, p. 5; http://www.arabschool.org/pdf_notes/20_REFINING_OF_KUWAITS_HEAVY_CRUDE_OIL.pdf.

[98] Ibid., p.6; Heather Dettman, et al, "Refinery Corrosion: The Influence of Organic Acid and Sulphur Compund Structure on Global Crude Corrosivity," Presentation to the 5th NCUT Upgrading and Refining Conference 2009, Edmonton, Alberta, September 14 - 16, 2009; Dennis Haynes, 2006, p. 8.

[99] Gregory R. Ruschau, and Mohammed A. Al-Anez, *Oil and Gas Exploration and Production*, Appendix S, Corrosion Prevention, p. S6, in: CC Technologies Laboratories, Inc., *Corrosion Costs And Preventive Strategies In The United States*, Report to the U.S. Federal Highway Administration, Office of Infrastructure Research and Development, Report FHWA-RD-01-156, September 2001, http://www.corrosioncost.com/pdf/oilgas.pdf.

[100] H.M Shalaby, 2005, p. 6.

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Abrasive Solids

Solids suspended in crude oil have the potential to accelerate corrosion in pipelines either by settling out (forming corrosive conditions beneath them) or through abrasion. Abrasion has been raised as a particular concern for DilBit pipelines because DilBit may contain significantly more solids than conventional crudes.[101] These solids, it is argued, might wear away the interior walls of a pipeline and exacerbate wall loss from acidic corrosion. Some have compared this process to sandblasters.[102] However, CRS is not aware of publically available research that has examined whether the conditions exist for significant internal abrasion of DilBit pipelines. Crude oils with high solids content are also generally filtered to meet the quality specifications set by pipelines and refiners. Thus DilBit blends may have solids content higher than other types of crudes, but still within an acceptable range for pipeline and refinery operations.

Keystone XL Pipeline Operating Parameters

Multiple parties submitted comments to DOS, highlighting the Keystone XL pipeline operating parameters as a particular concern.[103] The 2011 environmental groups' report claims that "the risks of corrosion and the abrasive nature of DilBit are made worse by the relatively high heat and pressure."[104]

The report asserts the pipeline will be operating at temperatures "up to 158° F," which is substantially higher than conventional crude pipelines, which, according to the report, operate at less than 100° F.[105] TransCanada has stated that "oil in a line like this comes into our pipeline between 80-120°F, and it stays within that temperature range during transport."[106] In the 2011 FEIS, DOS states that the maximum operating temperature of the proposed pipeline would not exceed 150° F. It is uncertain whether this 150° F mark is an upper bound that might be approached on rare occasions, or whether the operating temperature would typically hover near this maximum. Either way, it is below the maximum operational temperature cited by some environmental groups.

According to the report, conventional crude pipeline pressure is 600 pounds per square-inch (PSI), while diluted bitumen requires a pipeline pressure of 1,440 psi[107] A subsequent 2011 report lists this figure as 2,130 psi.[108] Regardless, the 2011 FEIS lists the Keystone XL operating pressure as 1,308 psi.

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[101] Baker Hughes Inc., *Planning Ahead for Effective Canadian Crude Processing*, Sugar Land, TX, 2010, p. 4, http://www.bakerhughes.com/assets/media/whitepapers/4c2a3c8ffa7e1e3e7400001d/file/28271-canadian_crudeoil_update_whitepaper_06-10.pdf.pdf&fs=1497549.

[102] *Tar Sands Pipelines Safety Risks.*.

[103] See 2011 final EIS, "Appendix A, Responses to Comments and Scoping Summary Report," available at http://keystonepipeline-xl.state.gov/archive/dos_docs/feis/vol3and4/appendixa/index.htm.

[104] *Tar Sands Pipelines Safety Risks.*

[105] *Tar Sands Pipelines Safety Risks.*

[106] TransCanada, "TransCanada's Keystone XL Pipeline – Know the Facts," fact sheet, May 2011, http://www.transcanada.com/docs/Key_Projects/know_the_facts_kxl.pdf.

[107] *Tar Sands Pipelines Safety Risks.*

[108] *Pipeline and Tanker Trouble.*

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The degree to which the Keystone XL pipeline's operating parameters differ from other oil pipeline operating parameters is beyond the scope of this report. In general, the Keystone XL operating parameters are different, because diluted bitumen (and heavy crude oils) are more viscous (resistant to flow) than conventional crude oil. According to a 2011 review of heavy crude transportation:

> Pipelining of heavy oil presents problems like instability of asphaltenes, paraffin precipitation and high viscosity that cause multiphase flow, clogging of pipes, high-pressure drops, and production stops.[109]

The same review describes several options that may be used "to resolve or improve pipelining of heavy and extra-heavy crude oil." These options include dilution with other substances and increasing/conserving the oil's temperature. Both of these options would reduce viscosity and both seem to be part of the Keystone XL proposed operations.

DOS states that the proposed pipeline would satisfy the Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) regulations (49 CFR Part 195) that apply to hazardous liquid pipelines. In addition, Keystone agreed to implement 57 additional measures developed by PHMSA. In consultation with PHMSA, DOS determined that incorporation of those conditions:

> would result in a Project that would have a degree of safety over any other typically constructed domestic oil pipeline system under current code and a degree of safety along the entire length of the pipeline system similar to that which is required in High Consequence Areas (HCAs) as defined in 49 CFR 195.450.[110]

The *degree* to which the additional 57 measures mitigate risk is debatable. For instance, the primary author of the 2011 environmental groups' report argued that only 12 of these conditions actually differ in some way from minimum requirements.[111]

Oil Pipeline Spill Data from Alberta

Many stakeholders have argued a comparison of oil spill data from Alberta and the United States indicates that internal corrosion has led to substantially more oil spills in the Alberta pipeline system than the U.S. system.[112] They reason that this difference is likely related to high proportion of oil sands crudes, which have been in the Alberta system since the 1980s. In contrast, the first dedicated oil sands crudes pipeline in the United States, the Alberta Clipper, began operating in 2010.[113]

DOS rejected this assertion, stating:

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[109] Rafael Martinez-Palou et al., "Transportation of Heavy and Extra-Heavy Crude Oil by Pipeline: A Review," *Journal of Petroleum Science and Engineering*, Vol. 75, pp. 274-282, January 2011.

[110] 2011 FEIS, "Project Description," p. 2-23, available at http://keystonepipeline-xl.state.gov/archive/dos_docs/feis/vol1/index.htm.

[111] Anthony Swift, "Clinton's Tar Sands Pipeline 'Safety Conditions' are Smoke and Mirrors," August 19, 2011, at http://switchboard.nrdc.org.

[112] 2011 FEIS, Appendix A (see footnote 59).

[113] *Tar Sands Pipelines Safety Risks*.

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> [T]here is no evidence that the transportation of oil sands derived crude oil in Alberta has resulted in a higher corrosion related failure rate than occurs in the transportation of the variable-sourced crude oils in the U.S. system.[114]

Further, DOS pointed out that a comparison of the oil spill data is problematic for various reasons. In particular, the scopes of the data collected in each nation are different. Canadian data includes smaller spills and spills from certain pipelines not covered by PHMSA regulations. To address these discrepancies in data collection, PHMSA prepared a comparison of pipeline incidents of similar scopes between the two databases. This comparison was part of the 2011 FEIS and is provided below in **Table 4**.

Table 4. PHMSA Comparison of Oil Pipeline Incidents in Alberta and United States

2002 - 2010

Crude Oil Pipeline Failures U.S. and Alberta \ (2002-2010)		
U.S. Crude Oil Pipeline Incident History[a]		
Incident/Failure Case	**Failures/Year**	**Failures per 1,000 Pipeline Miles per Year**
Corrosion - External	9.8	0.19
Corrosion - Internal	22.1	0.42
All Failures	89.3	1.70
Alberta Crude Oil Pipeline Incident History[b]		
Corrosion - External	2.3	0.21
Corrosion - Internal	3.6	0.32
All Failures	22.0	1.97

Source: Reproduced by CRS; original table from 2011 FEIS, , p. 3.13-38 (Table 3.13.5-4).

Notes: The following notes are included in the table in the 2011 FEIS:

a. PHMSA includes spill incidents greater than 5 gallons. U.S. had 52,475 miles of crude oil pipelines in 2008.

b. Alberta Energy and Utility Board Report, includes spills greater than and less than 5 bbls. Alberta had 11,187 miles of crude oil pipelines in 2006.

This comparison indicates that internal corrosion failures (per 1,000 miles of pipeline) were approximately 30% higher in the U.S. system (0.42 vs. 0.32). Regardless, such comparisons are challenging, if not impossible, considering the range of potential factors—pipeline age, enforcement, etc.—that may affect the underlying data. For this reason, the above comparison might be described as preliminary.

Keystone XL Spill Frequency Estimates

Spill frequency estimates for the Keystone XL project have been a subject of debate. During the NEPA process, Keystone submitted a spill frequency estimate of 0.22 spills per year. The company derived this estimate by using historical databases from PHMSA and then applying

[114] 2011 FEIS, "Potential Releases," p. 3.13-38 (see footnote 87).

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project-specific factors, such as regulatory requirements, material strength, and technological advances.

However, some questioned Keystone's modified estimate, arguing that the pipeline's operating parameters—temperatures and pressures higher than conventional crude pipelines—would yield spill frequencies above historical averages, rather than below.[115]

Subsequent to Keystone's estimate, the DOS estimated that a spill over 50 barrels would occur between 1.2 to 1.8 times per year; spills of any size would occur between 1.8 to 2.5 times per year.[116]

Another potential source of data is the pipeline operating history of Keystone. Keystone has operated the Keystone Mainline pipeline and the Cushing Extension since 2010. Since that time the Keystone pipeline has generated 14 unintentional releases. DOS cites personal communication with PHMSA staff, who stated that these incidents are "not unusual start-up issues that occur on pipeline and are not unique."[117] Regardless, this figure is considerably higher than the Keystone XL spill frequency estimates DOS included in its 2011 FEIS.

Spill Size Estimates

Citing the PHMSA significant incident database,[118] DOS indicates that between 1990 and 2010, the average spill size for onshore hazardous liquid pipelines, which includes both oil and other materials, was less than 1,000 barrels (42,000 gallons).[119] Using this database, CRS calculated the exact average spill to be 918 barrels (38,556 gallons). Per the spill size classification included in the 2011 FEIS, the average spill would be considered a "large spill."[120]

One may question whether this database is the best tool for predicting spill size from the Keystone XL pipeline. The database includes oil and other hazardous liquids; pipelines of varying sizes and pressures; and pipelines of varying ages. A more refined comparison may offer policymakers a better prediction of possible spill size, but the PHMSA database is not immediately amenable to a more tailored assessment.

In its 2011 FEIS, DOS seems to suggest that "very large spills" (defined as greater than 5,000 barrels or 210,000 gallons) would require a dramatic event. According to DOS:

> A very large spill from the pipeline would likely require the occurrence of an event that would shear the pipeline such as major earth movement resulting from slides, major earth movement resulting from an earthquake, major flood flows eroding river banks at non-HDD

[115] See John Stansbury, *Analysis of Frequency, Magnitude and Consequence of Worst-Case Spills from the Proposed Keystone XL Pipeline*, Submitted as a comment to the supplemental draft EIS and later cited in the 2011 FEIS.

[116] 2011 FEIS, "Potential Releases," pp. 3.13-18 – 3.13-21 (see footnote 87).

[117] 2011 FEIS, "Potential Releases," p. 3.13-11 (see footnote 87).

[118] The significant incident database represents a subset of all incidents. To qualify as "significant" an incident must result in one of the following: (1) a fatality or injury requiring in-patient hospitalization; (2) $50,000 or more in total costs, measured in 1984 dollars; (3) a highly volatile liquid release of 5 barrels or more or other liquid releases of 50 barrels or more; or (4) a liquid releases resulting in an unintentional fire or explosion.

[119] 2011 FEIS, "Potential Releases," p. 3.13-15 (see footnote 87).

[120] Ibid.

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> crossings, mechanical damage from third-party excavation or drilling work, or vandalism, sabotage, or terrorist actions.[121]

This assertion will be tested when the NTSB releases its investigation results for the July 2010 Enbridge oil spill.[122] That spill was a "very large spill," releasing over 800,000 gallons into the Kalamazoo River in Michigan.

Regardless, an average spill can require substantial cleanup efforts in certain locations. The July 2011 ExxonMobil spill into the Yellowstone River was approximately 42,000 gallons. The EPA is overseeing this oil spill response. In August 2011, over 1,000 personnel were engaged in cleanup and shoreline assessment efforts.[123] As of February 2012, the federal government has assigned $3.8 million from the Oil Spill Liability Trust Fund to address response activities.[124] This figure would not capture the expenses from the responsible party.

Environmental Impacts of Spills of Oil Sands Crude

Some contend that the distinct chemical composition of oil sands crude (e.g., DilBit) would pose a greater environmental risk from an oil spill than other crudes.[125] CRS is not aware of an authoritative study that has examined this assertion. Although parallels may be drawn between the possible behavior of conventional crudes and DilBit, studies are scarce regarding spills of heavy crudes with the specific composition of Canadian heavy crudes.

The behavior of crude oil spills and the fate of crude oil in the subsurface have been studied extensively around the world for a wide range of conventional crudes and other petrochemicals in both experimental settings and actual spills (e.g., Bemidji, Minnesota in 1979).[126] These include studies of specific chemical components that may be present in DilBit (e.g., benzene).[127] Based on extensive experience with other crudes and DilBit constituents, analysts may claim

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[121] Ibid.

[122] Although a synopsis of this report was made available July 10, 2012, NTSB has not released the final report. See http://www.ntsb.gov/news/events/2012/marshall_mi/index.html.

[123] See EPA Update on Yellowstone River Oil Spill (Silvertip Pipeline), August 12, 2011, at http://www.epa.gov/yellowstoneriverspill/.

[124] Personal communication with U.S. Coast Guard, February 14, 2012.

[125] Swift et al, p. 7.

[126] See, for example, work compiled by the U.S. Geological Survey about the 1979 crude oil spill near Bemidji, MN, which contaminated a shallow aquifer: U.S. Geological Survey, "Crude Oil Contamination in the Shallow Subsurface: Bemidji, Minnesota," Internet page, July 20, 2011, http://toxics.usgs.gov/sites/bemidji_page.html. See also: M. Whittaker, S.J.T. Pollard, and T.E. Fallick, "Characterisation of Refractory Wastes at Heavy Oil-Contaminated Sites: A Review of Conventional and Novel Analytical Methods," *Environmental Technology*, Vol. 16, No. 11, November 1, 1995, pp. 1009-1033; S Khaitan et al., "Remediation of Sites Contaminated by Oil Refinery Operations," *Environmental Progress*, Vol. 25, No. 1, April 2006, pp. 20-31.

[127] See, for example: Lisa M. Geig et al., "Intrinsic Bioremediation of Petroleum Hydrocarbons in a Gas Condensate-Contaminated Aquifer," *Environmental Science and Technology*, vol. 33, no. 15 (1999), pp. 2550-2560; Paul E. Hardisty, et al., "Characterization of LNAPL in Fractured Rock," *Quarterly Journal of Engineering Geology & Hydrogeology*, Vol. 36, No. 4, November 2003, p. 343-354; J.L. Busch-Harris, e al., "In Situ Assessment of Benzene Biodegradation Potential in a Gas Condensate Contaminated Aquifer," Proceedings of 11th Annual International Petroleum Environmental Conference, Albuquerque, NM, October 12-15, 2004; John A. Connor, et al., "Nature, Frequency, and Cost of Environmental Remediation at Onshore Oil and Gas Exploration and Production Sites," *Remediation*, Vol. 21, No. 3, Summer 2011, pp. 121-144; Bruce E Rittmann, et al., *Natural Attenuation for Groundwater Remediation*, National Academy Press, 2000.

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considerable confidence in models of DilBit behavior around groundwater. For example, the Energy Resources Conservation Board has stated that "DilBit should behave in much the same manner as other crude oils of similar characteristics.[128]

All spilled oil begins to "weather" or separate into different components over time. In general, heavier oils, like DilBit, are more persistent and may present greater technical challenges in oil removal operations than lighter crude oils. For a land spill, the heavier and more viscous components (i.e., the asphaltenes) would likely remain trapped in soil pores above the water table. It is also likely that the lighter constituents would partly evaporate and not be transported down through the soil with the heavier components.

However, if an oil spill reached the water table, some of the more soluble portions would likely dissolve into the groundwater and be transported in the direction of regional groundwater flow. The ultimate extent, shape, and composition of a groundwater contaminant plume resulting from a DilBit spill would depend on the specific characteristics of the soil, aquifer, and the amount and duration of the accidental release.

The heavier components of a DilBit spill would be difficult to remove from the soil during cleanup operations, and may require wholesale soil removal instead of other remediation techniques.[129] These challenges may come at a higher cost. In an oil spill model prepared for EPA, the model estimates that spills of heavy oil will cost nearly twice as much to clean up as comparable spills of conventional crude oil.[130]

Crude oils may contain multiple compounds that present toxicity concerns. DOS stated that "based on the combination of toxicity, solubility, and bioavailability, benzene was determined to dominate toxicity associated with potential crude oil spills."[131] Benzene and other BTEX compounds (benzene, toluene, ethyl benzene, and xylene) are generally in greater proportions in the lighter crude oils and particularly in refined products like gasoline.[132] In its 2011 FEIS, DOS compared the BTEX content of crude oil derived from oil sands (DilBit and DilSynBit) with conventional crude oils from Canada. The BTEX content of oil sands crudes ranged from 5,800 parts per million (ppm) to 9,100 ppm. The BTEX contents of conventional crude oils ranged from 5,800 ppm to 29,100 ppm.[133]

Other toxic compounds of concern in crude oils are polycyclic aromatic hydrocarbons (PAHs). Generally, PAHs are more toxic than BTEX and evaporate at a slower rate, but they are less soluble in water. The National Research Council's *Oil in the Sea* report stated that with

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[128] Canadian Energy Resources Conservation Board (ERCB), "ERCB Addresses Statements in Natural Resources Defense Council Pipeline Safety Report," Press release, Calgary, Alberta, February 16, 2011.

[129] One such other method is "pump and treat," which involves cleaning soil and groundwater contamination by pumping and capturing the contaminated groundwater, then treating it at the surface to remove the contaminants. The same technique may be used to extract soil gas vapor from contaminated soil above the water table. For more information, see Environmental Protection Agency, *Basics of Pump-and-Treat Ground-Water Remediation Technology*, EPA/800/8-90003, March 1990.

[130] Dagmar Etkin, *Modeling Oil Spill Response and Damages Costs*, Proceedings of the 5th Biennial Freshwater Spills Symposium, 2004, at http://www.environmental-research.com.

[131] 2011 FEIS, "Potential Releases," p. 3.13-80 (see footnote 87).

[132] For a comprehensive discussion, see National Research Council, *Oil in the Sea III Inputs, Fates, and Effects*, National Academies of Science, February 2003.

[133] 2011 FEIS, "Potential Releases," Table 3.13.5-6, p. 3.13-45 (see footnote 87).

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weathering/evaporation and the resulting loss of BTEX, PAHs become more important contributors to the remaining oil's toxicity.[134]

Unlike BTEX, the 2011 FEIS does not include a comparison of PAH concentrations across different crude oils. DOS states that PAH concentrations of crude oils that would be transported in the Keystone XL pipeline are unknown, because this information is proprietary.[135] Some commenters, including EPA, took issue with this during the EIS review process.[136]

Heavy metals may also be a concern. A 2011 NRDC report states that Dilbit contains quantities of heavy metals, particularly vanadium and nickel, that are "significantly larger" than conventional crude oil.[137] Assuming conventional oil means lighter crudes, this statement is largely correct.[138] However, the heavy metal concentrations in DilBit are similar to some other heavy crude oils, such as Mexican and Venezuela crudes that are processed in Gulf Coast refineries.[139] Most, if not all, of this crude oil arrives in the United States via vessel.[140]

Further Study

DOT officials acknowledge that they have not performed any specific studies nor reassessments of pipeline safety risks that might be unique to DilBit.[141] In addition, DOS points out that "a focused, peer-reviewed study of the potential corrosivity/erosivity of WCSB oil sands derived crude oils relative to other crude oils has not yet been conducted."[142]

Some in Congress have called for a review of DOT pipeline safety regulations to determine whether new regulations for Canadian heavy crudes are needed to account for any unique properties they may have. Accordingly, P.L. 112-90 requires PHMSA to review whether current regulations are sufficient to regulate pipelines transmitting "diluted bitumen," and analyze whether such oil presents an increased risk of release (§16).

Oil Sands Extraction Concerns

Opponents of the Keystone XL pipeline and oil sands development often highlight the environmental impacts that pertain to the region in which the oil sands resources are extracted. In general, these local/regional impacts from Canadian oil sands development may not directly

[134] National Research Council, 2003, p. 126.

[135] 2011 FEIS, "Potential Releases," p. 3.13-31 (see footnote 87).

[136] See footnote 57 regarding EPA's June 6, 2011 comments.

[137] Anthony Swift, Susan Casey-Lefkowitz, and Elizabeth Shope, *Tar Sands Pipelines Safety Risks*, Natural Resources Defense Council (NRDC), February 2011.

[138] Based on a comparison of crude oil assays from sources listed in Table 1.

[139] 2011 FEIS, "Potential Releases," Table 3.13.5-7 (see footnote 87).

[140] Although a considerable percentage of oil imports come from Mexico (e.g., approximately 12% of crude oil imports in 2010), the EIA states that "Mexico does not have any international pipeline connections, with most exports leaving the country via tanker from three export terminals in the southern part of the country." EIA, Country Analysis Briefs, at http://www.eia.gov/cabs/Mexico/Full.html.

[141] The Honorable Cynthia L. Quarterman, Administrator, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Testimony before the U.S. House Committee on Energy and Commerce, Subcommittee on Energy and Power, Hearing on "The American Energy Initiative," June 16, 2011.

[142] 2011 FEIS, "Potential Releases," p. 3.13-43 (see footnote 87).

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U.S. Department
of Transportation

Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave., SE
Washington, DC 20590

JUN 27 2011

Mr. David Chittick
Director, Pipeline Engineering
TransCanada Pipelines Limited
450 – 1st Street, S.W.
Calgary, Alberta, Canada T2P 5H1

Docket No. PHMSA-2010-0148

Dear Mr. Chittick:

On May 26, 2010, TransCanada Pipeline Limited (TCPL) operator of the PNGTS Pipeline Company (PNGTS) wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a special permit to waive compliance from PHMSA's pipeline safety regulation in 49 CFR § 192.611, for one (1) segment of the PNGTS natural gas transmission pipeline system located in Coos County, New Hampshire. The regulation requires confirmation or revision of the maximum allowable operating pressure (MAOP) of a pipeline segment where the class location has changed.

PHMSA is denying your May 26, 2010, special permit application based on operator compliance issues relating to not performing weekly aerial patrols and quarterly ground patrols as required by the special permit conditions (PHMSA-RSPA-2003-15733) at another location on this pipeline. For additional information concerning PHMSA's review of your application and the basis for our decision, please see the enclosed Special Permit Analysis and Findings document. This and all other pertinent documents are available for review in Docket No. PHMSA-2010-0148 on the internet at www.Regulations.gov.

Pursuant to 49 CFR 190.341(i), reconsideration of this decision may be sought by petition to the Associate Administrator. Petitions must be received by PHMSA within 20 calendar days of the notice of the denial and contain a brief statement of the issue(s) and an explanation of why the petitioner believes the decision is not in the public interest. The Associate Administrator may grant or deny, in whole or in part, any petition for reconsideration without further proceedings.

For the special permit application segment identified in the Special Permit Analysis and Findings document, TCPL must complete all pipe replacements, hydrostatic tests, or pressure reductions required to meet the MAOP requirements of § 192.611 by December 1, 2011.

Exhibit 8015

JUN 2 7 2011

My staff would be pleased to discuss this matter or any other regulatory matter with you. John Gale, Director of Standards and Rulemaking Division 202-366-0434, may be contacted on regulatory matters and Jeff Gilliam, Director of Engineering and Research Division 202-366-0568, may be contacted on technical matters specific to this special permit.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Enclosure: Special Permit Analysis & Findings

U.S. DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION (PHMSA)

Special Permit Analysis and Findings

Special Permit Information:

Docket Number: PHMSA–2010-0148

Pipeline Operator: TransCanada Pipelines Limited, operator of PNGTS Pipeline Company

Date Requested: May 26, 2010

Code Section(s): 49 CFR § 192.611

Purpose:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides this information to describe the facts of the subject special permit application submitted by TransCanada Pipelines Limited (TCPL), operator of the PNGTS Pipeline Company (PNGTS), to discuss any relevant public comments received with respect to the application, to present the engineering/safety analysis of the special permit application, and to make findings regarding whether the requested special permit should be granted and if so under what conditions.

Pipeline System Affected:

This special permit request involves one (1) *special permit segment* along the PNGTS 24-inch Mainline pipeline, a natural gas transmission pipeline, located in Coos County, New Hampshire. The *special permit segment* class location along the pipeline has changed from an original Class 1 location to a Class 3[1] location.

This special permit would allow, if granted, TCPL to continue to operate the one (1) pipeline segment at its current maximum allowable operating pressure (MAOP) of 1440 pounds per square inch gauge (psig) for the PNGTS 24-inch Mainline pipeline.

[1] The Class 3 location *special permit segment* was originally a Class 1 location that was upgraded to Class 2 location in accordance with 49 CFR 192.611 (a) hydrostatic test.

This special permit application applies to the *special permit segment* defined as follows using the PNGTS 24-inch Mainline pipeline mile post (MP) or survey station (Sta.) references:

- *Special permit segment* is defined as the PNGTS 24-inch Mainline pipeline beginning at Mile Post 70.18 (Survey Station 3705+59 feet) between Valve Site 7 and Valve Site 8. The *special permit segment* extends for 114 feet along the PNGTS 24-inch Mainline pipeline and concludes at Mile Post 70.20 (Survey Station 3706+73 feet), also between Valve Site 7 and Valve Site 8. The *special permit segment* is located in Coos County, New Hampshire.

This special permit application applies to the *special permit inspection area* defined as the area that extends 220 yards on each side of the centerline along the entire length of the PNGTS 24-inch Mainline pipeline as follows:

- *Special permit inspection area* is defined as the pipeline that begins at Mile Post 45.18 (Survey Station 2385+59 feet) between Valve Site 5 and Valve Site 6 in Coos County, New Hampshire. The *special permit inspection area* extends to Mile Post 95.20 (Survey Station 5026+73 feet) between Valve Site 9 and Valve Site 10 in Oxford County, Maine. The proposed *special permit inspection area* is located in Coos County, New Hampshire and Oxford County, Maine.

The total length of the proposed *special permit inspection area* is approximately 50.02 miles and includes the *special permit segment*.

Special Permit Request

TCPL submitted an application to PHMSA on May 26, 2010, for a special permit seeking relief from the Federal pipeline safety regulations in 49 CFR 192.611(a) for one (1) segment of TCPL's PNGTS 24-inch Mainline natural gas transmission pipeline, where a change has occurred from an original Class 1 location to a Class 3 location in Coos County, New Hampshire. As requested, this special permit would allow TCPL to continue to operate the pipeline segment at its current maximum allowable operating pressure (MAOP) of 1,440 pounds per square inch gauge (psig). The Federal pipeline safety regulations in 49 CFR 192.611(a) require natural gas pipeline operators to confirm or revise the MAOP of a pipeline segment after

a change in class location. A special permit, if granted, would allow TCPL to continue to operate the special permit segment at their existing MAOP's despite a change in class location.

In its application, TCPL suggested that the *special permit segment* be included in a *special permit inspection area* (see TCPL's application for the specific details). The *special permit inspection area* on the PNGTS 24-inch Mainline pipeline, if granted, would begin approximately 25 miles upstream of the beginning of the *special permit segment* and approximately 25 miles downstream of the *special permit segment*. The *special permit inspection area* would be approximately 50.02 miles in length and would include the *special permit segment*, if granted.

Public Notice:

On March 3, 2011, PHMSA posted a notice of this special permit request in the Federal Register (76 FR 11853). The request letter, Federal Register notice, and all other pertinent documents are available for review in Docket No. PHMSA-2010-0148 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

PHMSA did not receive any public comments on this application for a class location special permit.

Analysis:

Background: On June 29, 2004, PHMSA published in the Federal Register (69 FR 38948) the criteria it uses for the consideration of class location change waivers, now being granted through a special permit. First, certain threshold requirements must be met for a pipeline section to be further evaluated for a class location change special permit. Second, the age and manufacturing process of the pipe; system design and construction; environmental, operating and maintenance histories; and integrity management program elements are evaluated as significant criteria. These significant criteria are presented in matrix form and can be reviewed in the FDMS, Docket Number PHMSA-RSPA-2004-17401. Third, such special permits will only then be granted when pipe conditions and active integrity management provides a level of safety greater than or equal to a pipe replacement or pressure reduction.

Threshold Requirements: Each of the threshold requirements published by PHMSA in the June 29, 2004, FR notice is discussed below in regards to the TCPL special permit petition for the PNGTS 24-inch Mainline.

1) No pipeline segments in a class location changing to Class 4 location will be considered. This special permit request is for one (1) segment where a class location change has occurred from Class 1 to Class 3 location. TCPL has met this requirement.
2) No bare pipe will be considered. This TCPL *special permit segment* is coated with fusion bonded epoxy (FBE). TCPL has met this requirement.
3) No pipe containing wrinkle bends will be considered. There are no wrinkle bends in the *special permit segment*. TCPL has met this requirement.
4) No pipe segments operating above 72% of the specified minimum yield strength (SMYS) will be considered for a Class 3 special permit. The *special permit segment* operates at or below 72% SMYS. TCPL has met this requirement.
5) Records must be produced that show a hydrostatic test to at least 1.25 x maximum allowable operating pressure (MAOP) and 90% of SMYS. TCPL records submitted show that the section of the PNGTS 24-inch Mainline pipeline containing the *special permit segment* has been hydrostatically tested to 1807 psig, which is 1.255 x MAOP and 90.3% of SMYS. TCPL has met this requirement.
6) In-line inspection (ILI) must have been performed with no significant anomalies identified that indicate systemic problems. The proposed *special permit segment* was last inspected by ILI on February 29, 2008, with no immediate or one (1) year actionable anomalies found. TCPL has met this requirement and would be required to re-inspect the s*pecial permit inspection area* and *special permit segment* with ILI tools by February 29, 2015, if the special permit is granted.
7) Criteria for consideration of class location change waiver, now being granted through special permit, published by PHMSA in the Federal Register (69 FR 38948), define a *waiver inspection area (special permit inspection area)* as up to 25 miles of pipe either side of the *waiver segment (special permit segment).* The *special permit inspection area* must be inspected according to TCPL's integrity management program and periodically inspected with an in-line inspection technique. The *special permit inspection area* is approximately 50.02 miles long. This special permit, if granted, would be contingent upon TCPL's

incorporation of the *special permit segment* in its written integrity management program as a *"covered segment"* in a *"high consequence area"* (HCA) in accordance with 49 CFR § 192.903.

The *special permit segment* meets the threshold requirements.

Criteria Matrix: The original and supplemental data submitted by TCPL for the *special permit segment* have been compared to the class location change special permit criteria matrix. The *special permit segment* falls in the probable acceptance column of the criteria matrix for all criteria except for:

- Possible acceptance – pipeline depth of cover.
- Requires substantial justification – none.

The data findings above fall within the "possible acceptance" columns of the criteria matrix and will require some remediation measures as described below:

- Depth of Cover: TCPL has not conducted a pipeline depth of cover survey, and would be required, if the special permit is granted, to conduct a depth of cover survey in the *special permit segment* and implement remediation measures where depth of cover is reduced.

Operational Integrity Compliance:

PHMSA reviewed the existing special permit (PHMSA-RSPA-2003-15733) to ensure that TCPL is following the conditions of this existing special permit on the PNGTS 24-inch Mainline pipeline. PHMSA found that TCPL has not followed all conditions in this special permit through-out the life of the special permit as follows:

Special Permit Condition 5: Findings, remediation, and documentation – Perform weekly aerial patrols and quarterly ground patrols over the entire 143.8 miles of the 24-inch pipeline. The ground patrols must include leak surveys on all Class 3 portions of the pipeline using appropriate instrumented leak detection equipment.

PHMSA review of compliance documents:

TCPL/PNGTS did not meet the special permit conditions for performing weekly aerial patrols and quarterly ground patrols.

- TCPL/PNGTS stopped conducting weekly aerial patrols in July, 2006, through the present time. Bi-weekly aerial patrols were performed from

2008 through the present time. PHMSA was not notified of this special permit modification.

- TCPL/PNGTS performed quarterly ground patrols until the 4th-quarter of 2004, and annual ground patrols were conducted in 2005, 2006, and 2007. Quarterly ground patrols were resumed in 2008. PHMSA was not notified of this special permit modification.

PHMSA finds that TCPL/PNGTS lack of diligence in following all of the conditions of the existing special permit to be inconsistent with pipeline safety.

Compliance History – 2004 through 2011:

A review of PHMSA enforcement actions of TCPL operations on the PNGTS pipeline from August 3, 2004, through April 28, 2011, shows the following closed enforcement actions against TCPL during the time interval they have owned and operated PNGTS (OPID 31145).

- Letters - of Concern or Warning - 1 matters closed
- Notices – of Amendment or of Probable Violation – 3 matters closed
- Collected Civil Penalties - none collected

This enforcement history reveals a few compliance issues, including pipeline maintenance issues. TCPL has owned and operated PNGTS pipeline since August 3, 2004.

Findings:

Based on the information submitted by TCPL and PHMSA's analysis of the technical, operational, and existing special permit non-compliance issues on the PNGTS pipeline, PHMSA finds that granting this special permit to TCPL to operate this *special permit segment* of the PNGTS 24-inch Mainline pipeline, a natural gas transmission pipeline, at the current MAOP where a change in class location has occurred from an original Class 1 location to a Class 3 location is inconsistent with pipeline safety.

Completed in Washington DC on: JUN 27 2011

Prepared by: Engineering and Research Division

U.S. Department
of Transportation

Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave., SE
Washington, DC 20590

JUN 27 2011

Mr. David Chittick
Director, Pipeline Engineering
TransCanada Pipelines Limited
450 – 1st Street, S.W.
Calgary, Alberta, Canada T2P 5H1

Docket No. PHMSA-2010-0148

Dear Mr. Chittick:

On May 26, 2010, TransCanada Pipeline Limited (TCPL) operator of the PNGTS Pipeline Company (PNGTS) wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a special permit to waive compliance from PHMSA's pipeline safety regulation in 49 CFR § 192.611, for one (1) segment of the PNGTS natural gas transmission pipeline system located in Coos County, New Hampshire. The regulation requires confirmation or revision of the maximum allowable operating pressure (MAOP) of a pipeline segment where the class location has changed.

PHMSA is denying your May 26, 2010, special permit application based on operator compliance issues relating to not performing weekly aerial patrols and quarterly ground patrols as required by the special permit conditions (PHMSA-RSPA-2003-15733) at another location on this pipeline. For additional information concerning PHMSA's review of your application and the basis for our decision, please see the enclosed Special Permit Analysis and Findings document. This and all other pertinent documents are available for review in Docket No. PHMSA-2010-0148 on the internet at www.Regulations.gov.

Pursuant to 49 CFR 190.341(i), reconsideration of this decision may be sought by petition to the Associate Administrator. Petitions must be received by PHMSA within 20 calendar days of the notice of the denial and contain a brief statement of the issue(s) and an explanation of why the petitioner believes the decision is not in the public interest. The Associate Administrator may grant or deny, in whole or in part, any petition for reconsideration without further proceedings.

For the special permit application segment identified in the Special Permit Analysis and Findings document, TCPL must complete all pipe replacements, hydrostatic tests, or pressure reductions required to meet the MAOP requirements of § 192.611 by December 1, 2011.

Exhibit 8016

JUN 2 7 2011

My staff would be pleased to discuss this matter or any other regulatory matter with you. John Gale, Director of Standards and Rulemaking Division 202-366-0434, may be contacted on regulatory matters and Jeff Gilliam, Director of Engineering and Research Division 202-366-0568, may be contacted on technical matters specific to this special permit.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Enclosure: Special Permit Analysis & Findings

U.S. DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION (PHMSA)

Special Permit Analysis and Findings

Special Permit Information:

Docket Number: PHMSA–2010-0148

Pipeline Operator: TransCanada Pipelines Limited, operator of PNGTS Pipeline Company

Date Requested: May 26, 2010

Code Section(s): 49 CFR § 192.611

Purpose:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides this information to describe the facts of the subject special permit application submitted by TransCanada Pipelines Limited (TCPL), operator of the PNGTS Pipeline Company (PNGTS), to discuss any relevant public comments received with respect to the application, to present the engineering/safety analysis of the special permit application, and to make findings regarding whether the requested special permit should be granted and if so under what conditions.

Pipeline System Affected:

This special permit request involves one (1) *special permit segment* along the PNGTS 24-inch Mainline pipeline, a natural gas transmission pipeline, located in Coos County, New Hampshire. The *special permit segment* class location along the pipeline has changed from an original Class 1 location to a Class 3[1] location.

This special permit would allow, if granted, TCPL to continue to operate the one (1) pipeline segment at its current maximum allowable operating pressure (MAOP) of 1440 pounds per square inch gauge (psig) for the PNGTS 24-inch Mainline pipeline.

[1] The Class 3 location *special permit segment* was originally a Class 1 location that was upgraded to Class 2 location in accordance with 49 CFR 192.611 (a) hydrostatic test.

This special permit application applies to the *special permit segment* defined as follows using the PNGTS 24-inch Mainline pipeline mile post (MP) or survey station (Sta.) references:

- *Special permit segment* is defined as the PNGTS 24-inch Mainline pipeline beginning at Mile Post 70.18 (Survey Station 3705+59 feet) between Valve Site 7 and Valve Site 8. The *special permit segment* extends for 114 feet along the PNGTS 24-inch Mainline pipeline and concludes at Mile Post 70.20 (Survey Station 3706+73 feet), also between Valve Site 7 and Valve Site 8. The *special permit segment* is located in Coos County, New Hampshire.

This special permit application applies to the *special permit inspection area* defined as the area that extends 220 yards on each side of the centerline along the entire length of the PNGTS 24-inch Mainline pipeline as follows:

- *Special permit inspection area* is defined as the pipeline that begins at Mile Post 45.18 (Survey Station 2385+59 feet) between Valve Site 5 and Valve Site 6 in Coos County, New Hampshire. The *special permit inspection area* extends to Mile Post 95.20 (Survey Station 5026+73 feet) between Valve Site 9 and Valve Site 10 in Oxford County, Maine. The proposed *special permit inspection area* is located in Coos County, New Hampshire and Oxford County, Maine.

The total length of the proposed *special permit inspection area* is approximately 50.02 miles and includes the *special permit segment.*

Special Permit Request

TCPL submitted an application to PHMSA on May 26, 2010, for a special permit seeking relief from the Federal pipeline safety regulations in 49 CFR 192.611(a) for one (1) segment of TCPL's PNGTS 24-inch Mainline natural gas transmission pipeline, where a change has occurred from an original Class 1 location to a Class 3 location in Coos County, New Hampshire. As requested, this special permit would allow TCPL to continue to operate the pipeline segment at its current maximum allowable operating pressure (MAOP) of 1,440 pounds per square inch gauge (psig). The Federal pipeline safety regulations in 49 CFR 192.611(a) require natural gas pipeline operators to confirm or revise the MAOP of a pipeline segment after

a change in class location. A special permit, if granted, would allow TCPL to continue to operate the special permit segment at their existing MAOP's despite a change in class location.

In its application, TCPL suggested that the *special permit segment* be included in a *special permit inspection area* (see TCPL's application for the specific details). The *special permit inspection area* on the PNGTS 24-inch Mainline pipeline, if granted, would begin approximately 25 miles upstream of the beginning of the *special permit segment* and approximately 25 miles downstream of the *special permit segment*. The *special permit inspection area* would be approximately 50.02 miles in length and would include the *special permit segment*, if granted.

Public Notice:

On March 3, 2011, PHMSA posted a notice of this special permit request in the Federal Register (76 FR 11853). The request letter, Federal Register notice, and all other pertinent documents are available for review in Docket No. PHMSA-2010-0148 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

PHMSA did not receive any public comments on this application for a class location special permit.

Analysis:

Background: On June 29, 2004, PHMSA published in the Federal Register (69 FR 38948) the criteria it uses for the consideration of class location change waivers, now being granted through a special permit. First, certain threshold requirements must be met for a pipeline section to be further evaluated for a class location change special permit. Second, the age and manufacturing process of the pipe; system design and construction; environmental, operating and maintenance histories; and integrity management program elements are evaluated as significant criteria. These significant criteria are presented in matrix form and can be reviewed in the FDMS, Docket Number PHMSA-RSPA-2004-17401. Third, such special permits will only then be granted when pipe conditions and active integrity management provides a level of safety greater than or equal to a pipe replacement or pressure reduction.

Threshold Requirements: Each of the threshold requirements published by PHMSA in the June 29, 2004, FR notice is discussed below in regards to the TCPL special permit petition for the PNGTS 24-inch Mainline.

1) No pipeline segments in a class location changing to Class 4 location will be considered. This special permit request is for one (1) segment where a class location change has occurred from Class 1 to Class 3 location. TCPL has met this requirement.
2) No bare pipe will be considered. This TCPL *special permit segment* is coated with fusion bonded epoxy (FBE). TCPL has met this requirement.
3) No pipe containing wrinkle bends will be considered. There are no wrinkle bends in the *special permit segment*. TCPL has met this requirement.
4) No pipe segments operating above 72% of the specified minimum yield strength (SMYS) will be considered for a Class 3 special permit. The *special permit segment* operates at or below 72% SMYS. TCPL has met this requirement.
5) Records must be produced that show a hydrostatic test to at least 1.25 x maximum allowable operating pressure (MAOP) and 90% of SMYS. TCPL records submitted show that the section of the PNGTS 24-inch Mainline pipeline containing the *special permit segment* has been hydrostatically tested to 1807 psig, which is 1.255 x MAOP and 90.3% of SMYS. TCPL has met this requirement.
6) In-line inspection (ILI) must have been performed with no significant anomalies identified that indicate systemic problems. The proposed *special permit segment* was last inspected by ILI on February 29, 2008, with no immediate or one (1) year actionable anomalies found. TCPL has met this requirement and would be required to re-inspect the s*pecial permit inspection area* and *special permit segment* with ILI tools by February 29, 2015, if the special permit is granted.
7) Criteria for consideration of class location change waiver, now being granted through special permit, published by PHMSA in the Federal Register (69 FR 38948), define a *waiver inspection area (special permit inspection area)* as up to 25 miles of pipe either side of the *waiver segment (special permit segment).* The *special permit inspection area* must be inspected according to TCPL's integrity management program and periodically inspected with an in-line inspection technique. The *special permit inspection area* is approximately 50.02 miles long. This special permit, if granted, would be contingent upon TCPL's

incorporation of the *special permit segment* in its written integrity management program as a *"covered segment"* in a *"high consequence area"* (HCA) in accordance with 49 CFR § 192.903.

The *special permit segment* meets the threshold requirements.

Criteria Matrix: The original and supplemental data submitted by TCPL for the *special permit segment* have been compared to the class location change special permit criteria matrix. The *special permit segment* falls in the probable acceptance column of the criteria matrix for all criteria except for:

- Possible acceptance – pipeline depth of cover.
- Requires substantial justification – none.

The data findings above fall within the "possible acceptance" columns of the criteria matrix and will require some remediation measures as described below:

- Depth of Cover: TCPL has not conducted a pipeline depth of cover survey, and would be required, if the special permit is granted, to conduct a depth of cover survey in the *special permit segment* and implement remediation measures where depth of cover is reduced.

Operational Integrity Compliance:

PHMSA reviewed the existing special permit (PHMSA-RSPA-2003-15733) to ensure that TCPL is following the conditions of this existing special permit on the PNGTS 24-inch Mainline pipeline. PHMSA found that TCPL has not followed all conditions in this special permit through-out the life of the special permit as follows:

Special Permit Condition 5: Findings, remediation, and documentation – Perform weekly aerial patrols and quarterly ground patrols over the entire 143.8 miles of the 24-inch pipeline. The ground patrols must include leak surveys on all Class 3 portions of the pipeline using appropriate instrumented leak detection equipment.

PHMSA review of compliance documents:

TCPL/PNGTS did not meet the special permit conditions for performing weekly aerial patrols and quarterly ground patrols.

- TCPL/PNGTS stopped conducting weekly aerial patrols in July, 2006, through the present time. Bi-weekly aerial patrols were performed from

2008 through the present time. PHMSA was not notified of this special permit modification.

- TCPL/PNGTS performed quarterly ground patrols until the 4th-quarter of 2004, and annual ground patrols were conducted in 2005, 2006, and 2007. Quarterly ground patrols were resumed in 2008. PHMSA was not notified of this special permit modification.

PHMSA finds that TCPL/PNGTS lack of diligence in following all of the conditions of the existing special permit to be inconsistent with pipeline safety.

Compliance History – 2004 through 2011:

A review of PHMSA enforcement actions of TCPL operations on the PNGTS pipeline from August 3, 2004, through April 28, 2011, shows the following closed enforcement actions against TCPL during the time interval they have owned and operated PNGTS (OPID 31145).

- Letters - of Concern or Warning - 1 matters closed
- Notices – of Amendment or of Probable Violation – 3 matters closed
- Collected Civil Penalties - none collected

This enforcement history reveals a few compliance issues, including pipeline maintenance issues. TCPL has owned and operated PNGTS pipeline since August 3, 2004.

Findings:

Based on the information submitted by TCPL and PHMSA's analysis of the technical, operational, and existing special permit non-compliance issues on the PNGTS pipeline, PHMSA finds that granting this special permit to TCPL to operate this *special permit segment* of the PNGTS 24-inch Mainline pipeline, a natural gas transmission pipeline, at the current MAOP where a change in class location has occurred from an original Class 1 location to a Class 3 location is inconsistent with pipeline safety.

Completed in Washington DC on: JUN 27 2011

Prepared by: Engineering and Research Division

U.S. Department
of Transportation

Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave., SE
Washington, DC 20590

JUN 27 2011

Mr. David Chittick
Director, Pipeline Engineering
TransCanada Pipelines Limited
450 – 1st Street, S.W.
Calgary, Alberta, Canada T2P 5H1

Docket No. PHMSA-2010-0192

Dear Mr. Chittick:

On June 24, 2010, TransCanada Pipelines Limited (TCPL) operator of the ANR Pipeline Company (ANR) wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a special permit to waive compliance from PHMSA's pipeline safety regulation in 49 CFR § 192.611, for one (1) segment of the ANR natural gas transmission pipeline system located in St. Martin Parish, Louisiana. The regulation requires confirmation or revision of the maximum allowable operating pressure (MAOP) of a pipeline segment where the class location has changed.

PHMSA is denying your June 24, 2010, special permit application. PHMSA's denial is based on TGPL's compliance history, as an operator, with existing special permits. Specifically, TGPL's failure to perform weekly aerial patrols and quarterly ground patrols as required by the special permit conditions in the existing special permit (PHMSA-RSPA-2003-15733) that was issued to PNGTS Pipeline Company on March 4, 2004. For additional information concerning PHMSA's review of your application and the basis for our decision, please see the enclosed Special Permit Analysis and Findings document. This and all other pertinent documents are available for review in Docket No. PHMSA-2010-0192 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

Pursuant to § 190.341(i), reconsideration of this decision may be sought by petition to the Associate Administrator. Petitions must be received by PHMSA within 20 calendar days of the notice of the denial and must contain a brief statement of the issue and an explanation of why the petitioner believes the decision is not in the public interest. The Associate Administrator may grant or deny, in whole or in part, any petition for reconsideration without further proceedings.

For the special permit application segment identified in the Special Permit Analysis and Findings document, TCPL must complete all pipe replacements, hydrostatic tests, or pressure reductions required to meet the MAOP requirements of § 192.611 by May 31, 2012.

Exhibit 8017

JUN 27 2011

Docket No. PHMSA-2010-0192

My staff would be pleased to discuss this matter or any other regulatory matter with you. John Gale, Director of Standards and Rulemaking, 202-366-0434, may be contacted on regulatory matters and Jeff Gilliam, Director of Engineering and Research, 202-366-0568, may be contacted on technical matters specific to this special permit application.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Enclosure: Special Permit Analysis and Findings

U.S. DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION (PHMSA)

Special Permit Analysis and Findings

Special Permit Information:

Docket Number: PHMSA–2010-0192

Pipeline Operator: TransCanada Pipelines Limited, operator of ANR Pipeline Company[1]

Date Requested: June 24, 2010

Code Section(s): 49 CFR § 192.611(a)

Purpose:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides this information to describe the facts of the subject special permit application submitted by TransCanada Pipelines Limited (TCPL), operator of the ANR Pipeline Company (ANR), to discuss any relevant public comments received with respect to the application, to present the engineering/safety analysis of the special permit application, and to make findings regarding whether the requested special permit should be granted and if so under what conditions.

Pipeline System Affected:

This special permit request involves one (1) *special permit segment* along the 30-inch ANR Lateral Loop 2-716 pipeline natural gas transmission pipeline in St. Martin Parish, Louisiana. The *special permit segment* class location along the pipeline has changed from an original Class 1 location to a Class 3[2] location.

This special permit, if granted, will allow TCPL to continue to operate the one (1) pipeline segment at its current maximum allowable operating pressure (MAOP) of 1050 pounds per square inch gauge (psig) for the 30-inch ANR Lateral Loop 2-716 pipeline.

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[1] ANR Pipeline Company is owned and operated by TransCanada Pipelines Limited.

[2] The Class 3 location *special permit segment* was originally a Class 1 location that was upgraded to Class 2 location in accordance with 49 CFR § 192.611 (a) hydrostatic test.

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This special permit application applies to the *special permit segment* defined as follows using the ANR Lateral Loop 2-716 pipeline mile post and valve section survey station references:

- *Special permit segment* is defined as the 30-inch ANR Lateral Loop 2-716 pipeline beginning at Mile Post 54.02 (V4 584+66 feet) between Valve Site 3 and Valve Site 4. The *special permit segment* extends for 3,149 feet along 30-inch ANR Lateral Loop 2-176 and concludes at Mile Post 54.61 (V4 616+15), also between Valve Site 3 and Valve Site 4. The *special permit segment* is located in St. Martin Parish, Louisiana. (Note: The above ground Mile Posts do not correlate exactly with the below ground pipe lengths.)

This special permit application applies to the *special permit inspection area* defined as the area that extends 220 yards on each side of the centerline along the entire length of the 30-inch ANR Lateral Loop 1-716 and 2-716 pipelines as follows:

- *Special permit inspection area* is defined as the pipeline that begins at Mile Post 29.02 at Valve Site 2 (V3 427+75 feet) on Loop 1-716 in Iberia Parish, Louisiana. The *special permit inspection area* extends through Valve Site 3 to Mile Post 43.03 where the ANR pipeline lateral naming convention changes from Loop 1-716 to Loop 2-716 in St. Martin Parish, Louisiana. The *special permit inspection area* continues along Loop 2-176 to Valve Site 4 at Mile Post 55.52 where the ANR pipeline lateral naming convention reverts back to Loop 1-176, also in St. Martin Parish, Louisiana. The *special permit inspection area* continues along Loop 1-176 and concludes at Valve Site 5 at Mile Post 70.78 (V5 00+00 feet) in St. Landry Parish, Louisiana.

The total length of the proposed *special permit inspection area* is approximately 41.76 miles and includes the *special permit segment.*

Special Permit Request

TCPL submitted an application to PHMSA on June 24, 2010, for a special permit seeking relief from the Federal pipeline safety regulations in 49 CFR 192.611(a) for one (1) segment of TCPL's 30-inch ANR Lateral Loop 2-716 natural gas transmission pipeline, where a change has occurred from a original Class 1 location to a Class 3 location in St. Martin Parish, Louisiana.

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As requested, this proposed special permit would allow TCPL to continue to operate the pipeline segment at its current maximum allowable operating pressure (MAOP) of 1050 pounds per square inch gauge (psig). The Federal pipeline safety regulations in 49 CFR 192.611(a) require natural gas pipeline operators to confirm or revise the MAOP of a pipeline segment after a change in class location. A special permit, if granted, will allow TCPL to continue to operate the *special permit segment* at its existing MAOP's despite a change in class location.

In its application, TCPL suggested that the *special permit segment* be included in a *special permit inspection area* (see TCPL's application for the specific details). The *special permit inspection area* on the 30-inch ANR Lateral Loops 1-716 and 2-716 pipeline will begin approximately 25 miles upstream of the beginning of the *special permit segment* and approximately 16.17 miles downstream of the *special permit segment.* The *special permit inspection area* would be approximately 41.76 miles in length and will include the *special permit segment.*

Public Notice:

On March 3, 2011, PHMSA posted a notice of this special permit request in the Federal Register (76 FR 11853). The request letter, Federal Register notice, and all other pertinent documents are available for review in Docket No. PHMSA-2010-0192 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

PHMSA received no public comments on this application for a class location special permit.

Analysis:

Background: On June 29, 2004, PHMSA published in the Federal Register (69 FR 38948) the criteria it uses for the consideration of class location change waivers, now being granted through a special permit. First, certain threshold requirements must be met for a pipeline section to be further evaluated for a class location change special permit. Second, the age and manufacturing process of the pipe; system design and construction; environmental, operating and maintenance histories; and integrity management program elements are evaluated as significant criteria. These significant criteria are presented in matrix form and can be reviewed in the FDMS, Docket

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Number PHMSA-RSPA-2004-17401. Third, such special permits will only then be granted when pipe conditions and active integrity management provides a level of safety greater than or equal to a pipe replacement or pressure reduction.

Threshold Requirements: Each of the threshold requirements published by PHMSA in the June 29, 2004, FR notice is discussed below in regards to the TCPL special permit petition.

1) No pipeline segments in a class location changing to Class 4 location will be considered. This special permit request is for one (1) segment of ANR's 30-inch Lateral Loop 2-716 pipeline where a class location change has occurred from Class 1 to Class 3 location.
2) No bare pipe will be considered. This TCPL *special permit segment* is coated with coal tar enamel coating. TCPL has met this requirement.
3) No pipe containing wrinkle bends will be considered. There are no wrinkle bends in the *special permit segment.* TCPL has met this requirement.
4) No pipe segments operating above 72% of the specified minimum yield strength (SMYS) will be considered for a Class 3 special permit. The *special permit segment* operates at or below 72% SMYS. TCPL has met this requirement.
5) Records must be produced that show a hydrostatic test to at least 1.25 x maximum allowable operating pressure (MAOP) and 90% of SMYS. TCPL records submitted show that the section of the ANR's 30-inch Lateral Loop 2-716 pipeline containing the *special permit segment* has been hydrostatically tested to 1450 psig, which is 1.38 x MAOP and 99% of SMYS. TCPL has met this requirement.
6) In-line inspection (ILI) must have been performed with no significant anomalies identified that indicate systemic problems. The proposed *special permit segment* was last inspected by ILI in 2009, with no immediately actionable anomalies found. TCPL has met this requirement.
7) Criteria for consideration of class location change waiver, now being granted through special permit, published by PHMSA in the Federal Register (69 FR 38948), define a *waiver inspection area (special permit inspection area)* as up to 25 miles of pipe either side of the *waiver segment (special permit segment).* The *special permit inspection area* must be inspected according to TCPL's integrity management program and periodically inspected with an in-line inspection technique. The *special permit inspection area* is approximately

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41.76 miles long, which is the entire length of the 30-inch ANR Lateral Loops 1-716 and 2-716 pipeline. This special permit is contingent upon TCPL's incorporation of the *special permit segment* in its written integrity management program as a *"covered segment"* in a *"high consequence area"* (HCA) per 49 CFR § 192.903.

The *special permit segment* meets the threshold requirements.

Criteria Matrix: The original and supplemental data submitted by TCPL for the *special permit segment* have been compared to the class location change special permit criteria matrix. The *special permit segment* falls in the probable acceptance column of the criteria matrix for all criteria except for:

- Possible acceptance – pipe manufacture, pipe coating, and depth of cover.
- Requires substantial justification – none.

The data findings above fall within the "possible acceptance" columns of the criteria matrix and would require some remediation measures as described below:

1) Pipe manufacture: ANR's 30-inch Lateral Loop 2-716 pipeline was installed in 1972, and consists of American Petroleum Institute Specification 5LX, *Specification for Line Pipe* (API 5LX), doubled submerged arc welded (DSAW), X-52 steel pipe manufactured by US Steel Corporation. This pipe is of sufficient toughness – 53 foot-pounds. The ANR Lateral Loop 1-716 and 2-716 pipeline in the *special permit inspection area* has had no leaks or ruptures. This pipe meets requirements for a special permit with no conditions for manufacture.
2) Pipe coating: The pipe is coated with coal tar enamel – Koppers 70-B primer and hi-melt enamel. If the special permit is granted, TCPL will be required to perform ILI assessments, anomaly repairs, close interval surveys, and stress corrosion cracking direct assessment (SCCDA) along the entire length of the ANR Lateral Loops 1-716 and 2-716 pipeline *special permit inspection area* and *special permit segment* according to the requirements of 49 CFR § 192.929 within one (1) year after the grant of this special permit
3) Depth of cover: TCPL has not conducted a pipeline depth of cover survey, and would be required to conduct a depth of cover survey in the *special permit segment* and implement remediation measures where depth of cover is reduced.

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PHMSA has determined that imposing the special permit conditions, if granted, would address these concerns and provide equivalent safety for these areas.

Operational Integrity Compliance:

PHMSA reviewed this special permit request to ensure that integrity threats to the pipeline in the *special permit segment* and *special permit area* are in the operator's operations and management plan (O&M Plan) to provide a systematic program to review and remediate the pipeline for safety concerns. Additional operational integrity review and remediation requirements will be required for this *special permit segment* class location change, if a special permit is granted. The pipeline operational integrity requirements are to ensure that the operator has an ongoing program to locate and remediate safety threats. These threats to integrity and safety include pipe coating quality, cathodic protection effectiveness, operations damage prevention program for third party damage, weld seam and girth weld integrity, anomalies in the pipe steel, and material and structures either along or near the pipeline that could cause the cathodic protection system to be ineffective. PHMSA carefully designs a comprehensive set of conditions that an operator would be required to meet in order for the special permit to be granted. Among other things, the proposed conditions would include:

- A close interval survey to determine the effectiveness of the cathodic protection system must be performed within the *special permit inspection area* and all areas with inadequate cathodic protection must be remediated.
- A coating survey to determine the quality of the pipe coating must be conducted and in-effective coating areas must be required to be remediated.
- Stress corrosion cracking (SCC) surveys on the pipeline will be required to ensure that the pipe steel does not contain cracks due to the effects of high and near neutral pH SCC.
- The latest methods of damage prevention must be incorporated by the operator, such as the best practices of the Common Ground Alliance (CGA) within the *special permit inspection area.*
- Interference currents from electric transmission lines and other interfering structures in the *special permit inspection area* must be identified, controlled and mitigated by conducting surveys and installing grounding systems where required.

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- An analysis of pipeline field coated girth welds that could have shielding coatings that could cause corrosion of the pipe steel must be undertaken in the *special permit segment* and in-line inspection logs that indicate 30% corrosion indications on shielding or unknown coatings must be exposed and evaluated.
- Anomalies and dents in the pipeline must be repaired, based upon the special permit repair criteria.
- Girth welds in the special permit segments must have been inspected to a non destructive test plan during construction, or a quality review and remediation program must be implemented by the pipeline operator.
- All shorted casing at road crossings and railroad crossings in the special permit segments (either metallic or electrolytic) must be cleared to prevent corrosion.
- Pipeline longitudinal seams within the *special permit inspection area* must have an engineering analysis to determine if there are any threats and remediated, if integrity threats are determined.
- Periodic close interval surveys and in-line inspection surveys (pipeline internal surveys to determine corrosion in the pipeline) must be performed on the *special permit segment* at the applicable reassessment intervals.
- In-line tool (ILI) inspections must be conducted through the *special permit segments* and the *special permit inspection area,* and anomaly findings remediated any in accordance with the 49 CFR Part 192, Subpart O, § 192.485, and the conditions of the special permit.
- A depth of cover survey of the *special permit segments* must be conducted. Any pipe in the *special permit segment* that does not meet 49 CFR § 192.327(a) must have additional safety measures implemented in areas with reduced depth of cover.

Compliance History – 2007 through 2011:

A review of PHMSA enforcement actions of ANR from February 22, 2007, through May 24, 2011, shows the following closed enforcement actions against TCPL. During this time interval, TCPL has owned and operated ANR (OPID 405).

- Letters - of Concern or Warning - 4 matters closed
- Notices – of Amendment or of Probable Violation – 1 matters closed
- Collected Civil Penalties - $41,000 collected

This enforcement history reveals a few compliance issues, including pipeline maintenance issues. PHMSA would require TCPL to comply with Special Permit conditions to address these issues.

PHMSA reviewed the existing special permits issued to TGPL to ensure that TCPL is in compliance with the conditions of any existing special permits issued to them. PHMSA found that TGPL was not following all of the special permit conditions on the PNGTS[3] 24-inch mainline pipeline (PHMSA-RSPA-2003-15733) through-out the life of the special permit as follows:

> **Special Permit Condition 5**: Findings, remediation, and documentation – Perform weekly aerial patrols and quarterly ground patrols over the entire 143.8 miles of the 24-inch pipeline. The ground patrols must include leak surveys on all Class 3 portions of the pipeline using appropriate instrumented leak detection equipment.
>
> **PHMSA review of compliance documents:**
>
> TCPL/PNGTS did not meet the special permit conditions for performing weekly aerial patrols and quarterly ground patrols.
>
> - TCPL/PNGTS stopped conducting weekly aerial patrols in July, 2006, through early 2010. Bi-weekly aerial patrols were performed from 2008 through early 2010.. PHMSA was not notified of this special permit modification.
> - TCPL/PNGTS performed quarterly ground patrols until the 4th-quarter of 2004, and annual ground patrols were conducted in 2005, 2006, and 2007. Quarterly ground patrols were resumed in 2008. PHMSA was not notified of this special permit modification.

PHMSA finds that TCPL/PNGTS's lack of diligence in following all of the conditions of the existing special permit to be inconsistent with pipeline safety.

[3] TGPL is operator of the PNGTS Pipeline Company and was issued special permit (PHMSA-RSPA-2003-15733) on March 4, 2004.

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Findings:

TCP requested a *special permit* to operate the ANR 30-inch Lateral Loop 2-716, a natural gas transmission pipeline, at the current MAOP where a change in class location has occurred from an original Class 1 location to a Class 3 location. Based on the information submitted by TCPL and PHMSA's analysis of the technical, operational, and existing special permit non-compliance issues on other TGPL operated pipelines, PHMSA finds that granting this special permit to TCPL is inconsistent with pipeline safety.

Completed in Washington DC on: JUN 27 2011

Prepared by: Engineering and Research Division

022940

U.S. Department
of Transportation

Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave., SE
Washington, DC 20590

JUL 16 2010

Mr. David Chittick
Director, Pipeline Engineering
TransCanada Pipelines Limited
450 – 1st Street, S.W.
Calgary, Alberta, Canada T2P 5H1

Docket No. PHMSA-2009-0056

Dear Mr. Chittick:

On February 6, 2009, TransCanada Pipeline Limited operator of American Natural Resources Pipeline (TCPL-ANR) wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a special permit to waive compliance from PHMSA's pipeline safety regulation in 49 CFR § 192.611 for one (1) segment of the TCPL-ANR natural gas transmission pipeline system located in Tate County, Mississippi. The regulation requires confirmation or revision of the maximum allowable operating pressure (MAOP) of a pipeline segment where the class location has changed.

PHMSA is denying this special permit due to insufficient information in the application demonstrating the adequacy of the pipe steel toughness properties to mitigate fracture propagation. The reasons for this denial are more fully described in the special permit analysis and findings document enclosed with this letter. This document and all other pertinent documents are available for review in Docket No. PHMSA-2009-0056 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

TCPL-ANR should comply with the requirements of 49 CFR § 192.611 by September 30, 2011.

My staff would be pleased to discuss this special permit or any other regulatory matter with you. John Gale, Director of Regulations (202-366-4046), may be contacted on regulatory matters and Alan Mayberry, Deputy Associate Administrator for Pipeline Safety (202-366-5124), may be contacted on technical matters specific to this special permit

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Enclosure: Special Permit Analysis and Findings

Exhibit 8018

U.S. DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION

Special Permit Analysis and Findings

Special Permit Information:

Docket Number:	PHMSA-2009-0056
Pipeline Operator:	TransCanada Pipelines Limited, operator of American Natural Resources Pipeline (TCPL-ANR)
Date Requested:	February 6, 2009
Code Section(s):	49 CFR § 192.611

Purpose:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides this information to describe the facts of the subject special permit application submitted by TransCanada Pipelines Limited, operator of American Natural Resources[1] (TCPL-ANR), to discuss any relevant public comments received with respect to the application, to present the engineering/safety analysis of the special permit application, and to make findings regarding whether the requested special permit should be granted and if so under what conditions.

Pipeline System Affected:

This special permit application applies to one (1) *special permit segment* along the TCPL-ANR system of natural gas pipelines. This *special permit segment* is on the 30-inch Line 1-501 pipeline located in Tate County, Mississippi. The class location along the pipeline *special permit segment* has changed from an original Class 1 Location to a Class 3[2] Location.

This special permit application applies to the *special permit segment* and special permit inspection area defined using the TCPL-ANR valve stationing references as follows:

---

[1] American Natural Resources is owned and operated by TransCanada Pipelines Limited.

[2] This Class 3 *special permit segment* was originally a Class 1 location that was upgraded to Class 2 location in accordance with § 192.611 (a) hydrostatic test.

- ***Special permit segment*** - Line 1-501, 872 feet, from Valve 27 Station 927 +05 to Valve 27 Station 935+77.
- ***Special permit inspection area*** means the area that extends 220 yards perpendicular on each side of the centerline of the Line 1-501, 30-inch, pipeline from the discharge of the Sardis Compressor Station at Valve 27 Station 0+00 (approximately 17.6 miles upstream of the special permit segment) to the Brownsville Compressor Station at Valve 29 Station 297+05 (approximately 25 miles downstream of the special permit segment). The *special permit inspection area* is approximately 42.77 miles long and 440 yards wide and includes the *special permit segment*.

Special Permit Request

TCPL-ANR submitted an application to PHMSA on February 6, 2009, for a special permit seeking relief from the Federal pipeline safety regulations in 49 CFR § 192.611(a) for one (1) segment of TCPL-ANR natural gas transmission 30-inch Line 1-501 pipeline where a change has occurred from an original Class 1 location to a Class 3 location in Tate County, Mississippi. This special permit request is to allow TCPL-ANR to continue to operate the pipeline *special permit segment* at its current maximum allowable operating pressure (MAOP) of 858 pounds per square inch gauge (psig). The Federal pipeline safety regulations in 49 CFR § 192.611(a) require natural gas pipeline operators to confirm or revise the MAOP of a pipeline segment after a change in class location.

Public Notice:

On April 28, 2009, PHMSA posted a notice of this special permit request in the Federal Register (74 FR 19264). PHMSA did not receive any comments for or against this special permit request as a result of this notice. The request letter, Federal Register notice, and all other pertinent documents are available for review in Docket No. PHMSA-2009-0056 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

Analysis:

Background: On June 29, 2004, PHMSA published in the Federal Register (69 FR 38948) the criteria it uses for the consideration of class location change waivers, now referred to as a special

permit. Certain threshold requirements must be met for a pipeline section to be further evaluated for a class location change special permit. The age and manufacturing process of the pipe; system design and construction; environmental, operating and maintenance histories; and integrity management program elements are evaluated as significant criteria. These significant criteria are presented in matrix form and can be reviewed in the FDMS, Docket Number PHMSA-RSPA-2004-17401. Special permits will only then be granted when pipe conditions and active integrity management provides a level of safety greater than or equal to a pipe replacement or pressure reduction.

Threshold Requirements: Each of the threshold requirements published by PHMSA in the June 29, 2004, FR notice is discussed below in regards to the TCPL-ANR special permit petition.

1) No pipeline segments in a class location changing to Class 4 Location will be considered. This special permit request is for the PHMSA 2009-0056 segment of TCPL-ANR pipeline where a class location change has occurred from a Class 1 location to a Class 3 location.
2) No bare pipe will be considered. These TCPL-ANR *special permit segment* is coated with Allied cold tar enamel, primer, and felt wrap. TCPL-ANR has met this requirement.
3) No pipe containing wrinkle bends will be considered. There are no wrinkle bends in the *special permit segments*. TCPL-ANR has met this requirement.
4) No pipe segments operating above 72% of the specified minimum yield strength (SMYS) will be considered for a Class 3 special permit. The *special permit segment* operates at or below 72% SMYS. TCPL-ANR has met this requirement.
5) Records must be produced that show a hydrostatic test to at least 1.25 x maximum allowable operating pressure (MAOP) and 90% of SMYS. TCPL-ANR records submitted show that the sections of the 30-inch Line 1-501 pipeline has been hydrostatically tested to 1,150 psig which is 1.34 x MAOP and 96.5% of SMYS. TCPL-ANR has met this requirement. TCPL-ANR has mechanical and chemical properties test reports for the pipe to verify the pipe specifications, but these reports indicate the pipe has low toughness properties.
6) In-line inspection (ILI) must have been performed with no significant anomalies identified that indicate systemic problems. The proposed *special permit segment* was last inspected by ILI in 2003, with no immediately actionable anomalies found. TCPL-ANR has met this

requirement for wall loss, but would need to run in line inspection tools both high resolution MFL and geometry tools to detect corrosion and to detect dents.

7) TCPL-ANR has met this requirement for wall loss, but would need to run an ILI tool to detect dents and re-run ILI for anomalies and corrosion.
8) Criteria for consideration of class location change waiver, now referred to as a special permit, published by PHMSA in the Federal Register (69 FR 38948), define a *waiver inspection area (special permit inspection area)* as up to 25 miles of pipe either side of the *waiver segment (special permit segment)*. The *special permit inspection area* must be inspected according to operator's integrity management program and periodically inspected with an in-line inspection technique. The *special permit inspection area is* approximately 42.77 miles in contiguous length. This special permit, if issued, would be contingent upon the operator's incorporation of each of the *special permit segments* in its written integrity management program as a *"covered segment"* in a *"high consequence area"* (HCA) per 49 CFR § 192.903.

Criteria Matrix: The original and supplemental data submitted by TCPL-ANR for the *special permit segments* have been compared to the class location change special permit criteria matrix. The data fall within the *probable acceptance* column of the criteria matrix except for:

a. Possible acceptable justification – pipe coating, depth of cover, hydrostatic test rupture, ILI, and cathodic protection.
b. Requires substantial justification - pipe manufacture and girth weld inspections

The data findings below fall within the "possible acceptance" or the "requires substantial justification" column of the criteria matrix:

1) Possible Acceptable Justification - Pipe coating, leaks & failures, depth of cover and ILI inspections: The 30-inch pipe is coated with coal tar enamel coating. TCPL-ANR would be required to remediate this coating in the special permit segment by Direct Current Voltage Gradient (DCVG) survey or an Alternating Current Voltage Gradient (ACVG) survey and close interval surveys (CIS) and remediate poor quality coating. The pipeline did have a hydrostatic test failure in 1966, but has no leaks or failures since that time. Depth of cover was not confirmed by TCPL-ANR, so a survey and remediation of shallow areas would need

to be required if a special permit was issued. To confirm cathodic protection a CIS survey would be required in the special permit inspection area.

2) Requires substantial justification - pipe manufacture and girth weld inspections: TCPL-ANR indicates 30-inch Line 1-501 pipeline was installed in 1966 and consists of American Petroleum Institute Specification 5LX, *Specification for Line Pipe* (API 5LX), double submerges arc welded (DSAW), X-60 steel pipe manufactured by Kaiser Steel. TCPL-ANR states it has mill test reports to verify the strength and chemistry of the pipe, but the pipe steel toughness is low for fracture arrest. TCPL-ANR has tested this pipeline to 96.5% SMYS test levels, 1150 psig, and 134% of MAOP. TCPL-ANR reports no in service leaks or failure on this 30-inch pipeline in the special permit inspection area. This would place all *special permit segments* in the "requires substantial justification" column of the criteria matrix. TCPL-ANR would be required by the special permit conditions to hydrostatically test the 30-inch pipe in the special permit segment to 100% SMYS and to cut pipe samples to verify the pipe strength properties. TCPL-ANR does not have records to show that pipeline girth welds were non-destructively tested during construction. TCPL-ANR would be required to conduct tests to verify girth weld quality in the special permit conditions, if a special permit was issued.

   To further address the pipe manufacture and girth weld quality, an operator of pipe such as the pipe involved in this application would have to treat all *special permit segments* as "covered segments" in an HCA per 49 CFR § 192.903. ILI assessments, anomaly repairs, CIS, and stress corrosion cracking direct assessment (SCCDA) of 30-inch Line 1-501 pipeline would be required to be performed along the entire length of the *special permit inspection area* and *special permit segments* according to the requirements of 49 CFR § 192.929 within one year after the grant of a special permit and on a 7 year reassessment interval. A special permit would need to include a condition that each *special permit segment* be operated at or below its existing MAOP. TCPL-ANR would be required by a special permit to evaluate girth weld quality and pipe strength.

PHMSA has determined that issuing a special permit with conditions would not provide equivalent safety for this area where an original Class 1 location is being upgraded to a Class 3 location. TCPL-ANR did not furnish documentation that shows the pipe steel toughness properties are high enough to mitigate fracture propagation and arrest cracks in the steel pipeline. Low toughness pipe can potentially increase the consequences of a pipeline failure in a Class 3 location. Class location upgrades that are considered by PHMSA for special permits in populated areas must meet pipe toughness standards, so that integrity evaluations for special permit conditions are technically sound.

Findings:

PHMSA has determined that a special permit, even with conditions, that would allow TCPL-ANR to leave the existing subject pipeline segment in service at its current MAOP will not ensure equivalent safety in this populated Class 3 location and would not be consistent with pipeline safety. Accordingly, we recommend that the special permit request be denied.

Completed in Washington DC on: JUL 16 2010

Prepared By: PHMSA – Engineering and Emergency Support

U.S. Department
of Transportation

Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave., SE
Washington, DC 20590

JUL 16 2010

Mr. David Chittick
Director, Pipeline Engineering
TransCanada Pipelines Limited
450 – 1st Street, S.W.
Calgary, Alberta, Canada T2P 5H1

Docket No. PHMSA-2009-0055

Dear Mr. Chittick:

On February 6, 2009, TransCanada Pipelines Limited, operator of the American Natural Resources Pipeline (TCPL-ANR) wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a special permit to waive compliance from PHMSA's pipeline safety regulation in 49 CFR § 192.611 for four (4) segments of the TCPL-ANR natural gas transmission pipeline system located in St. Martin Parish, Louisiana. The regulation requires confirmation or revision of the maximum allowable operating pressure (MAOP) for a pipeline segment where the class location has changed. If granted, the special permit would have allowed TCPL-ANR to continue to operate four (4) segments of the 20-inch Line 716 pipeline located in St. Martin Parish, Louisiana at their current MAOP of 1,050 pounds per square inch gauge (psig).

PHMSA is denying the special permit request due to Line 716 pipeline gas quality issues from gas supplies, the 1983 internal leak due to internal corrosion and the presence of pre-1970 EFW pipe in the Class 3 location *special permit segments*. The reasons for this denial are more fully described in the special permit analysis and findings document enclosed with this letter. This document and all other pertinent documents are available for review in Docket No. PHMSA-2009-0055 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov. PHMSA is granting TCPL-ANR until September 30, 2011, to complete pipe replacements to comply with the requirements of § 192.611.

My staff would be pleased to discuss this denial or any other regulatory matter with you. John Gale, Director of Regulations (202-366-4046), may be contacted on regulatory matters and Alan Mayberry, Deputy Associate Administrator for Pipeline Safety (202-366-5124), may be contacted on technical matters specific to this special permit request.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Enclosure: Special Permit Analysis and Findings

Exhibit 8019

U.S. DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION (PHMSA)

Special Permit Analysis and Findings

Special Permit Information:

Docket Number:	PHMSA–2009-0055
Pipeline Operator:	TransCanada Pipelines Limited - American Natural Resource (TCPL-ANR)
Date Requested:	February 6, 2009
Code Section(s):	49 CFR § 192.611

Purpose:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides this information to describe the facts of the subject special permit application submitted by TransCanada Pipelines Limited, operator of American Natural Resources[1] (TCPL-ANR), to discuss any relevant public comments received with respect to the application, to present the engineering/safety analysis of the special permit application, and to make findings regarding whether the requested special permit should be granted and if so under what conditions.

Pipeline System Affected:

This special permit application applies to four (4) *special permit segments* along the TCPL-ANR system of natural gas pipelines. These four (4) *special permit segments* are on the 20-inch Line 716 pipeline located in St. Martin Parish, Louisiana. The class locations along the pipeline *special permit segments* have changed from an original Class 1 Location to a Class 3[2] Location. This special permit application applies to the *special permit segments* and *special permit inspection area* defined using the TCPL-ANR Survey Station Numbers (including Mile Post) references as follows:

---

[1] American Natural Resources is owned and operated by TransCanada Pipelines Limited.

[2] This Class 3 location *special permit segment* was originally a Class 1 location that was upgraded to Class 2 location in accordance with § 192.611 (a) hydrostatic test.

St. Martin Parish, Louisiana

- ***Special permit segment 1*** – approximately 553 feet of 20-inch Line 716 located downstream of Valve 6 (end of line) from Survey Station Number 628+29 feet to Survey Station Number 633+82 feet in St. Martin Parish, Louisiana, Mileposts 58.90 to 58.80.
- ***Special permit segment 2*** - approximately 1,042 feet of 20-inch Line 716 located from Survey Station Number 634+62 feet to Survey Station Number 644+86 feet in St. Martin Parish, Louisiana, Mile Posts 58.78 to 58.59.
- ***Special permit segment 3*** - approximately 63 feet of 20-inch Line 716 located from Survey Station Number 656+30 feet to Survey Station Number 656+93 feet in St. Martin Parish, Louisiana, Mile Posts 58.37 to 58.36.
- ***Special permit segment 4*** - approximately 817 feet of 20-inch Line 716 located from Survey Station Number 703+51 feet to Survey Station Number 711+68 feet in St. Martin Parish, Louisiana, Mile Posts 57.48 to 57.32.

St. Martin, St. Landry and Iberia Parishes, Louisiana

Special permit inspection area is the area that extends 220 yards on each side of the pipe centerline along the entire length of the 20-inch Line 716 pipeline from Station 0+00 0 of Valve 6 (end of line) in St. Landry Parish, Louisiana to 29,914 ft downstream of Valve 4 in Iberia Parish, Louisiana. The *special permit inspection area* is located in St. Landry, St. Martin, and Iberia Parishes, Louisiana. The *special permit inspection area* extends approximately 11.90 miles upstream of the *special permit segment 1* to approximately 25 miles downstream of the *special permit segment 4*; (Milepost 70.80 to 32.31). The total length of the *special permit inspection area* including the four *special permit segments* is approximately 38.48 miles.

Note: The *special permit inspection area* includes the four (4) *special permit segments*.

Special Permit Request

TCPL-ANR submitted an application to PHMSA on February 6, 2009, for a special permit seeking relief from the Federal pipeline safety regulations in 49 CFR § 192.611(a) for four segments of the TCPL-ANR natural gas transmission 20-inch Line 716 pipeline where a change has occurred from a original Class 1 location to a Class 3 location in St. Martin, St. Landry and

Iberia Parishes, Louisiana. The special permit would have allowed TCPL-ANR to continue to operate the pipeline segments at their current maximum allowable operating pressure (MAOP) of 1,050 pounds per square inch gauge (psig), respectively. The Federal pipeline safety regulations in 49 CFR § 192.611(a) require natural gas pipeline operators to confirm or revise the MAOP of a pipeline segment after a change in class location.

Public Notice:

On April 28, 2009, PHMSA posted a notice of this special permit request in the Federal Register (74 FR 19264). PHMSA did not receive any comments for or against this special permit request. The request letter, Federal Register notice, and all other pertinent documents are available for review in Docket No. PHMSA-2009-0055 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

Analysis:

Background: On June 29, 2004, PHMSA published in the Federal Register (69 FR 38948) the criteria it uses for the consideration of class location change waivers, now referred to as a special permit. Certain threshold requirements must be met for a pipeline section to be further evaluated for a class location change special permit. The age and manufacturing process of the pipe, system design and construction, environmental, operating and maintenance histories, and integrity management program elements are evaluated as significant criteria. These significant criteria are presented in matrix form and can be reviewed in the FDMS, Docket No. PHMSA-RSPA-2004-17401. Such special permits will only then be granted when pipe conditions and active integrity management provides a level of safety greater than or equal to a pipe replacement or pressure reduction.

Threshold Requirements: Each of the threshold requirements published by PHMSA in the June 29, 2004, FR notice is discussed below in regards to the TCPL-ANR special permit petition.

1) No pipeline segments in a class location changing to Class 4 Location will be considered. This special permit request is for PHMSA 2009-0055 segments of TCPL-ANR pipeline where a class location change has occurred from Class 1 to Class 3.

b. Requires substantial justification - pipe manufacture, pipe girth weld, and ILI inspections

The data findings below fall within the "probable acceptance" or the "requires substantial justification" column of the criteria matrix:

1) Pipe coating, leaks & failures, and depth of cover: The 20-inch pipe is coated with Koppers XXH enamel and primer and felt wrap. TCPL-ANR would be required to remediate this coating in the special permit segment by conducting Direct Current Voltage Gradient (DCVG) survey or an Alternating Current Voltage Gradient (ACVG) survey, and close interval surveys (CIS) and remediate poor quality coating. The pipeline did have a leak in 1983 due to internal corrosion caused by chlorines (salt) and water in the gas stream. Since 1995 TCPL-ANR has cleaned with scraper pigs this section of pipeline over 97 times to remove deleterious gas stream constituents from the *special permit inspection area.* Depth of cover was not confirmed by TCPL-ANR, so if a *special permit* was issued the conditions would require a survey and remediation of shallow areas.

2) Pipe manufacture, pipe girth weld, and ILI inspections: 20-inch Line 716 pipeline was installed in 1964 and consists of American Petroleum Institute Specification 5LX, *Specification for Line Pipe* (API 5LX), electric flash welded (EFW), X-52 steel pipe manufactured by A.O Smith. Pipe with EFW seams normally have systemic manufacturing issues. TCPL-ANR has tested this pipeline to 99.2% SMYS test levels, 1449 psig. TCPL-ANR reports no hydrostatic test and no in service leaks or failures on this 20-inch pipeline in the special permit inspection area due to selective seam corrosion. However, this type of weld seam pipe has been known for systemic manufacturing issues resulting in weld seam failure. This will place the *special permit segments* in the "requires substantial justification" column of the criteria matrix would place all *special permit segments* in the "requires substantial justification" column of the criteria matrix.

   To further address these pipe manufacture, girth weld and internal corrosion issues, an operator of pipe such as the pipe involved in this application would have to meet conditions requiring TCPL-ANR to treat all *special permit segments* as "covered segments" in an HCA per 49 CFR § 192.903. TCPL-ANR did not have records to substantiate girth weld quality.

To address lack of ILI Tool inspections, a *special permit inspection area* would need to require be the 20-inch Line 716 pipeline to be inspected according to TCPL-ANR's integrity management program and periodically inspected with an in-line inspection technique. Any special permit issued would need to be contingent upon TCPL-ANR incorporation of each of the *special permit segments* in its written integrity management program as a "covered segment" in a "high consequence area" (HCA) in accordance with 49 CFR § 192.903.

The proposed *special permit segments* on the 20-inch Line 716 pipeline have had internal corrosion issues due to poor gas quality, poor pigging practices, and have EFW weld seams. These proposed *special permit segments* are located in densely populated areas, which are new Class 3 location population areas defined by § 192.5(a)(1), (a)(2) and (b)(3) – Class Locations as follows;

> *(a) This section classifies pipeline locations for purposes of this part. The following criteria apply to classifications under this section.*
> *(1) A "class location unit" is an onshore area that extends 220 yards (200 meters) on either side of the centerline of any continuous 1-mile (1.6 kilometers) length of pipeline.*
> *(2) Each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.*
>
> *(b) (3) A Class 3 location is:*
> *(i) Any class location unit that has 46 or more buildings intended for human occupancy; or*
> *(ii) An area where the pipeline lies within 100 yards (91 meters) of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. (The days and weeks need not be consecutive.)*

To further address these pipe design and construction issues, an operator of pipe such as the pipe involved in this application would have to meet conditions requiring TCPL-ANR to treat all *special permit segments* as "covered segments" in an HCA per 49 CFR § 192.903. A stress corrosion cracking direct assessment (SCCDA) of the 20-inch Line 716 pipeline would also be required along the entire length of the *special permit inspection area* according to the requirements of 49 CFR § 192.929.

PHMSA has determined that a special permit, even with conditions, that would allow TCPL-ANR to leave the existing 20-inch Line 716 pipeline in service will not ensure equivalent safety based upon the 49 CFR § 192.611 regulations for Class 3 location areas due to Line 716 pipeline gas quality issues from gas supplies, the 1983 internal leak due to internal corrosion and the presence of pre-1970 EFW pipe in the Class 3 location *special permit segments*.

Findings:

Based on the information submitted by TCPL-ANR and PHMSA's analysis of the technical, operational, and safety issues, and given the additional measures required and conditions that would be imposed, PHMSA finds that granting this special permit to TCPL-ANR to operate four (4) *special permit segments* of the 20-inch Line 716 pipeline, a natural gas transmission pipeline, at the current MAOP of 1080 psig where a change in class location has occurred from an original Class 1 location to a Class 3 location would be inconsistent with pipeline safety.

The failure risks of vintage seam pipe longitudinal welds (EFW and LF-ERW pipe) are documented in the "Integrity of Vintage Pipelines" prepared by the Interstate Natural Gas Association of America (INGAA) dated October, 2004 (Vintage Pipe Report). The Vintage Pipe Report documents several integrity and performance history reasons to be concerned with LF-ERW and/or EFW pipe due to:

- Lack of fusion and oxides along the weld seam bond line, due to poor process controls,
- Stitched seam welds, which are alternating from complete and incompletely fused or partially fused areas, due to uneven heating,
- Hook cracks near the weld seam bond line caused by inclusions in the steel,
- Excessive trim or grooving (wall thickness reduction), and
- Arc burns resulting from poor or intermittent welding electrode contact.

PHMSA is advancing Research & Development to review the service history of LF-ERW (including EFW) longitudinal seam pipe and will also review integrity management/inspection tools to detect integrity issues with these pipe seams. This is a follow-up to a National Transportation Safety Board (NTSB) recommendation on the subject. Following NTSB's investigation of the Dixie Pipeline failure in 2007, NTSB developed safety recommendations to

PHMSA focused on preventing failures in LF- ERW pipe. Until PHMSA is satisfied that the inherent integrity risks associated with this type pipe seam can be reliably managed, PHMSA will not issue special permits to allow operation of LF-ERW, EFW, or other pipe with a history of pipe seam integrity issues for original Class 1 location pipe installed in a sparsely populated area to be upgraded through a special permit process to operate in a densely populated Class 3 location.

The risks posed by these pipe seam characteristics and the lack of documentation are not acceptable in a populated Class 3 location. The applicant has not described a plan or the use of technology to remediate these pipelines that would mitigate the safety risks in a Class 3 location consistent with replacing the pipe with modern steel pipe, external coatings, field welding, girth weld non-destructive testing, and in-place hydrostatic testing methods.

Based on the information submitted by TCPL-ANR and PHMSA's analysis of the technical, operational, and safety issues, PHMSA finds that granting this special permit to TCPL-ANR to operate segments of its natural gas transmission pipelines now in Class 3 locations, at the current MAOP, would be inconsistent with pipeline safety.

Completed in Washington DC on: JUL 16 2010

Prepared By: PHMSA – Engineering and Emergency Support

U.S. Department
of Transportation

Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave., SE
Washington, DC 20590

MAY 5 2010

Mr. David Chittick
Director, Pipeline Engineering
TransCanada Pipelines Limited
450 – 1st Street, S.W.
Calgary, Alberta, Canada T2P 5H1

Docket No. PHMSA-2009-0053

Dear Mr. Chittick:

On February 6, 2009, TransCanada Pipeline Limited-American Natural Resources (TCPL-ANR) wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) requesting a special permit to waive compliance from PHMSA's pipeline safety regulation in 49 CFR § 192.611 for four segments of the TCPL-ANR natural gas transmission pipeline system located in Lake County, Indiana, Outagamie and Winnebago Counties, Wisconsin and Fulton County, Ohio. The regulation requires confirmation or revision of the maximum allowable operating pressure (MAOP) of a pipeline segment where the class location has changed.

PHMSA is denying this special permit, which would have allowed TCPL-ANR to operate segments of 30-inch Line 1-100, two 24-inch Line 226, and 30-inch Line 501 pipelines in Lake County, Indiana, Outagamie and Winnebago Counties, Wisconsin and Fulton County, Ohio at their current MAOPs. The reason for this denial can be found in the special permit analysis and findings document enclosed with this letter. This document and all other pertinent documents are available for review in Docket No. PHMSA-2009-0053 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov. PHMSA will grant TCPL-ANR twelve (12) months from the date of this letter to comply with the requirements of 49 CFR § 192.611.

My staff would be pleased to discuss this special permit or any other regulatory matter with you. John Gale, Director of Regulations (202-366-4046), may be contacted on regulatory matters and Alan Mayberry, Deputy Associate Administrator for Pipeline Safety (202-366-5124), may be contacted on technical matters specific to this special permit

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Enclosure: Special Permit Analysis and Findings

Exhibit 8020

U.S. DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION

Special Permit Analysis and Findings

Special Permit Information:

Docket Number:	PHMSA-2009-0053
Pipeline Operator:	TransCanada Pipelines Limited, operator of American Natural Resources Pipeline (TCPL-ANR)
Date Requested:	February 6, 2009
Code Section(s):	49 CFR § 192.611(a)

Purpose:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides this information to describe the special permit application submitted by TransCanada Pipelines Limited, operator of American Natural Resources Pipeline (TCPL-ANR), to discuss any relevant public comments received with respect to the application, to present an engineering and safety analysis of the special permit application, and to make findings regarding whether the requested special permit should be granted and if so under what conditions.

Pipeline System Affected:

This special permit application applies to four *special permit segments* along the TCPL-ANR system of natural gas pipelines, where the class locations along these pipelines have changed from an original Class 1 location to a Class 3[1] location. These four *special permit segments* include 30-inch Line 1-100, 24-inch Line 226, 24-inch Line 226, and 30-Inch Line 501 located in Lake County, Indiana, Winnebago and Outagamie Counties, Wisconsin, and Fulton County,

[1] The Class 3 *special permit segments* were originally Class 1 locations that were upgraded to Class 2 locations in accordance with § 192.611 (a) hydrostatic test.

Ohio, respectively. This special permit application applies to the *special permit segments* and *special permit inspection areas* defined below using TCPL-ANR Survey Station Numbers.

Lake and Porter Counties, Indiana

- *Special permit segment 1 – 30-inch Line 1-100* – 3181 feet; from Survey Station Number 272+52 which is downstream of Valve 56 (St. John Compressor Station) to Survey Station Number 304+33 in Lake County, Indiana. (Milepost 860.63 to 861.20)
- *Special permit inspection area 1 - 30-inch Line 1-100* – from Survey Station Number 0+00 feet downstream of Valve 56 (St. John Compressor Station) in Lake County, Indiana to Survey Station Number 840+44 feet. downstream of Valve 57 in Porter County, Indiana. *Special permit inspection area 1* is located in Lake and Porter Counties, Indiana. *Special permit inspection area 1* extends from approximately 5.16 miles upstream of *special permit segment 1* to approximately 25 miles downstream of *special permit segment 1*; a total of approximately 30.76 miles. (Milepost 855.42 to 885.95)

Waupaca, Outagamie, and Winnebago Counties, Wisconsin

- *Special permit segment 2 -24-inch Line 226* – 1309 feet; from Survey Station Number 462+30 feet which is downstream of Valve 8, to Survey Station Number 475+39 feet in Winnebago County, Indiana. (Milepost 91.24 to 91.49)
- *Special permit inspection area 2 – 24-inch Line 226* – from Survey Station Number 766+74 feet downstream of Valve 6 in Waupaca County, Wisconsin to Survey Station Number 0+67 feet downstream of Valve 9 in Winnebago County, Wisconsin. *Special permit inspection area 2* extends from approximately 25 miles upstream of *special permit segment 2* to approximately 3164 feet downstream of *special permit segment 2*; a total of approximately 25.85 miles. (Milepost 66.24 to 92.88)

Waupaca, Outagamie, and Winnebago Counties, Wisconsin

- *Special permit segment 3 – 24-inch Line 226* – 102 feet; from Survey Station Number 727+37 feet which is downstream of Valve 7, to Survey Station Number 728+39 feet in Outagamie County, Wisconsin. (Milepost 82.38 to 82.40)
- *Special permit inspection area 3 - 24-inch Line 226* – from Survey Station Number 298+94

feet downstream of Valve 6 in Waupaca County, Wisconsin to Survey Station Number 0+67 feet downstream of Valve 9 in Winnebago, Wisconsin. *Special permit inspection area 3* is located in Waupaca, Outagamie, and Winnebago Counties, Wisconsin. *Special permit inspection area 3* extends from approximately 25 miles upstream of *special permit segment 3,* to approximately 9.69 miles downstream of *special permit segment 3*; a total of approximately 34.71 miles. (Milepost 57.38 to 92.88)

Note: *Special permit inspection areas 2 and 3* overlap.

Defiance, Henry, and Fulton Counties, Ohio and Lenawee County, Michigan

- *Special permit segment 4 – 30-inch Line 501* – 349 feet; from Survey Station Number 288+29 which is downstream of Valve 71, to Survey Station Number 291+78 feet in Fulton County, Ohio. (Milepost 913.94 to 914.01)
- *Special permit inspection area 4 – 30-inch Line 501* – from Survey Station Number 0+00 feet downstream of Valve 70 in Defiance County, Ohio to Survey Station Number 181+48 feet downstream of Valve 73 in Lenawee County, Michigan. *Special permit inspection area 4* is located in Defiance, Henry, and Fulton Counties, Wisconsin and Lenawee County, Michigan. *Special permit inspection area 4* extends from approximately 19.46 miles upstream of *special permit segment 4* to approximately 25 miles downstream of *special permit segment 4*; a total of approximately 44.52 miles. (Milepost 894.48 to 939.01)

The total length of all of the *special permit inspection areas* is approximately 111 miles.

Special Permit Request:

TCPL-ANR submitted an application to PHMSA on February 6, 2009, for a special permit seeking relief from the Federal pipeline safety regulations in 49 CFR § 192.611(a) for four segments of TCPL-ANR natural gas transmission pipeline where a change has occurred from an original Class 1 location to a Class 3 location in Lake County, Indiana, Winnebago and Outagamie Counties, Wisconsin and Fulton County, Ohio. This special permit would allow TCPL-ANR to continue to operate the pipeline segments at their current maximum allowable operating pressures (MAOP) of 850, 975, 975 and 858 pounds per square inch gauge (psig),

respectively. The Federal pipeline safety regulations in 49 CFR § 192.611(a) require natural gas pipeline operators to confirm or revise the MAOP of a pipeline segment after a change in class location. If granted, a special permit will allow TCPL-ANR to continue to operate each of the four *special permit segments* at their existing MAOP's despite a change in class location.

Public Notice:

On April 28, 2009, PHMSA posted a notice of this special permit request in the Federal Register (74 CFR 19264). PHMSA did not receive any comments for or against this special permit request as a result of this notice. The request letter, Federal Register notice and all other pertinent documents are available for review in Docket No. PHMSA-2009-0053 in the Federal Docket Management System (FDMS) located on the internet at www.Regulations.gov.

Analysis:

Background: On June 29, 2004, PHMSA published in the Federal Register (69 FR 38948) the criteria it uses for the consideration of class location change waivers, now called special permits. First, certain threshold requirements must be met for a pipeline section to be further evaluated for a class location change special permit. Second, the age and manufacturing process of the pipe; system design and construction; environmental, operating and maintenance histories; and integrity management program elements are evaluated as significant criteria. These significant criteria are presented in matrix form and can be reviewed in the FDMS, Docket Number PHMSA-RSPA-2004-17401. Third, such special permits may only then be granted when pipe conditions, integrity management, and additional permit conditions would provide a level of safety greater than or equal to a pipe replacement or pressure reduction.

Threshold Requirements: Each of the threshold requirements published by PHMSA in the June 29, 2004, FR notice is discussed below in regards to the TCPL-ANR special permit application.

1) No pipeline segments in a class location changing to Class 4 location will be considered. This special permit request is for segments of TCPL-ANR pipeline where a class location change has occurred from Class 1 location to Class 3 location.
2) No bare pipe will be considered. These TCPL-ANR *special permit segments* are coated with coal tar enamel or hot wax. TCPL-ANR has met this requirement.

3) No pipe containing wrinkle bends will be considered. There are no wrinkle bends in the *special permit segments*. TCPL-ANR has met this requirement.
4) No pipe segments operating above 72% of the specified minimum yield strength (SMYS) will be considered for a Class 3 location special permit. The *special permit segments* operate at or below 72% SMYS. TCPL-ANR has met this requirement.
5) Records must be produced that show a hydrostatic test to at least 1.25 x maximum allowable operating pressure (MAOP) and 90% of SMYS. TCPL-ANR records submitted showed that the sections of Lines 100-1, 226 and 501 pipeline containing the *special permit segments*, have been hydrostatically tested to the following pressures:

Special Permit Segment 1: 30-inch Line 100-1	1080 psig test pressure	1.27 X MAOP	90.5 % SMYS
Special Permit Segment 2: 24-inch Line 226	1411 psig test pressure	1.45 X MAOP	104% SMYS
Special Permit Segment 3: 24-inch Line 226	1411 psig test pressure	1.45 X MAOP	104% SMYS
Special Permit Segment 4: 30-inch Line 501	1222 psig test pressure	1.42 X MAOP	102% SMYS

TCPL-ANR has met this requirement.

6) In-line inspection (ILI) must have been performed with no significant anomalies identified that indicate systemic problems. The proposed *special permit segments* were last inspected by ILI in: *special permit segment 1* in 2003, *special permit segment* 2 in 2008, *special permit segment* 3 in 2008, and *special permit segment* 4 in 2006 with no immediately actionable anomalies found. TCPL-ANR has met this requirement for wall loss, but would need to run an ILI tool to detect dents and re-run ILI for anomalies and corrosion.
7) The PHMSA criteria for consideration of class location change special permits define a waiver inspection area (*special permit inspection area*) as up to 25 miles of pipe either side of the waiver segment (*special permit segment*). The *special permit inspection area* must be inspected according to TCPL-ANR's integrity management program and periodically inspected with an ILI tool. The *special permit inspection areas* are approximately 25 to 34 miles long. Any special permit would be issued contingent upon TCPL-ANR incorporation

of each of the *special permit segments* in its written integrity management program as a "covered segment" in a "high consequence area" (HCA) per 49 CFR § 192.903.

Criteria Matrix: The original and supplemental data submitted by TCPL-ANR for the *special permit segments* have been compared to the class location change special permit criteria matrix. The data falls within the probable acceptance column of the criteria matrix except for:

a. Possible acceptance – pipe coating, test failure, depth of cover, cathodic protection, ILI time frame, and compliance history. Some TCPL-ANR segments would require additional inspections to confirm coating quality, depth of cover and ILI inspections would be required. The subject pipelines have cathodic protection. Any special permit would require TCPL-ANR to identify and remediate areas along the pipeline with poor cathodic protection current and coating.
b. Requires substantial justification - pipe manufacture, pipe material, girth weld inspection, and safety related condition report. Some TCPL-ANR segments contain pipe with manufacturing seam weld and girth weld issues.

The data falls within the "probable acceptance" column of the criteria matrix for all criteria except for the following:

Lake and Porter Counties, Indiana - *Special permit segment 1* – 30-inch Line 1-100

Pipe manufacture and material documentation, girth welds, and pipe coating: The 30-inch Line 1-100 pipeline was installed in 1960 and consists of American Petroleum Institute Specification 5L, *Specification for Line Pipe* (API 5L), double submerged arc welded (DSAW), X-52 steel pipe manufactured by National Tube in 1960. This pipe is of unknown toughness. TCPL-ANR documents indicate that the 30-inch DSAW pipe in this *special permit inspection area* was hydrostatically tested to 90.5% SMYS or 127% times MAOP, and has had no test or in-service failures. TCPL-ANR does not have documentation to verify the pipe mechanical and chemical properties of the pipe. Pipelines that are allowed to be upgraded from Class 1 to Class 3 locations must have mechanical and chemical properties documentation to ensure that the pipe is, in fact, of the strength that is being used in anomaly repair calculations. TCPL-ANR does not have any records documenting the non-destructive testing of pipeline girth welds. Girth weld

documentation confirms that the pipeline was constructed by quality assurance methods to ensure girth welds will not fail due to longitudinal stresses. The pipe external coating is coal tar enamel.

Waupaca, Outagamie, and Winnebago Counties, Wisconsin - *Special permit segment 2* -24-inch Line 226

Pipe manufacture, pipe material, pipe coating and girth weld inspection: The *24-inch Line 226* pipeline was installed in 1960 and consists of API 5L, low frequency electric resistance welded (LF-ERW), X-52 steel pipe manufactured by A.O. Smith. This pipe is of unknown toughness but TCPL-ANR has addressed this risk in their integrity management plan. TCPL-ANR documents indicate that the 24-inch LF-ERW pipe in this *special permit inspection area* was hydrostatically tested to 104% SMYS or 145% of MAOP. TCPL-ANR also reports that the 24-inch pipe in the *special permit inspection area* has never experienced a field hydrostatic test failure or operating failure in the 24-inch LF-ERW weld seam. However, this type of weld seam pipe is known for systemic manufacturing issues resulting in weld seam failure. This places the *special permit segments* in the "requires substantial justification" column of the criteria matrix. PHMSA has seen systemic weld seam issues on many pipelines with LF-ERW pipe seams including several failures linked to LF-ERW seams. There is no existing technology to thoroughly remediate and mitigate LF-ERW seam risks for this pipeline while in gas service in a Class 3 Location. TCPL-ANR does not have any records documenting the non-destructive testing of pipeline girth welds. The 24-inch pipeline is coated with hot applied wax.

Waupaca, Outagamie, and Winnebago Counties, Wisconsin - *Special permit segment 3* – 24-inch Line 226

Pipe manufacture, pipe material, and pipe coating: The *24-inch Line 226* pipeline was installed in 1960 and consists of API 5L, LF-ERW, X-52 steel pipe manufactured by A.O. Smith. This pipe is of unknown toughness but TCPL-ANR has addressed this risk in their integrity management plan. TCPL-ANR documents indicate that the 24-inch LF-ERW pipe in this *special permit inspection area* was hydrostatically tested to 90% SMYS or 125% of MAOP. TCPL-ANR also reports that the 24-inch pipe in the *special permit inspection area* has never experienced a field hydrostatic test failure. TCPL-ANR reports a reportable seam leak in 1971 and 2 non-reportable third party mechanical damage incidents in the special permit inspection

area. However, this type of weld seam pipe is known for systemic manufacturing issues resulting in weld seam failure. This places the *special permit segments* in the "requires substantial justification" column of the criteria matrix. PHMSA has seen systemic weld seam issues on many pipelines with LF-ERW pipe seams including several failures linked to LF-ERW seams. The 24-inch pipeline is coated with hot applied wax.

Defiance, Henry, and Fulton Counties, Ohio and Lenawee County, Michigan - ***Special permit segment 4* – 30-inch Line 501**

Pipe manufacture and pipe coating: The 30-inch Line 501 pipeline was installed in 1956 and consists of API 5L, electric flash welded (EFW), X-52 steel pipe manufactured by A.O. Smith in 1956. This pipe is of unknown toughness. TCPL-ANR documents indicate that the 30-inch EFW pipe in this *special permit inspection area* was hydrostatically tested to 102% SMYS and had one test failure in a pipe seam. This seam failure emphasizes the seam failure risks with this vintage seam manufacturing process. The pipe external coating is coal tar enamel.

Class Location:

The proposed *special permit segments* on subject pipelines are located in densely populated areas, in new Class 3 location population areas defined by § 192.5(a)(1), (a)(2) and (b)(3) – Class Locations as follows;

> *(a) This section classifies pipeline locations for purposes of this part. The following criteria apply to classifications under this section.*
>
> *(1) A "class location unit" is an onshore area that extends 220 yards (200 meters) on either side of the centerline of any continuous 1-mile (1.6 kilometers) length of pipeline.*
>
> *(2) Each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.*
>
> *(b) (3) A Class 3 location is:*
>
> *(i) Any class location unit that has 46 or more buildings intended for human occupancy; or*
>
> *(ii) An area where the pipeline lies within 100 yards (91 meters) of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is*

occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. (The days and weeks need not be consecutive.)

Findings:

PHMSA has determined that a special permit, even with the conditions described above, that would allow TCPL-ANR to leave the existing subject pipeline segments in service at their current MAOPs will not ensure equivalent safety in these highly populated Class 3 Locations for the following reasons:

a) TCPL-ANR has not provided documentation of mechanical and chemical properties for its 30-inch Line 1-100-inch pipeline;

b) TCPL-ANR's 24-inch Line 226 pipeline contains LF-ERW seam pipe, which has known seam failure risks based upon a vintage seam manufacturing process; and

c) TCPL-ANR's 30-inch Line 501 pipeline contains EFW pipe, which has known seam failure risks based upon a vintage seam manufacturing process.

The failure risks of vintage seam pipe longitudinal welds (EFW and LF-ERW pipe) are documented in the "Integrity of Vintage Pipelines" prepared by the Interstate Natural Gas Association of America (INGAA) dated October, 2004 (Vintage Pipe Report). The Vintage Pipe Report documents several integrity and performance history reasons to be concerned with LF-ERW and/or EFW pipe due to:

- Lack of fusion and oxides along the weld seam bond line, due to poor process controls,
- Stitched seam welds, which are alternating from complete and incompletely fused or partially fused areas, due to uneven heating,
- Hook cracks near the weld seam bond line caused by inclusions in the steel,
- Excessive trim or grooving (wall thickness reduction), and
- Arc burns resulting from poor or intermittent welding electrode contact.

PHMSA plans to award a Research & Development contract to review the service history of LF-ERW (including EFW) longitudinal seam pipe and will also review integrity management/inspection tools to detect integrity issues with these pipe seams. This is a follow-up to a National Transportation Safety Board (NTSB) recommendation on the subject. Following

NTSB's investigation of the Dixie Pipeline failure in 2007, NTSB developed safety recommendations to PHMSA focused on preventing failures in LF- ERW pipe. Until the Research & Development project is finished, and PHMSA is satisfied that the inherent integrity risks associated with this type pipe seam can be reliably managed, PHMSA is not technically ready and will not issue special permits to allow operation of LF-ERW, EFW, or other pipe with a history of pipe seam integrity issues for original Class 1 location pipe installed in a sparsely populated area to be upgraded through a special permit process to operate in a densely populated Class 3 location.

The risks posed by these pipe seam characteristics and the lack of documentation are not acceptable in a populated Class 3 location. There is no existing technology to remediate these pipelines that would mitigate the safety risks in a Class 3 location consistent with replacing the pipe with modern steel pipe, external coatings, field welding, girth weld non-destructive testing, and in-place hydrostatic testing methods.

Based on the information submitted by TCPL-ANR and PHMSA's analysis of the technical, operational, and safety issues, PHMSA finds that granting this special permit to TCPL-ANR to operate segments of its natural gas transmission pipelines now in Class 3 locations, at the current MAOP, would be inconsistent with pipeline safety.

Completed in Washington DC on: MAY 5 2010

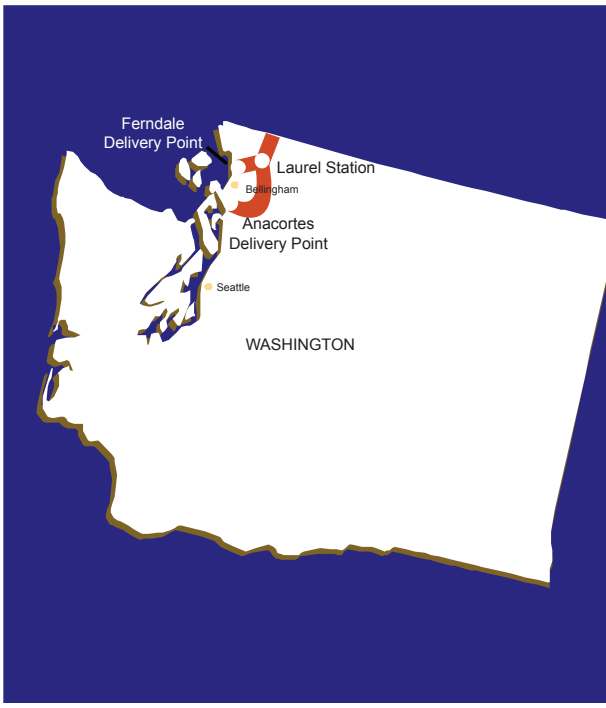
Prepared By: PHMSA – Engineering and Emergency Support

KINDER MORGAN
CANADA INC.









Emergency Response Plan - E.R.P.

Puget Sound

Exhibit 8021

022967

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PLAN IMPLEMENTATION

This Emergency Response plan will be implemented for any response to any emergency in the Puget Sound operating area either real or simulated. If another plan is deemed more appropriate to the situation the decision to use such plan will be first approved by the state and federal on-scene coordinators along with the incident commander from Kinder Morgan.

PLAN MAINTENANCE

Responsibility

Single point accountability for the Puget Sound Pipeline Emergency Response Plan development and maintenance rests with the Emergency Response and Security Advisor. This accountability is for:

- Ensuring the systems (ICS) and response structure are in place and able to meet the requirements set out in the Plan, and
- Ensuring a minimum annual audit of the Plan takes place, and that the plan is reviewed in full every 5 years. Any revisions will be distributed to WDOE and PHMSA for review and approval or if no plan changes are needed a letter will be sent to the WDOE and PHMSA confirming the existing plan is still accurate as per WAC 173-182-140.
- Annually reviewing all Letters of Intent (LOI) and Primary Response Contractor (PRC) contracts to ensure no lapse in coverage exists, and documenting the review of contracts and letters of intent.

Manual holders are responsible for:

- Keeping their copies current and ensuring that all revisions are appropriately filed
- Studying all new material issued and incorporating it into their work practice
- Suggesting changes/corrections to existing material and contributing new text material to improve the quality of the manual

PLAN REVISIONS

Initiating Revisions

All requests for change must be made through the Emergency Response and Security Advisor using the Revision Request Form located in this section of the manual.

Revision Distribution

Plan revisions are issued with an Acknowledgement of Receipt Form and a brief description of the changes itemized by chapter. The Acknowledgment of Receipt form must be signed and returned to the Emergency Response and Security Group as specified. Only revisions to the Distribution List will not be distributed to all manual holders, however they will be maintained electronically. All other changes will be distributed to all manual holders in a timely manner. A revised date is shown at the bottom of each updated or new page. The original revision date of the manual is 07/2013. All revisions will be tracked on the Control Sheet.

Revisions after a Release or an Exercise

In the event that Kinder Morgan Canada experiences a release (worst case or otherwise), or conducts an exercise or training session, the effectiveness of the plan will be evaluated and updated as necessary. The review of the plan may include a debrief with WDOE and/or PHMSA and/or other responding agencies, if appropriate especially when significant plan updates are identified or significant lessons can be recorded and implemented. The changes will be submitted to U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) and Washington Department of Ecology (WDOE) within 30 days.

Changes in Operating Conditions

If a new or different operating condition or information would substantially affect the implementation of the plan, Kinder Morgan Canada will modify the plan to address such a change, and within 30 days of making such a change, submit the change to PHMSA and WDOE, in addition to a 24 Hour notice of such changes occurring.

If at any point there is a permanent or temporary change in the personnel or response equipment described in this ERP, Kinder Morgan Canada will notify WDOE in writing within 24 hours of the change and provide a schedule for the prompt return of the plan to full operational status and a proposal for any backfill to compensate for the temporary significant changes. Changes that are considered significant include:

- the loss of equipment that results in being out of compliance with the planning standard either due to transfer out-of-region for spill response, or great than 10% of equipment is moved from its current location (boom, recovery and storage);
- a change or permanent loss of response personnel including initial response personnel, command and general staff, the binding agreement signer;
- changes to the type of oil handled, storage capacity, handling transporting or processing of products;
- change in equipment ownership if used to satisfy planning standards; or
- modification or discontinuation of any mutual aid, letter of intent or contract agreement.

Notes: If the proposed change to the plan is to be made permanent, KMC will have 30 days from notification to distribute the amended pages of this ERP for review and approval by WDOE. If WDOE finds that the ERP no longer meets approval criteria, WDOE may place conditions on approval or disapprove the ERP.

The resulting changes to the plan will also be submitted to PHMSA within 30 days of the change occurring.

REVISION REQUEST FORM

Requested by:	Date:
Dept/ Agency:	Phone No.:
Revision Type: ___ Addition ___ Deletion ___ Correction	
Manual Section:	Page:
Revision (attach separate sheet if necessary):	
Signature of Requestor:	
Send to: Emergency Response and Security Advisor Kinder Morgan Canada 2700-300 - 5th Avenue S.W. Calgary, AB T2P 5J2 Canada Fax: (403) 514-6401	

To be completed by Emergency Response and Security Advisor	
Date Received:	Comments:
Date Reviewed:	
Issued as Revision: Y/ N	
If No, reason for Rejection:	
Signature Emergency Response and Security Advisor	

CONTROL SHEET

The control sheet will record revisions and updates to the plan. The log sheet will identify the section amended including date, and verification of notification to WDOE and PHMSA and the person who made the changes and the purpose of the changes, where applicable.

Revision Number	Date of Revision	Change(s)	Name
1	October 2012	New Issue ERP	KM
2	July 16 2013	Updates to all sections to incorporate requirements for WDOE, and issue for approval. Updates to QI back-up and RSPA references in Section 16 as outlined in PHMSA letter dated June 18, 2013.	KM
3	November, 2013	All Changes to incorporate requirements for WDOE approval: Regulatory Scope of the plan – reworded for EPA Region X Section 16.2 correction to wording Washington State Geographic Response Plans Letter of Intent – Global Diving and Salvage has been renewed and inserted to Section 18. Section 7.7 removed disclaimer wording. Section 10.3.1 added wording regarding tracking buoys. Section 9.9.5 has been updated to make maintenance records available to ecology on request. Section 8.0 added wording identify difference in ICS structure below the section chief level and Washington staffing policies Section 8.12 updated wording. Section 8.13 updated wording Section 10.7 added reference to Area Plan guidance on SCAT. Section 10.3 added section on Environmental Unit Leader. Section 10.4.3 added Air Monitoring Description Section 10.8 removed air monitoring plans, Section 10.9 added section on REET. Section 9.9.3 added statement regarding in-situ burn. Section 10.5.2 – changed title of section Section 5.1 revised wording for cultural sites Section 19.3 added PHMSA approval letter Updated Table of Contents for new chapter titles Updated Control Sheet Updated Distribution List	KM

Revision Number	Date of Revision	Change(s)	Name
4	January, 2014	Preface: update to distribution list, and revision record Section 2 updated telephone number for WDFW, verified KMC telephone numbers, and numbers for OSRO's, updated diagram in section 2.8.1 to show link between NWACP and KMC plans. Section 5.1 and 5.2 updated species classification Section 8 added Wildlife Branch Director to list of positions that could be filled by agency representation Section 19.4 Added Department of Ecology Plan Certificate.	KM
5	December 2014	Updates throughout manual for new Primary Response contractor including the following: Preface – Plan Maintenance – added annual requirement to review and document contracts and letters of intent for Primary response contractors/oil spill response organizations cited in the plan. Updated distribution listing and revision record. References to MSRC replaced with references to NRCES in the following sections: 2.8.1, 2.8.4, 2.10, 4.4.1, 4.7, 9.9.1, 9.9.3, 10.4.1, 16.2, 18.2.1 (.1-.12) and 19.5 Section 7.4 updated for new ICP location KMC Contact information in Sections 2.6 and 2.7	KM

DISTRIBUTION

This Plan is a controlled document and all copies have been numbered prior to distribution. Copies are found in the locations shown below, or have been given to the person/organization listed.

No.	Issued To	Non Confidential	E-Copy
1	U.S. Department of Transportation – PHMSA		X
2	U.S. Department of Transportation – PHMSA		X
3	Department of Ecology, Washington		
4	Department of Ecology, Washington*	X	X
5	Whatcom County Emergency Management		X
6	Skagit County Emergency Management		X
7	Utilities and Transportation Commission		X
8	Control Centre		
9	Control Centre (back up)		
10	Director, EHS Department		
11	Manager, Emergency Response & Security		
12	Manager, Environment		
13	Manager, Health and Safety		
14	EHS Coordinator (Puget Sound)		
15	Emergency Response and Security Advisor		
16	Director, Western Region		
17	Western Region Burnaby Office		
18	Sumas Station		
19	Supervisor, Puget Sound		
20	Laurel Station Control Room		
21	Anacortes Control Room		
22	Ferndale Station		
23	Operations Section Go-Box		
24	Planning Section Go-Box		
25	Logistics/Finance Section Go-Box		
26	Command Go-Box		
27	Sumas Station – 2nd copy		
28	Spare		
29	Truck #820		
30	Spare		

* Non-Confidential Copy for Public Review/Access

ACRONYMS

Acronym	Meaning
ADIOS	Automated Data Inquiry for Oil Spills
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
ATV	All Terrain Vehicle
bbl	Barrel
C	Centigrade (temperature)
CCG	Canadian Coast Guard
CHS	Canadian Hydrographic Service
cm	Centimetre
cm/s	Centimetre per second
cp	Centipoises
cs (cSt)	Centistokes
decon	Decontamination
DHP	Duty Harbour Pilot
DWT	Deadweight
EHS	Environment, Health and Safety
EMT	Emergency Medical Technician
ESI	Environmental Sensitivity Index
F	Fahrenheit (temperature)
FOSET	Fisherman's Oil Spill Emergencies Team
FSA	Forward Staging Area
ft	Feet
GIS	Geographic Information System
gpm	Gallons per Minute
GPS	Global Positioning Satellite
GRT	Gross Registered Tons
H_2S	Hydrogen Sulphide
Ha	Hectare
HAZMAT	Hazardous Materials
HAZWOPER	Hazardous Waste Operations and Emergency Response
HF	High Frequency
HFO	Heavy Fuel Oil
HP	Horsepower
HQ	Headquarters
HR	Human Resources
IACS	International Association of Classification Societies
IBRRC	International Bird Rescue and Rehabilitation Centre
IC	Incident Command (Commander)
ICLL	International Convention on Load Lines
ICP	Incident Command Post
ICS	Incident Command System

Acronym	Meaning
IMO	International Maritime Organisation
IMT	Incident Management Team
IPIECA	International Petroleum Industry Environmental Conservation Association
IR	Infra Red
IRG	Incident Response Guide
IRT	Initial Response Team (Tier 1)
ISF	International Shipping Federation
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ISM	International Management Code for Safe Operations of Ships and for Pollution Prevention
ITOPF	International Tanker Owners Pollution Federation
ITZ	Intertidal Zone
IUCN	International Union for Conservation of Nature and Natural Resources
KBOD	Thousand Barrels of Oil per Day
kg	Kilogram
km	Kilometre
kts	Knots (nautical miles per hour)
kW	Kilowatt
l	Litre
LFO	Light Fuel Oil
LOA	Length Over all
LR	Lloyd's Register of Shipping
m	Metre
m^3	Cubic Meter
m/s	Metres per Second
MARPOL	Marine Pollution (International Convention for the Prevention of Pollution from Ships)
MB	Million Barrels
MCTS	Marine Communications and Traffic Services
MFO	Medium Fuel Oil
MGO	Marine Gas Oil
MHz	Megahertz
min	Minute
mm	Millimetre
MOV	Manually Operated Valve
MSDS	Material Safety Data Sheet
NAPL	Non-Aqueous Phase Liquids
NCP	National Contingency Plan
NEBA	Net Environmental Benefit Analysis
NGL	Natural Gas Liquid
NO_2	Nitrogen Oxides
NOAA	National Oceanic and Atmospheric Administration (USA)
O_2	Oxygen
OEL	Occupational Exposure Limit

Acronym	Meaning
OGC	Oil and Gas Commission
OHF	Oil Handling Facility
OPRC	Oil Pollution Preparedness, Response and Co-operation Convention 1990
Ops	Operations
OSC	On-Scene Commander
OSCP	Oil Spill Contingency Plan
OSHA	Occupational Safety and Health Administration (USA)
OSIC	On-Scene Incident Commander (Facility Manager/Designated IRT Supervisor)
OSR	Oil Spill Response
OSRL	Oil Spill Response Limited (UK)
OSRPs	Oil Spill Response Plans
OSRV	Oil Spill Response Vessel
PAHs	Polynuclear Aromatic Hydrocarbons
PC	Personal Computer (IBM based)
PEL	Permissible Exposure Limits
PEP	Provincial Emergency Program
PFD	Personal Flotation Device
PIC	Person In Charge
PM10	Particulate Matter having a diameter less than 10 microns
PPE	Personal Protective Equipment
ppm	Parts per Million
psi	Pounds per square inch (pressure)
PVC	Poly Vinyl Chloride
REET	Regional Environmental Emergencies Team
RO	Response Organization
SCAT	Shoreline Cleanup Assessment Team
SCBA	Self-Contained Breathing Apparatus
sec	Second
SO_2	Sulfur Dioxide
SOLAS	(International Convention for) Safety of Life at Sea
SOS	Shoreline Oiling Summary
SSB	Single Side Band (Radio)
STEL	Short-term Exposure Limit
TLV	Threshold Limit Value
TRS	Tiered Response System
TWA	Time-weighted Average
UHF	Ultra High Frequency
UK	United Kingdom
USA	United States of America
UV	Ultra Violet
VCR	Videotape Cassette Recorder
VHF	Very High Frequency
VOSS	Vessel of Opportunity Skimming System

Acronym	Meaning
VRP	Vessel Response Plan
VTC	Vessel Traffic Control
VTS	Vessel Traffic Services
WCB	WorkSafe BC
WCMRC	Western Canada Marine Response Corporation

INTRODUCTION

Initial Incident Actions

The initial responder to arrive at a spill site will take some immediate actions to ensure responder and public safety and to protect the environment. The initial responder will complete the following tasks, if appropriate and safe to do so while waiting for the Qualified Individual(QI).

1. Ensure the safety of all workers and public in the area of the spill
2. Assess the situation (i.e., incident size, severity, likely impacts)
3. Notify the Control Centre and/or Supervisor immediately to activate the Emergency Response Line (ERL/ERL+) System as outlined in Section 2.
4. Take appropriate action to mitigate the impacts to life safety, the environment, and property prior to the arrival of the Qualified Individual (QI)

Note: the initial responder will begin documentation on an ICS 201 form, and/or notes on other paper, or will relay the information to personnel at the Control Centre or to the District Supervisor who will initiate an ICS 201 form. This initial documentation will be kept with all other incident documentation.

How to use this Plan

This Plan is divided into 3 Sections:



In the event of an incident, Kinder Morgan Canada will utilize the Incident Command System (ICS) to ensure a safe, comprehensive and effective response. This Plan includes initial objectives for the first Operational Period of the incident (to be captured on the ICS 201) as well as objectives and strategies for subsequent Operational Periods.

Purpose of the Plan

This is the Emergency Response Plan (Spill Contingency Plan) for the assets operated by Trans Mountain Pipeline (Puget Sound) LLC. These entities are all referred to as "Kinder Morgan", “Kinder Morgan Canada” or "The Company”.

The purpose of this Plan is to provide guidelines to quickly, safely and effectively respond to an emergency, in order to protect:

- Public and Company Personnel
- Public and Company Property
- The Environment

Regulatory Scope of the Plan

This Plan is intended to satisfy the requirements of the Oil Pollution Act of 1990 (OPA 90), and has been prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and applicable Area Contingency Plans (ACP), EPA Region X Regional Contingency Plans. Specifically, this Plan is intended to satisfy The Pipeline Hazardous Material Safety Administration (PHMSA), and the Washington Department of Ecology (WDOE) requirements under Washington Administrative Code (WAC) 173-182.

Scope of the Plan

This Emergency Response Plan (ERP) will cover all emergencies that originate on the Puget Sound pipeline and/or associated stations in Washington State including spills, security incidents, natural hazards, explosions and fires. This plan will not cover the tactical response techniques for a fire, however it will cover the response actions for the effects of radiant heat and air monitoring for plumes (smoke or otherwise), on the public, that result from a fire event, and rate as requiring specific response actions as set out in the Emergency Response Risk Assessment. Detailed response actions including tactical information for fires can be found in the site specific “Fire Pre-Plan”.

Plan Implementation

This Emergency Response Plan (ERP) will be implemented for any emergency or drill within Washington State. If a different plan is identified as more applicable it may be used if the decision to use an alternate plan is first approved by the state and federal on-scene coordinators.

Emergency Definition

An emergency is defined as any condition that results in or may result in:

- Death or injury requiring hospitalization
- Explosion or fire
- Leak, rupture or spill
- Any significant event such as; earthquake, flood, severe storm or bomb threat

Emergency Response Philosophy

On all emergency incidents, Kinder Morgan will follow the following basic response approach:

1. **Control the Incident Site**
   - The incident scene must first be controlled to ensure a safe and effective response to any incident:
     - Don't rush in; hazards must first be fully assessed
     - Establish and announce command at the ICP, either at the incident scene location or, if necessary at a remote location
     - Establish and maintain an isolation perimeter, with hot, warm and cold zones
     - Establish staging area(s)
2. **Size up the Situation**
   - A site assessment will identify the scope and nature of the incident, as well as any potential hazards to responders:
     - Recognize and identify any hazardous materials involved
     - Source of any releases
     - Potential exposures
3. **Evaluate the Hazards and Risks**
   - An assessment must be conducted to evaluate the level of risk to responders and the public:
     - Assess health, physical and chemical hazards
     - Gather technical data (MSDSs, etc.)
     - Conduct vapor monitoring
4. **Establish Initial Objectives**
   - After the potential hazards have been identified, the Incident Commander(s) can establish the initial objectives for the response. Typical initial objectives include:
     - Control the incident Scene
     - Ensure the safety of responders and the public
     - Establish Incident Command Post
5. **Select and Don PPE**
   - All incident responders must be protected with the PPE appropriate to the hazards present:
     - Approved Fire-Resistant Coveralls
     - Hard Hats (where overhead hazards are present)
     - Gloves
     - Splash Goggles
     - Rubber Steel-Toed Boots

   Also:
     - PPE must be worn properly in order to fully protect responders.
     - Damaged or heavily-oiled PPE should be replaced as soon as possible.
     - All responders leaving the *Hot Zone* must go through a decontamination zone *(Warm Zone)* to ensure that contamination is not spread into the *Cold Zone.*

6. **Manage Information and Coordinate Resources**
    - It is essential that information flows quickly and freely to all resources to ensure a safe and coordinated response:
        - Expand the ICS as needed, especially if a Unified Command is established
        - Ensure that all (internal and external) notifications are made
        - Conduct briefings
        - Confirm all communications to ensure that they are fully understood and implemented
7. **Implement Response Objectives**
    - Once initial objectives have been established, it will be possible to develop, and implement, strategies and tactics to achieve these objectives. These may be:
        - Offensive (i.e., emergency rescue, fire-fighting, spill source control)
        - Defensive (i.e., protecting the public, fire control, spill response)
        - Non-intervention (protecting the public)
8. **Manage the Incident**
    - On larger incidents, it will be necessary be operate over a number of Operational Periods. In these cases, it will be necessary to fully-staff the Incident Management Team, especially the Planning Section:
        - Establish Incident Objectives for each Operational Period
        - Conduct Tactics and Planning Meetings
        - Develop and approve Incident Action Plans
        - Conduct Operations Briefings
9. **Terminate the Incident Response**
    - Once the emergency phase of the incident is over, the Incident Commander will stand down the Incident Management Team and ensure that all post-incident activities are completed:
        - Transition to, and conduct the post-emergency phase of the response
        - Conduct an incident debrief
        - Ensure that all incident documentation is completed
        - Ensure that all equipment, PPE and ICP supplies are replenished
        - Transition from Emergency Phase to Project Phase with adequate documentation and continue any required project phase activities.

Emergency Levels

The Kinder Morgan Canada Emergency Response Organization is based on a three-tiered response structure. Incidents are identified and categorized into one of the three tiers. Each Tier is managed by an escalating degree of management seniority and authority, and assistance from outside the initial response organization. The standardization of the ICS Structure and Incident Management Process provides the flexibility to tailor the size of the response organization to the specifics of the incident and allows for rapid adjustments as an incident evolves. Where appropriate, the Kinder Morgan Incident Commander will invite the participation of Federal, State and local Agencies to form a Unified Command.

Level	Definition	Examples
1	The Company has the capability to manage and control a Level I emergency using company resources available within the area. The District Supervisor will assume the Incident Commander position.	• Oil spills confined to company property (pipeline station, terminal, or scraper trap) • Public, contractor, or employee safety not endangered • Public property not endangered • Local response handled by District personnel • Notification may not be required to regulatory authorities
2	The Company has the capability to manage and control a Level II emergency using company resources and expertise, with some assistance from local contractors. The Region Director or designate may assume the Incident Commander position.	• Oil has migrated beyond company property (pipeline station, terminal, or scraper trap) but not into a waterway • Emergency services may be required (e.g., fire, police, ambulance) • Public, contractor, or employee safety and/or property may be endangered • Notification required to regulatory authorities • May use a unified command organizational structure in the emergency
3	The Company may request assistance from other Industry, Municipal, or State Agency personnel to support the response to the incident. The Region Director will assume the Incident Commander position.	• Major emergency condition such as: ○ uncontrolled leak ○ spill on a watercourse ○ large fire at an operating facility or office building ○ fatality or serious injury to an employee, contractor, or the public ○ spill of hazardous substances • Major off-site environmental impact has occurred • Public, contractor, or employee safety and/ or property is endangered • Emergency services are required (e.g., police, fire, ambulance) • Notification required to regulatory authorities • Use of a Unified Command organizational structure in the emergency, as required, to facilitate coordination of company, government and other agency response to the emergency.

1.0 RESPONDER HEALTH AND SAFETY

It is important to understand that the different crude oils handled pose different hazards when spilled, depending on their chemical composition. Therefore, the primary hazards, and the need for vapor monitoring, and the cleanup techniques will depend on the characteristics and volume of crude oil spilled.

Many crude oils (including “sweet” crudes) can emit potentially dangerous levels of H_2S, and most crude oils also contain Benzene. Some crude oils have low flash points, especially during the initial hours after being spilled. In all of these cases, the risk of accidental ignition and/or the inhalation of toxic vapors must be mitigated, and a detailed site assessment (see Section 3) must be completed before on-scene operations are initiated. This assessment will be made by the Safety Officer.

Typically, the risks associated with the concentration of potentially-dangerous vapors will diminish with time, due to reduced vapor production as the lighter components volatize, and vapors disperse. There are exceptions to this however; i.e., in some cases, where crude oil pools into thick layers, a skin may develop on the surface, trapping vapors. Later, if the skin is broken and the oil disturbed, the oil might emit vapors normally associated with freshly-spilled oil. In all cases, the results of the initial site assessment should be used to develop a Safety and Health Plan.

The Initial Site Health & Safety Plan (ISHSP – Section 1.2) should be completed as soon as possible by one of the initial responders, and updated as required. When completing the ISHSP some of the information may not apply during the initial stages of the response, but may change within a short period, thereby altering the PPE and/ or other requirements.

The ISHSP:

- Aids the initial responders in assessing hazards related to the incident
- States the required PPE to be used
- Documents important health and safety information
- Serves as an interim "Plan" until the Site Health & Safety Plan (Section 1.3) is developed
- Assigns responsibilities, i.e., completion of the ICS 201 and notification
- Identifies "site set-up" features that may be required
- Authorizes work to be completed (in lieu of a Safe Work Permit)

Upon the completion and delivery of the Site Health & Safety Plan, the Initial Site Health & Safety Plan becomes void.

1.1 Safety Guidelines

1.1.1 Skin Contact

The accidental absorption of toxins through skin/eye contact can be greatly reduced through the wearing of oil-resistant Personal Protective Equipment (PPE). These include:

- Approved Fire-Resistant Coveralls
- Hard Hats (where overhead hazards are present)
- Gloves
- Splash Goggles
- Rubber Steel-Toed Boots

Also:

- PPE must be worn properly in order to fully protect responders.
- Damaged or heavily-oiled PPE should be replaced as soon as possible.
- All responders leaving the *Hot Zone* must go through a decontamination zone *(Warm Zone)* to ensure that contamination is not spread into the *Cold Zone.*

1.1.2 Inhalation of Vapors

The need for respiratory protection will be determined by the Safety Officer after a review of the MSDS and data retrieved from the initial site assessment (see Section 3). If toxic vapor levels are determined to exceed safe working limits (see Section 3.4 for details), it might be possible for responders to work while wearing half-face respirators fitted with Organic cartridges. In this case, on-going vapor monitoring is essential to ensure that vapor levels do not exceed safe working limits.

1.1.3 Fire/Explosion

All hydrocarbon products are capable of ignition if certain conditions are met. It is important to review the MSDS to determine the flash point of the material spilled and to perform vapor monitoring (for LEL). However, the MSDS does not replace the need for vapor monitoring. Whenever vapor levels are approaching 10% of the LEL for any spilled product, responders should leave the area immediately.

1.1.4 Other Hazards

There are a number of additional potential hazards faced during spill response including slips, trips and falls, and working around vessels/water and equipment. Special care should be taken when walking on oiled surfaces or shoreline, especially during night-time operations. The Site-Specific Health and Safety Plan shall identify these potential hazards, and they must be clearly communicated to responders.

1.2 Initial Health and Safety Plan

The Initial Health and Safety Plan form is available on the intranet site:
http://kmonline/business_units/KMC/Pages/EHS_Forms.aspx

1.3 Health and Safety Plan

The Health and Safety Plan form is available on the intranet site:
http://kmonline/business_units/KMC/Pages/EHS_Forms.aspx

KINDER MORGAN

INITIAL SITE HEALTH & SAFETY PLAN

INCIDENT PARTICULARS

Incident Name:	Date/ Time:
Command Post Location:	Site Phone Number:
Product: Est. Vol: m^3	MSDS Available: ☐ Yes ☐ No
ICS 201 Form Initiated: ☐ Yes ☐ No	Person Responsible:
Internal/ External Notifications Made: ☐ Yes ☐ No	Person Responsible:

SITE CHARACTERIZATION

☐ Pipeline ☐ Storage Facility ☐ Truck ☐ Land ☐ Water ☐ Other (please specify)

SITE SECURITY & ACCESS POINTS

Description:

SITE HAZARDS

☐ Fire Explosion	☐ Equipment Operations	☐ Trenching Excavation	☐ Fatigue	☐ Slips, Trips, and Falls
☐ Chemicals	☐ Motor Vehicles	☐ Confined Spaces	☐ Heat Stress	☐ Restricted Work Area
☐ Electrical	☐ Boat Operations	☐ UV Radiation	☐ Cold Stress	☐ Heavy Lifting
☐ Steam/ Hot Water	☐ Helicopter Operations	☐ Overhead/ Buried Utilities	☐ Weather	☐ Drum Handling
☐ Noise	☐ Shore Line Operations	☐ Pumps and Hoses	☐ Visibility	☐ Plants/ Wildlife
				☐ Other:

ATMOSPHERIC MONITORING – INITIAL READING

O_2	%	LEL	%	Other (specify):
H_2S	ppm	Benzene	ppm	

NOTE: Additional results to be recorded in 'Emergency Response/ Safety Watch Log'

CONTROL MEASURES

☐ Source of Release Secured
☐ Site Secured
☐ Valve(s) Closed
☐ Energy Sources Locked/ Tagged Out
☐ Facility Shut Down
☐ Other:

SITE SETUP

Communications Established	☐ Yes ☐ No
Hot Zone Established	☐ Yes ☐ No
Fire Extinguisher Accessible	☐ Yes ☐ No
Decontamination Stations Established	☐ Yes ☐ No
Illumination Equipment Provided	☐ Yes ☐ No
Medical Surveillance Provided	☐ Yes ☐ No
Sanitation Facilities Provided	☐ Yes ☐ No

HOT ZONE PPE REQUIREMENTS

General	Other			Respiratory	
☐ Hard Hat	☐ Face Shield	☐ Rubber boots	☐ Leather gloves	☐ SABA/ Air Line w/ Esc	
☐ FR Clothing	☐ Tinted Lens	☐ High Vis. Vests	☐ Nitrile gloves	☐ SCBA to be worn	☐ Cartridge Type OV
☐ Steel toes	☐ Impact Goggles	☐ PFD's	☐ Rubber gloves	☐ SCBA to be avail. #	☐ Cartridge Type P(M)-100
☐ Safety Glasses	☐ Chemical Res. Clothing	☐ Safety Harness	☐ Hearing Protection	☐ Air Purifying (full mask)	☐ Cartridge Type P(M)-100/OV
		☐ FR Rain Gear	☐ FR Tyvek	☐ Air Purifying (half mask)	

WARM ZONE PPE REQUIREMENTS

General	Other			Respiratory	
☐ Hard Hat	☐ Face Shield	☐ Rubber boots	☐ Leather gloves	☐ SABA/ Air Line w/ Esc	
☐ FR Clothing	☐ Tinted Lens	☐ High Vis. Vests	☐ Nitrile gloves	☐ SCBA to be worn	☐ Cartridge Type OV
☐ Steel toes	☐ Impact Goggles	☐ PFD's	☐ Rubber gloves	☐ SCBA to be avail. #	☐ Cartridge Type P(M)-100
☐ Safety Glasses	☐ Chemical Res. Clothing	☐ Safety Harness	☐ Hearing Protection	☐ Air Purifying (full mask)	☐ Cartridge Type P(M)-100/OV
		☐ FR Rain Gear	☐ FR Tyvek	☐ Air Purifying (half mask)	

TRAINING AND REVIEW

Hazwoper Training Records Verified for U.S.A. Operations ☐ Yes ☐ No All Responders have reviewed this Plan ☐ Yes ☐ No

Completed by:

KINDER MORGAN CANADA

SITE HEALTH & SAFETY PLAN

This document is intended to facilitate the rapid development of a written site health and safety plan (SHSP) during the emergency and post emergency phases of an incident response. It is intended to address all health & safety aspects for response personnel. SHSPs help mount a rapid response to an oil release, or other type of incident in a safe manner, as well as, provide readily available information to all affected parties.

INCIDENT PARTICULARS

Incident Name:				Date/ Time:	
Command Post Location:				Site Phone Number:	
Product:		Estimated Volume:		MSDS Available:	☐ Yes ☐ No
ICS 201 Form Initiated:		☐ Yes ☐ No		Person Responsible:	
Internal/ External Notifications Made:		☐ Yes ☐ No		Person Responsible:	

SITE CHARACTERIZATION

☐ Land ☐ Water ☐ Other (please specify)

IMPACTED ASSETS

☐ Pipeline ☐ Storage Facility ☐ Truck ☐ Other (please specify)

WEATHER

☐ Clear	☐ Cloudy	☐ Fog
☐ Rain	☐ Freezing Rain	☐ Hail
☐ Snow	☐ Lightning	

WIND

☐ Calm (0.5 km/ hr; 0.3 mi./ hr)
☐ Light (5-15 km/ hr; 3-10 mi./ hr)
☐ Moderate (15-30 km/ hr; 10-20 mi./ hr)
☐ Strong (30+ km/ hr; 20+ mi./ hr)

SITE SECURITY & ACCESS POINTS

Description:

SITE HAZARDS

☐ Fire/ Explosion	☐ Equipment Operations	☐ Trenching/ Excavation	☐ Fatigue	☐ Slips, Trips, and Falls
☐ Chemicals	☐ Motor Vehicles	☐ Confined Spaces	☐ Heat Stress	☐ Restricted Work Area
☐ Electrical	☐ Boat Operations	☐ UV Radiation	☐ Cold Stress	☐ Heavy Lifting
☐ Steam/ Hot Water	☐ Helicopter Operations	☐ Overhead/ Buried Utilities	☐ Weather	☐ Drum Handling
☐ Noise	☐ Shore Line Operations	☐ Pumps and Hoses	☐ Visibility	☐ Plants/ Wildlife
				☐ Other:

ATMOSPHERIC MONITORING – INITIAL READING

O_2	%	LEL	%	Other (specify):
H_2S	ppm	Benzene	ppm	

NOTE: Additional results to be recorded in 'Event/ Safety Watch Log'

CONTROL MEASURES	SITE SETUP	
☐ Source of Release Secured	Communications Established	☐ Yes ☐ No
☐ Site Secured	Work Zones Established	☐ Yes ☐ No
☐ Valve(s) Closed	Fire Extinguisher Accessible	☐ Yes ☐ No
☐ Energy Sources Locked/ Tagged Out	Decontamination Stations Established	☐ Yes ☐ No
☐ Facility Shut Down	First Aid Stations Established	☐ Yes ☐ No
☐ Other	Illumination Equipment Provided	☐ Yes ☐ No
	Medical Surveillance Provided	☐ Yes ☐ No
	Sanitation Facilities Provided	☐ Yes ☐ No

GENERAL SITE REQUIREMENTS

1) Personnel entering the site must **Sign-in** at the Field Command Post or designated area, and must **Sign-out** before leaving the site.

2) Personnel entering the site for the first time must attend a **Pre-Entry Briefing** at the Field Command Post before they will be permitted site entry. The briefing will cover the Site Health and Safety Plan and the site specific hazards present.

3) The spill site has a "No Smoking" policy – Security at the Field Command Post will give directions to the designated "Smoking Area".

4) Cameras and other electronic devices are not permitted on the Site unless approval has been given by the Health and Safety Department

5) All Injuries or Unsafe Activities/ Conditions shall be immediately reported to the Work Leader or the Safety Watch.

6) Site Emergency – 3 blasts of air horn or megaphone (unless otherwise advised) – all personnel must immediately leave the area and report to the Field Command Post.

7) The site will be divided into work zones with access control points. As a minimum, personnel will always work in pairs. Personnel must follow decontamination procedures when exiting the work zones.

THE BUDDY SYSTEM IS MANDATORY FOR EVERYONE ON SITE

HEALTH & SAFETY BRIEFINGS/ MEETINGS

1. All personnel, employees, contractors, and subcontractors shall be provided with an initial site safety briefing to communicate the nature, level and degree of hazards expected on site.

2. Personnel will also receive regular briefings before and after each shift, before making a hot zone level entry, or when significant changes are made in the work procedures or safety plans. These site safety meetings/ briefings shall be held by the on-scene commander or safety watch. At a minimum these meeting will describe the work to be accomplished, discuss safety procedure changes, and note any items which need to be passed to other crews. General safety training topics should also be covered based on points raised in previous meetings and the site health and safety plan attachments.

   - The Tailgate Meeting Form should be utilized for this purpose.

LOCAL SOURCES OF ASSISTANCE

General: When calling emergency responders provide the following information to the responding agency: *(see Emergency Numbers for Ambulance, Fire and Police)*

Type of Emergency:

Incident Location and directions to incident: (e.g. SW25-53-11-W5, Highway 16, South RR 11)

Ambulance	Name:		Telephone:	
Fire Dept.	Name:		Telephone:	
Police Dept.	Name:		Telephone:	
Hospital	Name:		Telephone:	

Directions To Hospital:

Travel Time:

PRODUCT INFORMATION

Hazardous Material (Known or Suspected): The following are the products that could be expected to be in the vicinity of the incident. (Obtain copies of MSDS)

Material:		**MSDS Number:**		**Quantity:**	
Material:		**MSDS Number:**		**Quantity:**	

Toxicological Hazards:		
☐ Inhalation		
☐ Ingestion		
☐ Skin		
Substance:	**PEL/ TLV:**	**IDLH:**
Substance:	**PEL/ TLV:**	**IDLH:**
Substance:	**PEL/ TLV:**	**IDLH:**
Future weather conditions that may affect Incident Site:		

Job Assignment/ Task	Cold Zone	Warm Zone	Hot Zone
General Labour on Land			
General Labour on Water			
Equipment Operator			
Vac-Truck Operator/ Crew			
Site Assessment/ Investigation			
Boom Deployment/ Maintenance			
Welder			
Corrosion/ Coating			
Wildlife Hazing			
Decon Workers			
Land/ Water Surveillance			
Supervisory Personnel			

Select the appropriate level of PPE for each of the applicable Job Assignment/ Tasks from the following list, as well as, any additional PPE that is required. (e.g. Level C, 7 and 11).

PPE REQUIREMENTS

Level A	Level B	Level C	Level D	Additional PPE		
Not used by Company Employees	SCBA (or Air Line with escape back)	Full/ Half face air purifying respirator	Flame Resistant or normal work clothing	1. Hard hat 2. FR Clothing 3. Steel toes	10. High Vis vests 11. PFD's 12. Safety Harness	19. SABA/ air lines w/Esc 20. SCBA to be worn 22. SCBA to be avail. #
	Flame Resistant or Coated Tyvex	Flame Resistant or Coated Tyvex	Eye & face protection	4. Safety Glasses 5. Face Shield 6. Tinted Lens 7. Splash Goggles 8. Chemical resist. clothing 9. Rubber boots	13. FR rain gear 14. Leather Gloves 15. Nitrile gloves 16. Rubber Gloves 17. Hearing Protection 18. FR Tyvek	23. Air Purifying (full mask) 24. Air Purifying (half mask) 25. Cartridge Type OV 26. Cartridge Type P(M) – 100 27. Cartridge Type P(M)-100/ OV
	Chemical resistant steel toe boots	Chemical resistant steel toe boots	Protective footwear			
	Chemical resistant gloves	Chemical resistant or leather gloves	Gloves			
		Eye protection				
		Hard hat				

WORK ZONES

Control boundaries have been established in the site safety map below according to the following guidelines:

- The **HOT ZONE**, or **EXCLUSION ZONE**, is the area where contamination or product hazards are expected.
- The **WARM ZONE**, or **CONTAMINATION REDUCTION ZONE**, is a transition area between the **HOT ZONE** and the **COLD ZONE**. It is the area where a **DECONTAMINATION** is conducted for personnel and equipment leaving the **HOT ZONE**.
- The **COLD ZONE**, or **SUPPORT ZONE**, is an area adjacent to the **WARM ZONE** that is intended to remain safe and as free of contamination as possible.

SITE DIAGRAM

☐ See Site diagram or Site Map from ICS form 201.

GENERAL DIAGRAM INSTRUCTIONS

1. Site Diagram should include the following:
   a. Sketch with major feature locations (buildings, drainage paths, roads, etc.)
   b. Hazardous substance location
   c. Work zones (exclusion, contamination reduction, support)
   d. Command center and decontamination area
   e. Access and access restrictions
   f. Routes of entry
   f. Wind direction
   g. Emergency evacuation routes
   h. Assembly points
   i. First aid locations
   j. Communication system

CONTINGENCY PLANS

In the event of an emergency (at this incident site) the person first noticing the emergency is to notify other workers in the immediate area. Evacuation must commence at once if the emergency poses any threat to the safety of the workers. Upon receiving notification of an emergency, the individual in charge of the work area is to take appropriate measures to protect human life, the environment (including wildlife) and property.

Escape Routes:

Evacuation Procedures:

Alerting Methods:

Muster Point:

MEDICAL SURVEILLANCE

Special medical monitoring required:

☐ **Urinary/ Phenol**	☐ **Blood Test**	☐ **Chest X-ray**	☐ **Other:**

Procedure:

Facility to perform medical testing/ monitoring
NAME:
LOCATION:

HAZWOPER (US OPERATIONS ONLY)

Personnel are required to be trained in accordance with 29CFR 1910.120 for the level at which they are performing duties. Personnel approaching the release and performing offensive actions are to meet the Hazardous Materials Technician Level. Personnel working away from the release area performing defensive actions are to be trained at the First Responder – Operational Level.

Site specific training required: In addition to the training requirements above, the following site specific training topics are to be reviewed prior to work on the site:

- ☐ Site Hazards (material released, physical hazards, etc.)
- ☐ Work areas/ activities identified
- ☐ Site Emergency Alerting/ Contingency Plan
- ☐ Evacuation Route/ Assembly Areas
- ☐ Required PPE
- ☐ Obtaining Medical Treatment/ First Aid
- ☐ Decontamination procedures

Other Types of Training:

1.
2.
3.
4.
5.
6.

INCLUDED ATTACHMENTS:
Amendment form
Tailgate meeting form
☐ Wild Animals: Ungulates, Reptiles & Insects; ref. H&S Standards Manual Section 4, #417
☐ Boat operation; ref. H&S Standards Manual Section 6, #603
☐ Thermal Stress (Cold & Hypothermia); ref. H&S Standards Manual Section 4, #423, #424
☐ Confined Space Entry; ref. H&S Standards Manual Section 7, #701
☐ Cranes & Mechanical Lifting Equipment; ref. H&S Standards Manual Section 5, #511
☐ Manual lifting; ref. H&S Standards Manual Section 5, #523
☐ Organic Solvents; ref. H&S Standards Manual Section 4, #409
☐ Hydrogen Sulfide; ref. H&S Standards Manual Section 4, #406
☐ Helicopter Safety; ref. H&S Standards Manual Section 6, #605
☐ PPE; ref. H&S Standards Manual Section 5, #527
☐ Sanitation Requirement; ref. H&S Standards Manual Section 5, #532
☐ Traffic Safety, ref. H&S Standards Manual Section 6, #609
☐ Action levels; ref. H&S Standards Manual Section 5, #502
☐ MSDS
☐ Medical Monitoring Form
☐
☐
Note: Air Monitoring Results, and Hot Zone Personnel Tracking is to be documented in the Emergency Response/ Safety Watch Log

PLAN PREPARATION		
Prepared by:	**Date:**	**Time:**
Signature:		
Prepared by:	**Date:**	**Time:**
Signature:		

ALL RESPONSE PERSONNEL ARE TO REVIEW THE SITE HEALTH & SAFETY PLAN

AMENDMENTS TO SITE SPECIFIC HEALTH & SAFETY PLAN

This Site Health and Safety Plan is based on information available at the time of preparation. Unexpected conditions may arise which necessitate changes to this plan. It is important that personal protective measures be thoroughly assessed prior to and during the planned activities. Unplanned activities and/ or changes in the hazard status should initiate a review of major changes in this plan.

Changes in the hazard status or unplanned activities are to be submitted on "Amendments to Site Health and Safety Plan" which is included as Page ___ of this plan.

Amendments must be approved by the Safety Officer prior to implementation of amendment.

All notes, documentation and records must NOT be discarded after their use. Documents are to be submitted to Documentation (Planning Section) for records retention.

AMENDMENTS TO SITE HEALTH & SAFETY PLAN	
Changes in field activities or hazards:	
Proposed Amendment:	
Proposed By:	**Date:**
Approved By:	**Date:**
Amendment Number	
Amendment Effective Date	**Time:**

KINDER MORGAN CANADA

TAILGATE MEETING MINUTES

Location:	Date	MM DD YYYY	Time	HH MM

Description of work to be performed:

HAZARD IDENTIFICATION AND SAFETY DISCUSSION *(Check and discuss all relevant hazards)*

☐ Flammables/ Combustibles/ Explosives	☐ Overhead Work/ Suspended Loads/ Chains/ Slings	☐ High Noise Levels
☐ Trapped or Stored Pressure/ Energy	☐ Falling from Heights	☐ Walking/ working surfaces
☐ Hazardous/ Toxic Substances	☐ Slips/ trips and falls	☐ Insect bites/ bird droppings
☐ Pinch Points/ Moving/ Rotating Equipment	☐ Radiation	☐ Sharp Edges
☐ Electrical Current	☐ Extreme Heat/ Cold	☐ Animals
☐ Traffic	☐ Exertion/ Heavy Lifting	☐ Other
☐ Working in awkward positions	☐ Weather (ice, snow, rain)	☐ Other

REQUIRED HAZARD CONTROLS *(Check applicable)*

☐ Gas Detection (Available & Calibrated)	☐ Signage and/ or Barricades Provided	☐ Emergency Retrieval Equipment
☐ Mechanical & Electrical Lockout Complete	☐ Traffic Control	☐ Full Body Harness w/ "D" Ring
☐ Safety Watch	☐ Grounding and/ or bonding in place	☐ Life Lines & Lanyards
☐ Proper Ventilation	☐ MSDS Available & Reviewed	☐ 2 Way Radios
☐ Piping/ Vessel Isolated	☐ Fire Extinguishers	☐ Other
☐ Trained/ Cert. Personnel Available	☐ Lighting (Class 1, Div. 1- Explosion Proof)	☐ Other

REQUIRED PERSONAL PROTECTIVE EQUIPMENT *(Check applicable)*

General	Other			Respiratory	
☐ Hard Hat	☐ Face Shield	☐ Rubber boots	☐ Leather gloves	☐ SABA/ Air Line w/ Esc	
☐ FR Clothing	☐ Tinted Lens	☐ High Vis. Vests	☐ Nitrile gloves	☐ SCBA to be worn	☐ Cartridge Type OV
☐ Steel toe boots	☐ Impact Goggles	☐ PFD's	☐ Rubber gloves	☐ SCBA to be avail. #	☐ Cartridge Type P-100
☐ Safety Glasses	☐ Chemical Res. Clothing	☐ Safety Harness	☐ Ear Protection	☐ Air Purifying (full mask) ☐ Air Purifying (half mask)	☐ Cartridge Type P-100/ OV

ADDITIONAL TOPICS/ HAZARDS & HAZARD CONTROLS – *identified and discussed*

EMERGENCY PREPARATION

☐ ERP	☐ Muster Areas	☐ Communication Equipment	☐ Means of Egress	☐ Emergency Equipment
☐ Designated First Aid Attendant:			☐ First Aid equipment available	☐ Other

JOB INTERRUPTION

Were additional hazards identified during the work?	☐ Yes	☐ No

If yes, list them here:

Additional Comments:

Company Meeting Facilitator:

KINDER MORGAN CANADA

TAILGATE MEETING MINUTES

Name	Company
1.	
2.	
3.	
4.	
5.	
6.	
7.	
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11.	
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18.	
19.	
20.	
21.	

KINDER MORGAN CANADA

GAS DETECTION RECORDS

DATE:	**PAGE NUMBER:**
DATA COLLECTOR:	**OTHER:**

GAS DETECTION EQUIPMENT INFORMATION

MANUFACTURER:	**MANUFACTURER:**
MODEL:	**MODEL:**
SERIAL NUMBER:	**SERIAL NUMBER:**
TYPE:	**TYPE:**
DATE OF LAST CALIBRATION / TEST:	**DATE OF LAST CALIBRATION / TEST:**

			Benzene					
Location	Time	VOC ppm	ppm	STEL	O_2 %	LEL %	H_2S ppm	CO ppm

EHS Rev. 0 19-Nov-2011

023003

SAMPLE

2.0 INTERNAL AND EXTERNAL NOTIFICATION

Immediate notification is a key element of any emergency response action. The health and safety of employees and the public is paramount and, as a result, immediate notification is essential. This section describes both the internal and external notification processes, and includes the contact information for Kinder Morgan resources, and external resources.

2.1 Incident Verification

The first step in many incidents is to confirm that an emergency condition exists. Reports may come from a number of sources including automated detection systems, on-site KMC or other personnel, and members of the public and/or Emergency Services (Police, Ambulance, Fire).

2.1.1 Automated -Spill Detection

The tanks and pipeline are equipped with pressure and flow monitors, which exercise local control and transmit data to the Control Centre. These systems are set to alarm or shut down on preset deviations of pressure flow. In case of an alarm, the Control Centre personnel will take the appropriate actions in accordance with operating procedures. The following is a summary of the operating procedures for automated spill detection:

- SCADA System 10-Second Data Access –monitors and controls pipeline operations with the SCADA system in the Control Centre. The ultimate decision on leak detection lies with the Control Centre.
- Communication Flexibility/Redundancy – the SCADA system acquires data via a satellite network. Satellite communications allow large volumes of data to be transmitted very rapidly both to and from all field locations. Network configuration and transmission protocols provide the flexibility to establish guaranteed delivery transmissions as required. Communication system redundancy provides accurate and reliable data to pipeline operators.
- Parameter Alarms – a parameter alarm is a data value limit (high or low) which can be set by the Control Centre operator to alert upset conditions regardless of whether the Operator is actively monitoring the data point in question.
- Operators are required to establish parameter alarm settings on mainline pressures and flow rates for all operating line segments. In combination with ten-second data acquisition rates, parameter alarms provide near instantaneous notification of potential upset conditions on all operation mainlines.
- Trending – the SCADA system includes a trending facility which graphically displays pressures, temperature, and flow rate data for each mainline pump and oil receiving location on the system. This system can provide valuable insight into operations history and can help the operator proactively address potential upset conditions.
- Tank Gauging with Parameter Alarms – tank gauge data is available to the Control Centre for use by pipeline operators. The systems are gauged automatically by the SCADA computer and the data is made available to the operator on demand. Parameter alarms (see above) are also available for tank levels to ensure no potential tank discharge.
- Training – all operators are compliant with DOT 195 Operator Qualification Requirements.

2.1.2 Automated - Fire Detection

Fire detection at Laurel Station consists of fire wire alarms in the foam dam area on the top of the two tanks. If a fire was to occur along the rim seal of either tank it will melt the wire which then alarms to the Control Centre and Laurel Station. All enclosed buildings on site have fire alarms which also alarm to the Control Centre and Laurel station.

2.1.3 Automated – Intrusion Alarm

All buildings at Laurel Station have intrusion alarms which send a signal to the alarm monitoring company who then begins a callout starting with the on-call person, district supervisor and finally the Control Centre.

2.1.4 Automated/Complaint Detection Verification

If the detection method comes from alarms to the CCO or a member of the public the potential incident must then be visually verified by KMC personnel. If a leak, fire or other emergency event is confirmed the on-site operator will inform CCO of the incident and CCO will initiate the internal notification procedure.

2.1.5 Early Detection Methods

Aerial patrol flights will be made at least 26 times a year, and will not to exceed 21 days apart. The intent of the patrol is to observe the area directly over the pipeline right-of-way for leaks, exposed pipes, washes, missing markers and other unusual conditions. Construction on the right-of-way, or adjacent to the right-of-way is also closely monitored.

Discharge to the land and/or surface waters may also be detected by company personnel at Laurel Station when employees perform daily scheduled inspections of the site. At Anacortes and Ferndale locations, inspections are performed during scheduled deliveries.

Right-of-way marker signs are installed and maintained at road crossings and other noticeable points and provide an emergency telephone number for reporting emergency situations. The company also participates in the “call before you dig” or “One Call” utility notification services which can be contacted to report a leak and determine the owner/operator of the pipeline.

If a notification is made to a local office or pump station, the Kinder Morgan representative receiving the call will generally implement the following actions:

- Notify the Control Centre and Regional Office/Qualified Individual
- Dispatch field personnel to the site to confirm a discharge and conduct preliminary assessment
- Notify their immediate supervisor and provide assessment results.

2.1.6 Detection in Adverse Weather

A conservative shutdown time of 15 minutes has been established for calculating worst case discharge. Line ruptures and tank failures that cause worst case spills in adverse weather conditions would normally be detected and acted upon within 5 minutes. In the event that visual detection cannot occur due to adverse weather, and/or low visibility the pipeline will be shut down for safety until detection can occur. Equipment that may be used in these situations includes vapor detection, and thermal/infrared imagery.

2.1.7 Detection of Spills to Groundwater

In an area where a spill occurs that is not on impermeable ground a contractor will be contacted to assist with the detection and ongoing evaluation of a spill that may impact groundwater. The contacts for the specific contractors can be found in Section 2.10 Support Services - Primary Response Contractors (PRC).

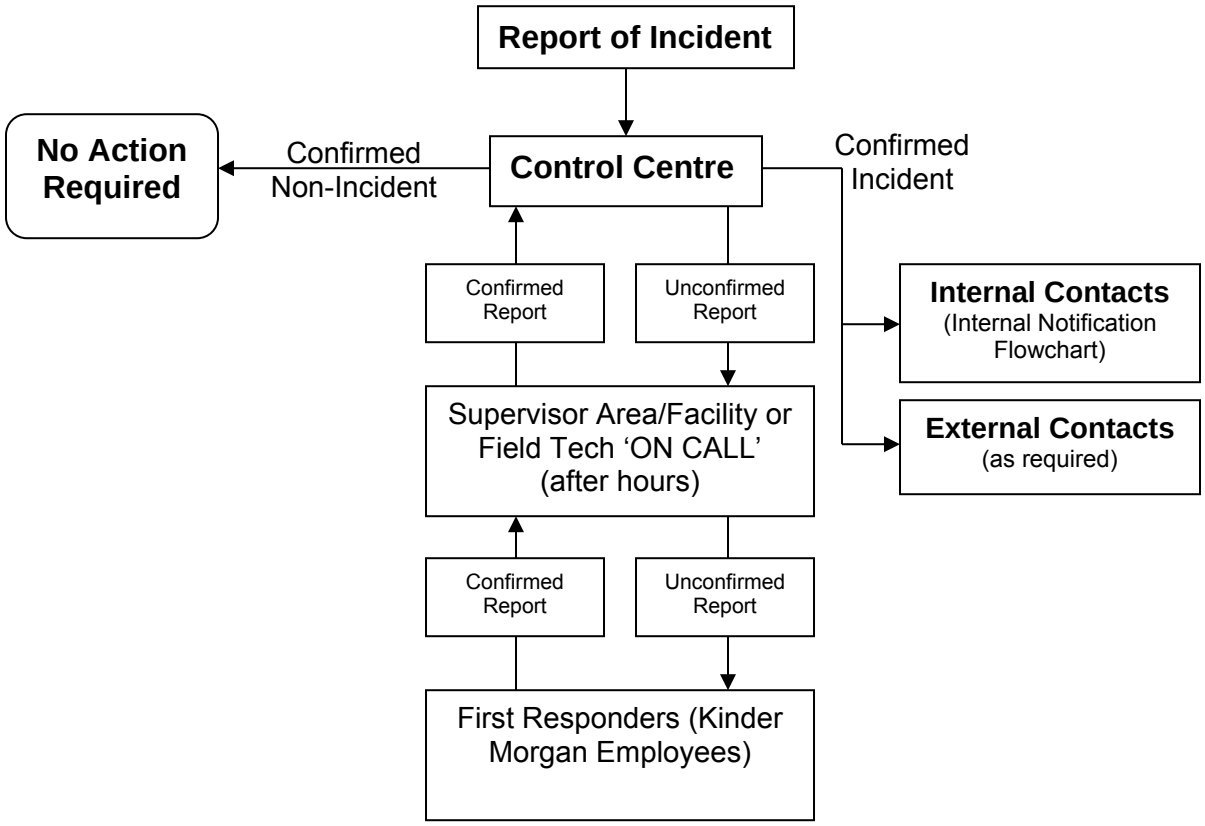
2.1.8 Shutdown Events

If abnormal conditions exist, the Control Centre will take the appropriate actions to ensure that a release does not occur. If a discharge has occurred, the Control Centre will take actions to limit the magnitude. In either case appropriate actions taken by the Control Centre personnel may include, but are not limited to:

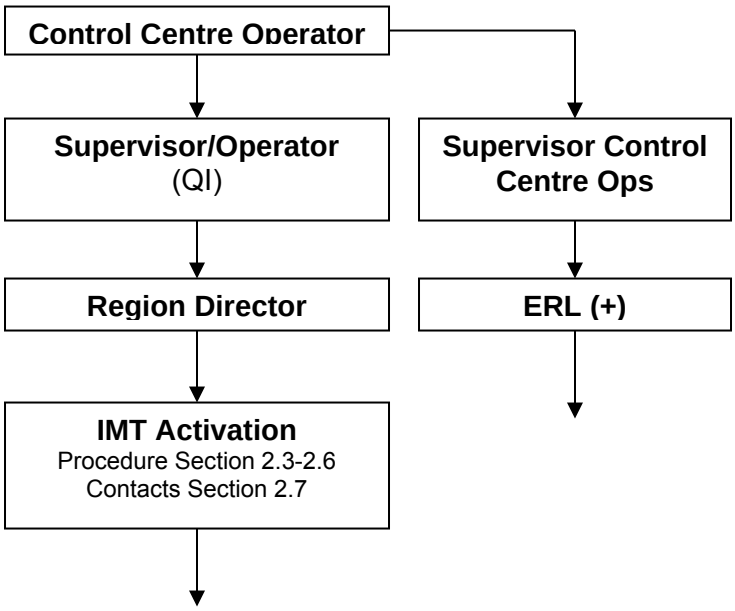
- Shut down affected line segment if there is an indication of a leak
- Isolate line segment
- Depressurize line
- Start internal and external notifications
- Mobilize additional personnel as required.

2.1.9 Spill Verification Flowchart

The first step in many incidents is to confirm that a spill has actually occurred. Spill reports may come from a number of sources including the public, and First Responders (Police, Fire and Ambulance). Once received the following flowchart shows the direction of communication to verify an incident.



2.2 Internal Notification Chart



2.3 Internal Notification Procedure

All spills, regardless of size, must be reported immediately to the Control Center, who will:

- Contact the District Supervisor to verify and Assess the situation
- Determine the Response Level (i.e., Level 1, 2 or 3 - See Introduction for a description of the 3 Response Levels)
- Initiate the notification of company and external personnel

2.3.1 Information to Report

Information about the spill should be as clear, concise, accurate and timely as possible. The minimum information reported, for initial report and update reports, should be:

- Name and Telephone Number of the Caller
- Date and Time of the call
- Name of Pipeline
- Location of the Spill
- Product(s) Spilled
- Estimated Quantity
- Actions Taken To-Date
- Assistance Required
- Injuries
- Weather Conditions
- Reason for discharge (if known)

2.3.2 How to report

- **Call the Control Centre at 1-888-876-6711**

Note: The Control Centre number is monitored 24 hours a day.

2.4 Incident Management Team (IMT) Notification/Activation

Upon being notified of the incident, the CC Supervisor will issue and ERL or ERL+. The ERL system is an online tool that delivers an automated group text message to designated Kinder Morgan personnel when notification of an emergency or non-emergency event is required. The CCO fills in the Emergency Condition Report and issues an ERL/ERL+ call. Once received the mandatory call in personnel will participate in a conference call to determine next actions, and the IMT members that need further contact/mobilization. An initial IMT will be set up using these individuals. The mandatory callers are as follows:

- Regional Director, affected area
    - The following people are contacted at the discretion of the Regional Director
        - Pipeline Protection Supervisor, affected area
        - Director, External Relations
        - Scheduler, Shipper Services, affected area
- Director, Central Region and Control Centre
- Director, Technical Services
- Field Representative
- EHS, regional contact
- Director, EHS (Calgary)
- Legal Representative
- Manager, Emergency Response & Security

If the on-line system is not operational the CCO will begin a manual call down of the above individuals and request they join the conference call. If the conferencing telephone lines are not operational the flow of information will occur via individual telephone calls until an alternate conferencing solution is available.

The following positions, at a minimum, will be assigned during this call:

- Safety Officer
- Information Officer
- Liaison Officer
- Legal Officer
- Operations Section Chief
- Planning Section Chief
- Logistics Section Chief
- Finance/Administration Section Chief

As core IMT members arrive at the site or are assigned, they are responsible for contacting the remaining members of their respective sections/units/groups/division, deemed necessary based on the size and nature of the incident.

2.5 IMT Fan-Out

As core IMT members arrive at the site or are assigned, they are responsible for contacting the remaining members of their respective sections/units/groups/division, deemed necessary based on the size and nature of the incident/

2.6 Emergency Response Line (ERL/ERL+) Initial Contacts

This listing serves as the manual back-up ERL and ERL+ call down list for the Puget Sound Operating Area.

Position	Names)	Office	Cell
Qualified Individual Field Representative	[redacted]	[redacted]	[redacted]
Director, Western Region	[redacted]	[redacted]	[redacted]
Director, Central Region and Control Centre	[redacted]	[redacted]	[redacted]
Director, Technical Services	[redacted]	[redacted]	[redacted]
Director, EHS	[redacted]	[redacted]	[redacted]
Manager Emergency Response and Security	[redacted]	[redacted]	[redacted]
Legal Representative	[redacted]	[redacted]	[redacted]
Director, External Relations	[redacted]	[redacted]	[redacted]
EHS Reginal Contact	[redacted]	[redacted]	[redacted]
Pipeline Protection Supervisor	[redacted]	[redacted]	[redacted]

2.7 Kinder Morgan Contacts

The IMT is only listed to the Section Chief level, a full listing of IMT members can be obtained from the Emergency Response and Security Advisor. A Section Chief is also classed as a Deputy Section Chief.

Position	Name	Office	Cell
Command Staff			
Incident Commander	[redacted]	[redacted]	[redacted]
Incident Commander	[redacted]	[redacted]	[redacted]
Incident Commander	[redacted]	[redacted]	[redacted]
Incident Commander	[redacted]	[redacted]	[redacted]
Incident Commander	[redacted]	[redacted]	[redacted]
Incident Commander	[redacted]	[redacted]	[redacted]
Incident Commander	[redacted]	[redacted]	[redacted]
Information Officer	[redacted]	[redacted]	[redacted]
Information Officer	[redacted]	[redacted]	[redacted]
Information Officer	[redacted]	[redacted]	[redacted]
Legal Officer	[redacted]	[redacted]	[redacted]
Legal Officer	[redacted]	[redacted]	
Liaison Officer	[redacted]	[redacted]	[redacted]
Liaison Officer	[redacted]	[redacted]	[redacted]
Safety Officer	[redacted]	[redacted]	[redacted]
Safety Officer	[redacted]	[redacted]	[redacted]

Position	Name	Office	Cell
Safety Officer	[redacted]	[redacted]	[redacted]
Safety Officer	[redacted]	[redacted]	[redacted]
Safety Officer	[redacted]	[redacted]	[redacted]
Operations Section			
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Planning Section			
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Logistics Section			
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	
Section Chief	[redacted]	[redacted]	[redacted]
Finance Section			
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]
Section Chief	[redacted]	[redacted]	[redacted]

2.8 External Notification

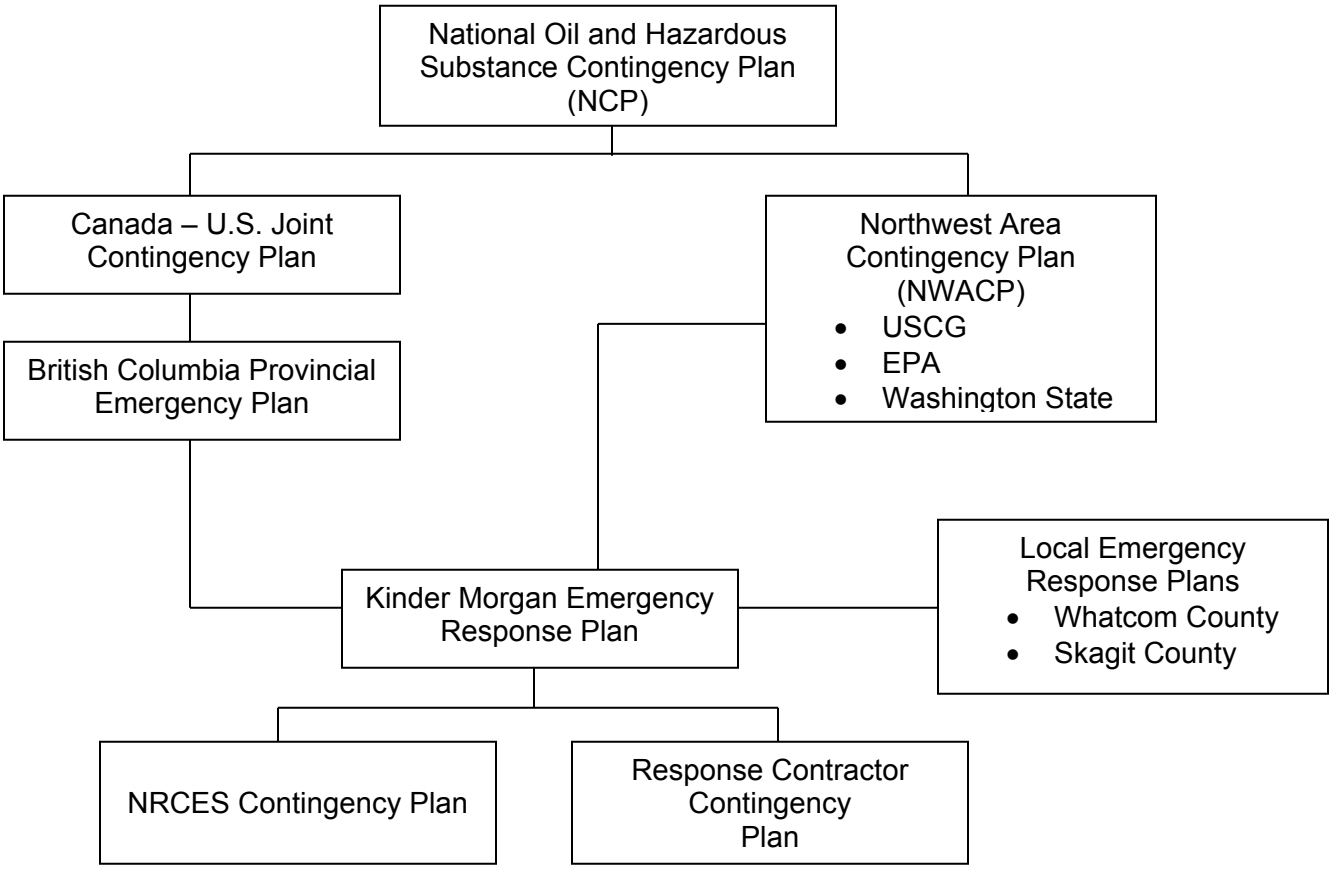
2.8.1 Interface With Other Plans

Kinder Morgan will respond to spills from its pipeline system to the best of its ability. In the event of a worst case spill, Kinder Morgan may require assistance, advice or direction from state and federal agencies regarding shoreline protection and cleanup measures. The relationship of the emergency Response Plan to federal, state and local plans is shown on the chart below.

Kinder Morgan has a contract with National Response Corporation (NRCES), an oil spill primary response contractor in Washington State. The NRCES area of operation includes all of the inland water and marine areas that could be impacted by a spill from the pipeline system.

Kinder Morgan will rely on NRCES to provide response assistance for inland water and marine waters that may be impacted by potential spills from its pipeline system.

The British Columbia Provincial Emergency Program is identified on the following chart due to the possible migration of petroleum from Washington State into Canada should a spill occur from the pipeline system into the Sumas River upstream of the international boundary.



2.8.2 External Notification – Potential Emergency Condition

In the case of a potential emergency condition[1] Washington State Department of Ecology will be contacted as per WAC 173-182-264(2) when any of the following conditions are met:

1. Emergency Shutdown – is an event or situation that could imminently be hazardous to persons, property or the environment. This includes but is not limited to component malfunction or personnel error that could cause a hazard to persons, property or the environment, an operational failure causing a hazardous condition, natural disaster, a terrorist threat, third party damage that could affect pipeline operations, leaks or spills, fires or a response to the activation of an emergency system.

2. Safety Shutdown – is a situation where a pipeline is shutdown due to an emergency or abnormal operating condition along a pipeline, or at a terminal, station or other facility. The automated shutdown of a pipeline due to the activation of a protective device in response to an abnormal operating condition is also considered a Safety Shutdown.

3. Odor Complaint – in the event of multiple complaints and/or a single complaint in conjunction with available operating data, the CCO has a reason to suspect a release of product and decides to do a Safety Shutdown of the pipeline and/or station.

WDOE Reporting Line: (800) 258-5990

The on site supervisor will make contact with the WDOE while investigating the potential spill location(s) prior to the confirmation of an incident to allow WDOE maximum response time possible.

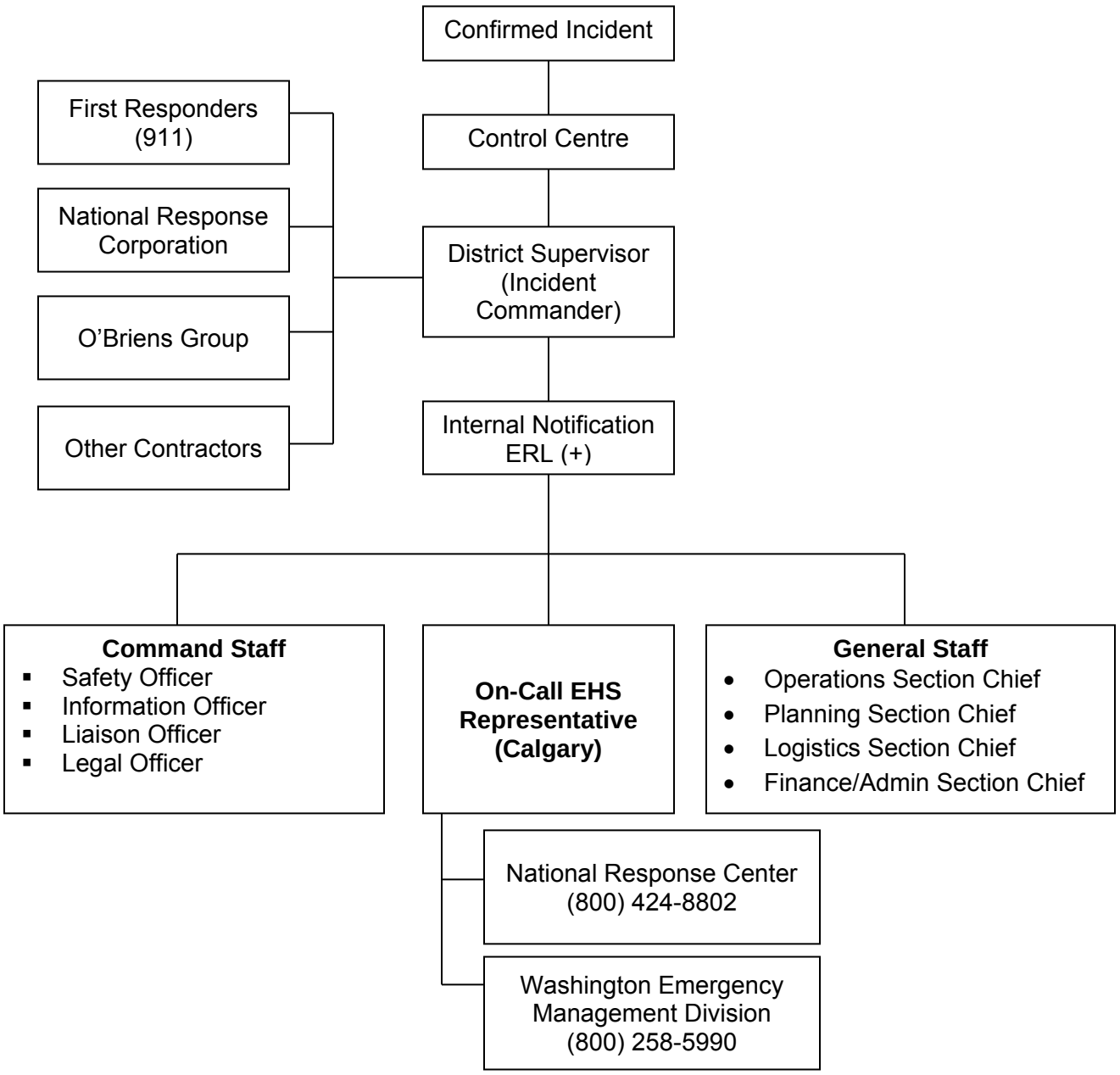
Notes: The CCO has the authority and the responsibility to shutdown a pipeline, station, or terminal during an emergency or as a precaution when in his/her judgment, further operation is unsafe. The CCO will not be faulted for shutting down under these conditions.

An Operator or District Supervisor may request a shutdown as the result of local conditions in response to the investigation of a complaint or regular duties where a release or other abnormal operating condition is suspected. The CCO will comply with the request and initiate the Emergency Condition Response Procedures.

[1] A potential emergency can be defined as a spill of unknown volume, unconfirmed and is adjacent to waters of the state or where there is a pathway to waters of the state, and the environmental conditions, such as rain events or known shallow groundwater make impacts to waters of the state likely.

2.8.3 External Notification Chart – Confirmed Emergency Condition

In the case of a confirmed or known emergency condition the following chart will be used to identify who is to be contacted upon confirmation of the incident.



2.8.4 Initial Notification Requirements – Confirmed Emergency Condition

Kinder Morgan's policy is to make all of the calls directly to ensure that all appropriate government agencies are notified. This would be done by the EHS Department, and/or the on-site representative as needed.

Order of Call	Agency	Reporting Requirements	Comments
District Supervisor/Incident Commander Initial Calls			
1	**911 Call Centre** (911) or (9911 from a company land line)		The local 911 call centre will be notified of any incident to inform the call centre operators of the problem or potential problem so they do not allocate additional unneeded resources to the event.
2	**NRCES** 800-899-4672		Primary Response Contractor to assist with equipment and personnel.
KMC On-Call EHS Representative			
1	**U.S. National Response Center (NRC)** 1-800-424-8802 (24 Hour Number) (Covers PHMSA, EPA and USCG)	The NRC must be notified as soon as possible by telephone of any failure that causes death or injury, results in a fire or explosion, damage exceeds 50,000 US, pollutes any water body or is significant even though it did not meet the criteria of any other paragraph of this section. A report must also be made for any failure that results in a loss of 5 or more US gallons of hazardous liquid.	Use the form on the following page to make the initial report to ensure all known information is included. Following initial report PHMSA requires the F-7000-1 Accident Report Form to be filed electronically. The form and instructions can be found online http://www.phmsa.dot.gov/pipeline/library/forms
2	**Washington State Emergency Management Division** 1-800-258-5990 Northwest Regional Office (WDOE) 1-425-649-7000	All spills are required to be reported to WDOE if it has the potential to impact waters of the state[2] except where the spill is less than 42 Gallons (1 bbl) which does not/cannot impact waters of the state. WAC 173-182-264	State and local authorities must be notified immediately if there is a release of hazardous substances under Superfund Regulations in excess of reportable quantities and which could result in exposure of persons outside the boundaries of the facility site. A follow up written notification is required to the LEPC as soon as practical after the release.

[2] Waters of the State means all lakes, rivers, ponds, streams, inland waters, underground water, salt waters, estuaries, tidal flats, beaches and lands adjoining the seacoast of the state, sewers, and all other surface waters and watercourses within the jurisdiction of the sate of Washington. WAC 173-182-030(67)

2.8.5 Emergency Condition Agency Report Form

Name and Address of Company
Name of Pipeline
Time of Discharge
Location of Discharge
Name of Oil Involved
Reason for Discharge (i.e., Material Failure, Excavation Damage, Corrosion)
Estimated Volume of Discharge
Weather Conditions On-Scene
Actions Taken or Planned by Persons On Scene

2.9 Additional Government Contacts

These agencies may be contacted on an as-needed basis.

Agency	*Contact*
Federal Government – U.S.A.	
National Response Center (NRC)	(800) 424-8802 (202) 267-2675
Occupational Safety & Health Administration (OSHA)	(800) 321-6742
Poison Center Emergency Contact	(800) 222-1222
United States Coast Guard	(800) 424-8802
Federal Government - Canada	
National Energy Board (NEB)	(403) 807-9473
Transportation Safety Board Occurrence Hotline	(819) 997-7887
Washington State Government	
Washington Call Before You Dig	(800) 424-5555
Washington Department of Natural Resources	(360) 902-1000
Washington Emergency Management Agency, Spill Reporting Line and Burn Permits	(800) 258-5990
Northwest Air Pollution Authority	(800) 622-4627
Washington Department of Fish & Wildlife	(360) 534-8233
Washington State Department of Ecology	(425) 649-7000
Washington State Department of Transportation	(360) 676-2100
Washington State Police	911
Provincial Government – British Columbia	
Provincial Emergency Program (PEP)	(800) 663-3456
Skagit County	
Skagit County Emergency Management (LEPC)	(360) 428-3250
Skagit County Sheriff Department	(360) 336-3131 (911)
Skagit Valley Hospital Switchboard	(360) 424-4111
Whatcom County	
Whatcom County Sheriffs Office - Division of Emergency Management (LEPC)	(360) 676-6681 (911)
St. Joseph's Hospital	(360) 734-5400
Lummi Tribe	
Ronald Tso, Chief of Police	(360) 384-2266

2.10 Support Services - Primary Response Contractors (PRC)

Name/Agency	*Services/Personnel*	*Contact*
Washington State Approved - Primary Response Contractors		
National Response Corporation (NRCES)*	• Spill Management Teams and Response Supervisors • Equipment Decontamination and Management • Waste Minimization, Management and Disposal • Contact NRCES for current list of trained individuals.	(800) 899-4672
Global Diving, Salvage Inc	• Provides personnel and equipment for subsurface marine environments, and shoreline cleanup. • Equipment is located in Anacortes, WA • Contact Global for current list of trained individuals	(800) 441-3483
Additional Kinder Morgan Response Contractors		
O'Brien's Group*	• Provides personnel for ICS and expertise currently trained individual lists can be obtained by contacting O'Brien's	(985) 781-0804
Focus Wildlife*	• Provides Wildlife support for Washington State • Contact Focus for current list of trained individuals	(800) 578-3048 (310) 386-5965 (778) 574-1501
Polaris Applied Sciences, Inc*	• Provides SCAT services for Washington State and British Columbia Canada	(425) 823-4841 (206) 369-5686
CTEH*	• Air Monitoring, Air Modeling, environmental sampling, data management and toxicology consulting services.	(866) 869-2834 (317) 473-0688
URS Corporation*	• Environmental Plan development, Field Sampling/support, Data management, waste management, groundwater spills and regulatory support	(206) 438-2700
BAI Environmental Services*	• Provides Vacuum Truck, and other response equipment/personnel	(360) 354-1134 Ivan DeVries Cell (360) 815-0238 Jeff TenPas (360) 815-0270 (360) 354-3822
Baker Tanks*	• Provides temporary storage tanks.	(800) 225-3712 (425) 347-8811

* Contract or letter of intent on file available in Section 19.

** No formal work directive, or letter of intent specific to Trans Mountain (Puget Sound) ULC, however there is an MSA in place covering Kinder Morgan and its subsidiaries for further creation of work directives in the event of an emergency.

2.11 Oil Company Contacts

Name/Office	*Emergency/24-Hour Phone*	*Description*
BP Cherry Point Refinery	(360) 371-1500	The Laurel Station to Ferndale Meter Station and delivers to a BP pipeline that then delivers to the Cherry Point Refinery
Phillips 66 Ferndale Refinery	(360) 384-1011	The Laurel Station to Ferndale Meter Station delivers to the Phillips 66 Ferndale Refinery.
Shell Oil Products Refinery	(360) 293-0800	The Laurel Station to Anacortes Pipeline delivers to the Shell Oil Products Refinery
Tesoro Refinery	(360) 293-9119	The Laurel Station to Anacortes Pipeline delivers to the Tesoro Refinery

2.12 Additional Resources Suppliers

Name	Location	Contact
Equipment/Construction		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		[redacted]
[redacted]	[redacted]	[redacted]
Aviation		

Name	Location	Contact
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
Security		
[redacted]	[redacted]	[redacted]
Transportation		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
Pipeline Repair		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
Waste Management		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
Wildlife Specialists		
[redacted]	[redacted]	[redacted]
Environmental Specialists		
[redacted]	[redacted]	[redacted]

3.0 SPILL/SITE ASSESSMENT

The primary purpose of a spill/site assessment is to evaluate the presence of risk to both incident responders and the public. However, if it is safe to do so, information about the spill should be gathered as quickly as possible in order to evaluate the situation and develop an initial response plan. It might also be possible for the Site Assessment Team to take measures to reduce possible spill impacts.

The nature of Spill/Site Assessments will depend on the product spilled, the spill size and the location (i.e., land, groundwater or marine).

Site Assessment Team members should don half-face respirators for all spill until the nature of the material can be assessed for safety.

Product	Spill Size	Vapor Monitoring	Assessment Team PPE	
			Skin/Eyes	Respiratory
Crude	All	LEL, O_2 and Toxins (see Sections 3.2 - 3.4)		

NOTE: **If vapor levels reach 10% of the LEL, Site Assessment Team members should leave the area immediately**

3.1 Site Assessment Guidelines

3.1.1 Safety Checklist

- Conduct Pre-Entry Safety Checklist
- Remove all non intrinsically-safe radios, pagers, etc.
- Establish communications procedures/schedules
- Don appropriate PPE
- Refer to MSDS
- Determine wind speed and direction
- Determine current direction
- Approach spill from upwind/up current if possible
- Conduct vapor monitoring

3.1.2 Incident Intelligence checklist

- Determine status of any injured personnel
- Determine spill source
- Confirm spilled product (if different, leave the area)
- Determine if source is isolated
- Estimate spill rate/volume
- Determine if product has or will reach the water
- Determine if product has escaped local containment

3.1.3 Incident Mitigation Checklist

- Evacuate and attend to any injured personnel
- Isolate spill source
- Close all valves
- Block escaping product

3.2 Vapor Monitoring on Marine Spills

3.2.1 Pre-Assessment Preparation

A trained team should conduct an initial site assessment from land and, if available and spill impacts water, a second team in a workboat should conduct an assessment. If only one team is available, they will be required to make both assessments. The site assessment team(s) should wear appropriate PPE for the initial site assessment unless specifically instructed otherwise by the Incident Commander. The Incident Commander may downgrade the level of PPE required by the site assessment team if the product and amount spilled are known, and a lesser level of PPE is deemed appropriate.

- Calibrate and check battery charge levels on each air monitoring instrument.
- Complete an *Initial Health and Safety Plan*. Conduct the pre-entry briefing, using the completed *Permit to Work Form* and any other relevant documentation. Select and use the *Gas Testing Certificate* that matches the level of respiratory protection in use by the assessment team.
- Ensure that all air monitoring instruments are well secured and protected from weather. Be careful that any "protection" does not cover any of the meters' ports that require continuous airflow.

3.2.2 Site Assessment Procedures

The on-water team should move toward the spill and stop at an upwind location to make final preparations for the assessment. Air monitoring requires accurate position information. A global positioning system (GPS) is the preferred method for determining positions.

Due to the lack of elevation and the rapid spread of the oil on water, the site assessment team may not be able to accurately judge the spill parameters. Lacking any other guidance, the assessment team must make judgments on where the main body of oil may be, and how to approach it. Vapor readings should be taken frequently.

The survey should continue as long as air monitoring instrument readings remain within acceptable limits, with the objective of (a) obtaining readings across the zone and (b) locating a significant accumulation to provide a "worst case" assessment. A safe and effective site assessment will require caution, persistence and field decisions.

As the assessment team moves toward the oil, or its anticipated location, periodic stops will be made to record results. The team leader must take immediate action if at any time the air monitoring instrument readings meet or exceed “evacuation” levels (see Vapor Monitoring Flowchart - Section 3.4). If “evacuation” levels are met or exceeded, move upwind from the spill and halt the assessment. Notify the Incident Commander.

When sufficient representative locations have been recorded, the air-monitoring phase of the initial spill characterization is complete. The identification of physical, environmental, chemical or other hazards will complete the assessment.

3.3 Vapor Monitoring on Land Spills

3.3.1 Site Assessment Procedures

The team should move toward the area and stop at an acceptable location, preferably upwind, to make final preparations for assessment. The GPS is the preferred method for determining position of air sampling results ashore.

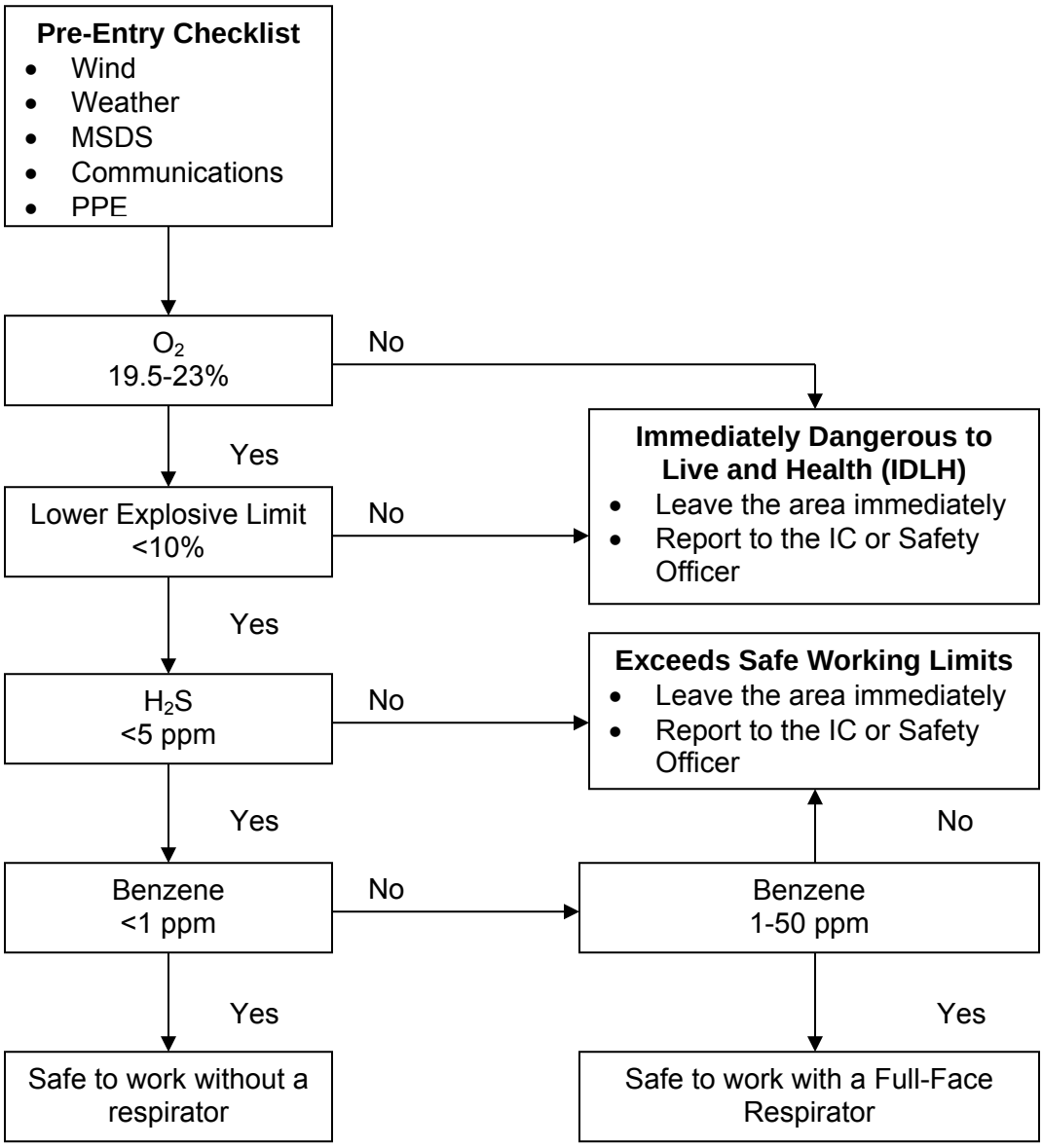
On shoreline assessments, the team will likely have accurate information or visual sightings of the extent of the oil in the zone. Local geography, access roads, and other features may limit the team’s ability to approach the impacted area from upwind. The team must evaluate its options and decide the best approach route. Frequent reading of air monitoring instruments can ensure the safety of the survey party during the approach. The assessment team leader needs to exercise caution and use controls that will best protect the team.

The survey should continue as long as air monitoring instrument readings remain within acceptable limits, with the objective of (a) obtaining readings across the zone and (b) locating a significant accumulation to provide a "worst case" assessment. A safe and effective site assessment will require caution, persistence and field decisions.

The team leader must take immediate action if at any time the air monitoring instrument readings meet or exceed “evacuation” levels. If “evacuation” levels are met or exceeded, move upwind from the spill and halt the assessment. Notify the Incident Commander.

When sufficient representative locations have been recorded, the air-monitoring phase of the initial oil spill characterization is complete. The identification of physical, environmental, or other hazards will complete the assessment.

3.4 Vapor Monitoring Flowchart



Note: This flowchart should be used as a guideline only. If there are any questions about safe working vapor levels, consult the Safety Officer.

3.5 Spill Observation/Assessment/Estimation Factors

3.5.1 Spill Surveillance

The following guideline assists in spill surveillance:

- Surveillance of an oil spill should begin as soon as possible following discovery to enable response personnel to assess spill size, movement, and potential impact locations. Dispatch observers to crossings downstream or down gradient to determine the spills maximum spread.
- Clouds, shadows, sediment, floating organic matter, submerged sand banks or wind-induced patterns on the water may resemble an oil slick if viewed from a distance.
- Use surface vessels to confirm the presence of any suspected oil slicks (if safe to do so); consider directing the vessels and photographing the vessels from the air, the latter to show their position and size relative to the slick.
- Spill surveillance is best accomplished through the use of helicopters or small planes; helicopters are preferred due to their superior visibility and manoeuvrability.
- All observations should be documented in writing and with photographs and/ or videotapes.
- Describe the approximate dimensions of the oil slick based on available reference points (i.e. vessel, shoreline features and facilities); use the aircraft or vessel to traverse the length and width of the slick while timing each pass; calculate the approximate size and area of the slick by multiplying speed and time.
- Record aerial observations on detailed maps, such as topographic maps.
- In the event of reduced visibility, such as dense fog or cloud cover, boats may be used to patrol the area and document the location and movements of the spill, however, this method may not be safe if the spill involves a highly flammable product.
- Surveillance is required during spill response operations to gauge the effectiveness of response operations; to assist in locating skimmers; and assess the spill size, movement, and impact.

3.5.2 Estimating Spill Trajectories

Oil spill trajectories should be estimated in order to predict direction and speed of the slick movement. Trajectory calculations provide and estimate of where oil slicks may impact shorelines and other sensitive areas, and also provide an estimate of the most effective location in which to mobilized spill response resources for protection, containment and recovery.

Oil spill trajectories can be estimated using vector addition or with computer programs such as CAMEO Hand calculations typically utilize the following assumptions:

- Oil moves at approximately the same direction and speed as the water currents, unless the winds are strong.
- Wind speed can be multiplied by 0.034 to determine the effect of winds on speed and direction of spill movement
- The combined effects of winds and currents can be added to estimate spill movement speed and direction.

More sophisticated predictions can be obtained from computer programs. Oil spill trajectory services can be obtained from:

- National Oceanic and Atmospheric Administration (NOAA) through the Federal On-Scene Commander (FOSC)
- Private Consulting Firms

3.5.3 Estimating River/Stream Velocity

Time Required for Stick/Floating Object to go 100 feet (seconds)	Stream Velocity (mph)[1]
136	0.5
68	1.0
45	1.5
34	2.0
27	2.5
23	3.0
19	3.5
17	4.0
15	4.5
14	5.0
11	6.0
10	7.0
9	8.0
8	9.0
7	10.0

Multiply mph x 1.6 to obtain current speed in kilometers per hour (km/ h)

To estimate the total time until recovery can start (in hours):

1. Estimate: the time since the spill occurred
2. Add: the time required to mobilize personnel and equipment to a control point
3. Add: the time to set up

To estimate the distance that the spill has advanced downstream:

1. Take: total time in hours (estimated above)
2. Multiple by: oil slick velocity in mile/ hour

To estimate the location of the front of the oil spill:

1. Determine: location (mile) on stream where spill occurred
2. Subtract: distance (estimate above)
3. To Get: location (mile) of the oil slick when the recovery team is ready

3.5.4 Estimating Spill Volume

If possible the initial assessment should also include an estimate of the volume of oil spilled. Oil volumes can be estimated by multiplying the area of the slick by the average estimated thickness. See below figured for estimating slick thickness.

Appearance	Slick Thickness	Spill Volume
 Barely visible	0.05 μm	50 L/km^2
 Visible as silvery sheen	0.08 μm	80 L/km^2
 First trace of colours	0.15 μm	150 L/km^2
 Bright bands of colour	0.3 μm	300 L/km^2
 Colours begin to turn dull	1 μm	1,000 L/km^2
 Colours are much darker	2 μm	2,000 L/km^2

Early in a spill response, estimation of spill volume is required in order to:

- Report to agencies
- Determine liquid recovery requirements
- Determine personnel and equipment requirements
- Estimate disposal and interim storage requirements.

Some rapid methods to estimate spill size are:

- Transfer operations: Multiply the pumping rate by the elapsed time that the leak was in progress, plus the drainage volume of the line between the two closest valves or isolation points (volume loss = pump rate [bbls/ min] x elapsed time [min] + line contents [bbl])
- Tank overfills: Elapsed time multiplied by the pumping rate
- Visual assessment of the surface area and thickness (note that this method may yield unreliable results):
    - Interpretation of sheen color varies with different observers
    - Appearance of a slick varies depending upon amount of available sunlight, sea-state/turbulence, and viewing angle
    - Different products may behave differently, depending upon their properties.

4.0 SPILL CONTAINMENT AND RECOVERY

The containment of spilled oil will:

- Reduce the spread of slicks and their impacts beyond the property
- Reduce potential impacts to the surrounding environment
- Reduce potential economic impacts
- Maximize the thickness of floating slicks
- Maximize the effectiveness of mechanical countermeasures (i.e., skimmers and sorbents)

Where safety allows, every effort should be made to limit the quantity of released product into adjacent waterways:

- Conduct site assessment (see Section 3.1)
- Act quickly and carefully
- Activate the Emergency Shut Down (ESD) from the Control Centre
- Stop all pumps
- Close all valves
- Block potential escape points using sorbent booms

4.1 Initial Containment Actions

Initial containment actions will focus on utilizing containment on site in the most effective manner to:

- Prevent the oil from impacting water, thereby reduce the surface area and shoreline to be cleaned
- Concentrate the oil (when safe to do so), making physical recovery more efficient
- Limit the environmental impact to the immediate spill area.

Selection of the appropriate location and method will depend upon

- Length of time since the spill occurred
- Amount and type of spilled material
- Area of coverage
- Environmental factors such as wind speed and direction

4.2 Spill Mitigation Procedures

Failure	Procedure
Failure of Transfer Equipment	• Personnel safety is the first priority. Evacuate nonessential personnel or personnel at high risk. • Terminate transfer operations and close block valves. • Drain product into containment areas if possible. • Eliminate sources of vapor cloud ignition by shutting down all engines and motors.
Tank/ Cavern Overfill/ Failure	• Personnel safety is the first priority. Evacuate nonessential personnel or personnel at high risk. • Shut down or divert source of incoming flow to tank. • Transfer fluid to another tank with adequate storage capacity (if possible). • Shut down source of vapor cloud ignition by shutting down all engines and motors. • Ensure that dike discharge valves are closed. • Monitor containment area for leaks and potential capacity limitations. • Begin transferring spilled product to another tank as soon as possible.
Piping Rupture/ Leak (under pressure and no pressure)	• Personnel safety is the first priority. Evacuate nonessential personnel or personnel at high risk. • Shut down pumps. Close the closest block valves on each side of the rupture. • Drain the line back into contained areas (if possible). Alert nearby personnel of potential safety hazards. • Shut down source of vapor cloud ignition by shutting down all engines and motors. • If piping is leaking and under pressure, then relieve pressure by draining into a containment area or back to a tank (if possible). Then repair line according to established procedures.
Fire/ Explosion	• Personnel safety is the first priority. Evacuate nonessential personnel or personnel at risk of injury. • Notify local fire and police departments. • Attempt to extinguish fire if it is in incipient (early) stage. • Shut down transfer or pumping operation. Attempt to divert or stop flow of product to the hazardous area (if it can be done safely). • Eliminate sources of vapor cloud ignition shutting down all engines and motors. • Control fire before taking steps to contain spill.
Manifold Failure	• Personnel safety is the first priority. Evacuate nonessential personnel or personnel at high risk. • Terminate transfer operations immediately. • Isolate the damaged area by closing block valves on both sides of the leak/ rupture. • Shut down source of vapor cloud ignition by shutting down all engines and motors. • Drain fluids back into containment areas (if possible).

4.3 Spills to Land

The penetration of oil into soil depends on a number of factors, including:

- Oil viscosity
- Soil type, wetness, and permeability
- Ground temperature

Normally, the amount of oil in saturated soil will range from 0.1 to 0.3 gallons/ft^3, however, the amount may exceed 0.4 gallons/ft^3 in dry soils, i.e., beneath structures. Also, low viscosity oils will tend to penetrate deeply into coarse sediments. In homogonous soils, the deepest penetration will normally be located below pooled oil. In the event that oil reaches groundwater, the oil will typically move relatively slowly - typically 1.5 to 3 ft/day.

On impermeable ground, immediately block drain inlets, drain tiles, conduits, sewage systems, and pipe/cable ducts (limit the spread to waterways).

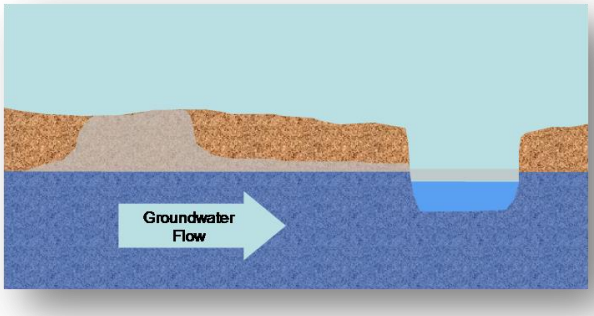
On permeable ground, pump out pooled oil as soon as possible to temporary storage and move contaminated soil to an impermeable surface (HDPE liner).

4.3.1 Interceptor/Trench

The construction of an interceptor/trench requires:

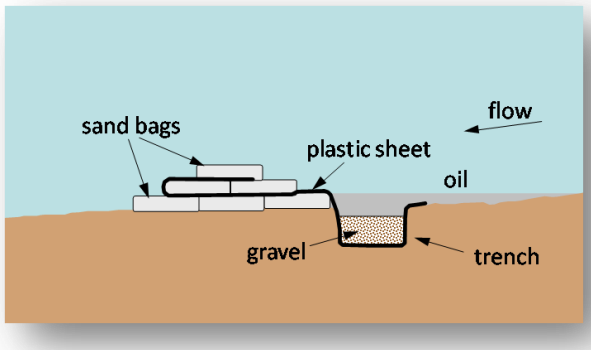
- Excavators/hand tools
- Wood planks (depending on soil type)
- Water pumps

Only use a trench if the water table is less than 10 ft. below ground. Dig the trench approximately 3 ft. below oil level, then reduce the water level in trench about 2 ft.



4.3.2 Trench/Berm

Berms can be built from sorbents, earth, or snow to block the spread of oil. Where time allows, an HDPE liner can be used to line a trench.



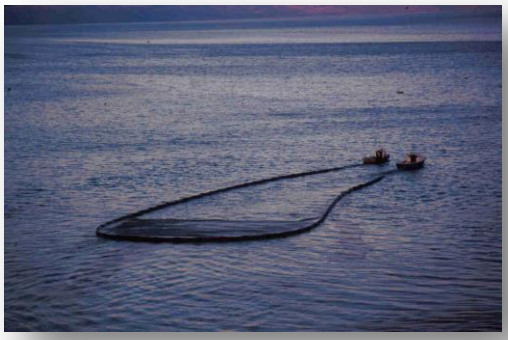
4.4 Open Water Containment

4.4.1 Open Water Booming

In cases where significant amounts of spilled oil enter a lake type environment, it might be necessary to attempt to contain free-floating oil in open water using the U, J or V-booming techniques. This activity will be conducted by NRCES.

4.4.2 U-Booming (Open Water Containment)

A single boom can be towed at a low speed (around 0.5 knots) allowing the oil to collect/concentrate in the apex of the boom. The collected oil can then be towed to a location where conditions allow the mechanical recovery of the oil.



4.4.3 J-Booming

A single boom can be towed at a low speed (around 0.5 knots) allowing the oil to collect/concentrate in the apex.

Once oil is collected, the second vessel drops back and deploys a skimmer into the thickest patches of oil.





4.4.4 V-Booming

Two booms are towed at a low speed (around 1 knot) funneling the oil into the mouth of a skimming vessel.

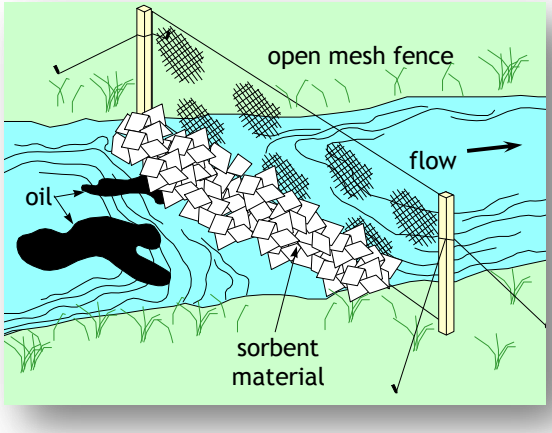
Collected oil is then transferred to a barge or other floating oil storage device. The recovered product could then be transferred to slop oil tanks or to a vacuum truck.

4.5 Spills to Creeks and Rivers

4.5.1 Small Creeks

On spills to small (less than 0.5 ft/sec.) creeks, a board can be placed across the creek in order to block the surface flow. This technique will only work on very low velocity flow creeks.

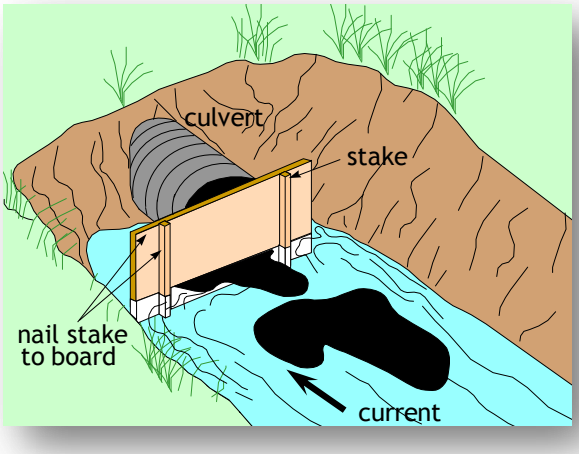




Another option on slowly-flowing creeks and rivers (less than 0.5 ft/sec.) is a filter fence. Chicken wire, or open mesh fence material is placed across the waterway, and sorbent pads of booms are positioned against the fence. Sorbents should be monitored as once they water-wet, they will no longer absorb oil.

4.5.2 Ditches/Culverts

Spills into ditches can be blocked at culverts by placing a plywood board against the culvert opening. The plywood should be nailed to stakes to maintain its position. Also, care should be taken to ensure that the board does not block the water flow under the board into the culvert. The board can be repositioned vertically to reduce/increase the water flow under the board.



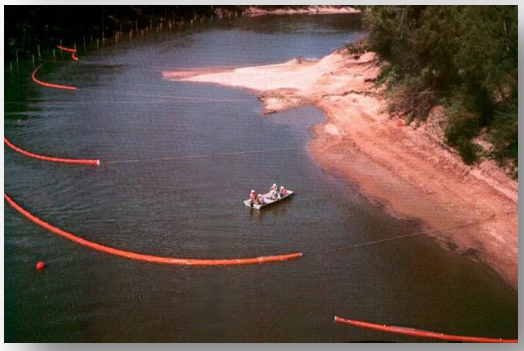
4.5.3 Inverted Weir Dam

On higher-flow creeks and rivers, angled pipes can be placed in sand bag or earthen dams to allow clean water to flow from the bottom (allowing floating oil to be blocked at the surface).

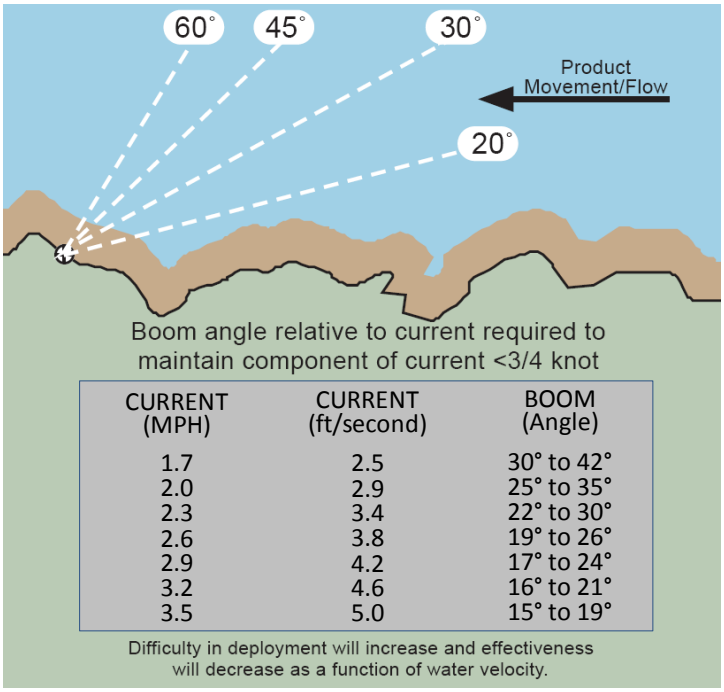


4.5.4 Deflection Booms

On fast-flowing rivers (exceeding 1 knot), booms should be angled in order to deflect floating oil towards shore. In some cases, it might be necessary to use multiple booms. When booming in rivers, take advantage of natural eddies and collection points.



4.5.5 Boom Angles in High Currents



Boom angle relative to current required to maintain component of current <3/4 knot

CURRENT (MPH)	CURRENT (ft/second)	BOOM (Angle)
1.7	2.5	30° to 42°
2.0	2.9	25° to 35°
2.3	3.4	22° to 30°
2.6	3.8	19° to 26°
2.9	4.2	17° to 24°
3.2	4.6	16° to 21°
3.5	5.0	15° to 19°

Difficulty in deployment will increase and effectiveness will decrease as a function of water velocity.

4.6 Spills in Cold Weather

4.6.1 Oil Fate in Cold Weather

Cold weather will have a significant impact on the response. Loss of light ends (weathering) slows down at lower temperatures, which can offset some of the temperature effect on viscosity. The evaporation rate at 41°F is approximately 1/3 of what it is at 86°F. As a result, oils may remain amenable to treatment by recovery or burning for a longer period. Water is at or near its maximum density in near-freezing temperatures. Cold, viscous oil will spread slower providing additional time for response.

4.6.2 Spill Response

Frozen conditions can actually serve to facilitate recovery operations by providing a solid working platform over the oil and by creating natural barriers, which can be used to contain and immobilize oil. Downward-growing ice may quickly encapsulate oil under ice, additionally there may be many under-ice pockets where oil can accumulate in natural depressions, providing access for recovery.

Snow and ice can be used to contain oil. Snow is also an effective sorbent. Equipment such as pumps and hoses must be thoroughly dried after use to minimize residual water that can freeze, causing damage or limiting use.

Any available snow near a spill can be used by forming snow berms to help contain oil and minimize its spreading prior to removal by mechanical means.

4.6.3 Biological Issues in Cold Conditions

Biological recovery on shorelines may be slower, although many organisms grow well at near-freezing temperatures. Biodegradation is likely to stop if shorelines freeze solid. Also, vulnerable times for key sensitivities typically are shorter than in temperate settings. Therefore, planning protective strategies requires specialized teams, and tactics related to shoreline protection.

4.6.4 Trenches and Berms

In cases where spilled oil has pooled on snow and ice, efforts should be made to block the spread of oil using trenches and/or berms.

Where possible, trenches should be lined using a HDPE liner or ice layer, using a water spray.



4.6.5 Oil on Ice



Oil that has pooled on top of ice should be removed as soon as possible using Vac trucks or transfer pumps.

The transfer of highly-viscous weathered oil may be difficult, especially in cold temperatures. In this case,

steam-injected screw auger pumps should be used to transfer oil to temporary storage.

4.6.6 Oil Under Ice

Courtesy BCO

The containment and recovery of oil under ice involves numerous safety and operational issues. The combination of pre-planning and safe practices will increase the likelihood of success.

Ice safety will be assessed immediately prior to flooding and if weather conditions change during the flooding where personnel are required to be deployed on ice.

4.6.7 Ice Augering

On spills under lake ice, or where oil is trapped and/or migrating slowly, ice augering can be used to create pathways for the oil to float to the surface for removal.



4.6.8 Ice Trenching/Slotting

Where safety allows, ice trenching/slotting can be employed in flowing rivers to provide a means of allowing under ice oil to float to the surface for recovery.



Trenches should be angled relative to the water flow to reduce losses due to entrainment. Note that specialized equipment is required to cut trenches and is available in the OSCAR units in Canada.

4.7 Response Tactics for Shorelines

Kinder Morgan and all contractors/consultants will conduct shoreline assessments and clean-up through the appropriate method on a site-specific basis using pre-existing mapping of shorelines and Geographic Response plans, the North West Area Contingency Plan, overflights and SCAT teams. Shoreline protection and clean-up resources are available via Kinder Morgan's contract with NRCES and per Appendix W of the approved PRC application. Additionally Kinder Morgan can meet the requirements of WAC 173-182-510(2) and WAC 173-182-520 by utilizing environmental consultants Polaris and URS. The following table is a summary of shoreline types and response tactics.

Type of Shoreline	Recommended Cleanup Activity
Developed or unforested Land	May require high pressure spraying: • To remove oil. • To prepare substrate for recolonization of barnacle and oyster communities. • For aesthetic reasons.
Freshwater Flat	• These areas require high priority for protection against oil contamination • Cleanup of freshwater flats is nearly impossible because of soft substrate • Cleanup is usually not even considered because of the likelihood of mixing oil deeper into the sediments during clean up effort • Passive efforts such as sorbent boom can be used to retain oil as it is naturally removed.
Fresh marsh	• Marshes require the highest priority for shoreline protection. • Natural recovery is recommended when: ○ a small extent of marsh is affected. ○ as small amount o foil impacts the marsh fringe. • The preferred cleanup method is a combination of low-pressure flushing, sorption, and vacuum pumping performed from boats. • Any cleanup activities should be supervised closely to avoid excessive disturbances of the marsh surface or roots. • Oil wrack and other debris may be removed by hand.
Swamp	• No cleanup recommended under light conditions. • Under moderate to heave accumulations to prevent chronic oil pollution of the surrounding areas placement sorbent along the fringe swam forest may be effective under close scientific supervision. • Proper strategic boom placement may be highly effective in trapping large quantities of oil, thus reducing oil impact to interior swam forests. • Oil trapped by boom can be reclaimed through the use of skimmers and vacuums.

4.8 Recovery

It is Kinder Morgan Canada's policy that, wherever possible, spilled oil be mechanically removed from the environment, using sorbents and/or oil skimmers.

4.8.1 Sorbents

On small spills, sorbent pads should be deployed into the thickest areas of the collected slicks. On heavy oil, the pads should be flipped over to maximize oil recovery. Oil-only pads will water-saturate if left in the water too long. Once pads are oil-soaked, they should be removed using pitch forks, pike poles or debris scoops. Care should be taken when recovering oiled sorbents, i.e., personnel should wear gloves, oil-resistance coveralls and splash goggles.



Sorbent booms can also be used, either to sweep oil within the contained area to increase the oil thickness or they can be positioned, as a liner, inside skirted booms.

Recovered sorbents should be placed in 6 mil poly bags, with the bag weight limited to 25 - 30 lbs. Bags should then be sealed and then double-bagged and placed in lined bins to avoid secondary contamination.

4.8.2 Skimmers

Where pooled oil is concentrated in sufficient quantities, mechanical skimmers should be used. This activity, would focus on areas where oil has collected, either in down-wind/current boom pockets or in near-shore boom pockets. Where possible, recovery efforts should be mounted where recovered oil could be stored temporarily on shore.



4.8.3 Cleanup Techniques – Removal

Technique	Description	Recommended Equipment	Applicability	Potential Environmental Impacts
Manual Removal	Hand tool (scrapers, wire brushes, shovels, cutting tools, wheel barrows, etc.) are used to scrape oil off surfaces or recover oiled sediments, vegetation, or debris where oil conditions are light or sporadic and/ or access is limited.	Equipment misc. hand tools Personnel 10-20 workers	• Can be used on all habitat types • Light to moderate oiling conditions for stranded oil or heavy oils that have formed semi-solid to solid masses • In areas where roosting or birthing animals cannot or should not be disturbed.	• Sediment disturbance and erosion potential.
Mechanical Removal	Mechanical earthmoving equipment is used to remove oiled sediments and debris from heavily impacted areas with suitable access.	Equipment motor grader, backhoe, dump truck elevating scrapers Personnel 2-4 workers plus equipment operators	• On land, wherever surface sediments are accessible to heavy equipment • Large amounts of oiled materials.	• Removes upper 2 to 12 inches of sediments.
Sorbent Use	Sorbents are applied manually to oil accumulations, coatings, sheens, etc. to remove and recover the oil.	Equipment misc. hand tools misc. sorbents Personnel 2-10 workers	• Can be used on all habitat types • Free-floating oil close to shore or stranded on shore, secondary treatment method after gross oil removal • Sensitive areas where access is restricted.	• Sediment disturbance and erosion potential • Trampling of vegetation and organisms • Foot traffic can work oil deeper into soft sediments.
Vacuum/ Pumps/ Skimmers	Pumps, vacuum trucks, skimmers are used to remove oil accumulations from land or relatively thick floating layers from the water.	Equipment 1-2 50- to 100-bbl vacuum trucks w/ hoses 1-2 nozzle screens or skimmer heads Personnel 2-6 workers plus truck operators	• Can be used on all habitat types • Stranded oil on the substrate • Shoreline access points.	• Typically does not remove all oil • Can remove some surface organisms, sediments, and vegetation.

4.8.4 Cleanup Techniques - Washing

Technique	Description	Recommended Equipment	Applicability	Potential Environmental Impacts
Flooding	High volumes of water at low pressure are used to flood the oiled area to float oil off and out of sediments and back into the water or to a containment area where it can be recovered. Frequently used with flushing.	Equipment 1-5 100- to 200-gpm pumping systems 1 100-ft perforated header hose per system 1-2 200-ft containment booms per system 1 oil recovery device per system Personnel 6-8 workers per system	• All shoreline types except steep intertidal areas • Heavily oiled areas where the oil is still fluid and adheres loosely to the substrate • Where oil has penetrated into gravel sediments • Used with other washing techniques.	• Can impact clean downgradient areas • Can displace some surface organisms if present • Sediments transported into water can affect water quality.
Flushing	Water streams at low to moderate pressure, and possibly elevated temperatures, are used to remove oil from surface or near-surface sediments through agitation and direct contact. Oil is flushed back into the water or a collection point for subsequent recovery. May also be used to flush out oil trapped by shoreline or aquatic vegetation.	Equipment 1-5 50- to 100-gpm/ 100-psi pumping systems with manifold 1-4 100-ft hoses and nozzles per system 1-2 200-ft containment booms per system 1 oil recovery device per system Personnel 8-10 workers per system	• Substrates, riprap, and solid man-made structures • Oil stranded onshore • Floating oil on shallow intertidal areas.	• Can impact clean downgradient areas • Will displace many surface organisms if present • Sediments transported into water can affect water quality • Hot water can be lethal to many organisms • Can increase oil penetration depth.
Spot (High Pressure Washing)	High pressure water streams are used to remove oil coatings from hard surfaces in small areas where flushing is ineffective. Oil is directed back into water or collection point for subsequent recovery.	Equipment 1-5 1,200- to 4,000-psi units with hose and spray wand 1-2 100-ft containment booms per unit 1 oil recovery device per unit Personnel 2-4 workers per unit	• Bedrock, man-made structures, and gravel substrates • When low-pressure flushing is not effective • Directed water jet can remove oil from hard to reach sites.	• Will remove most organisms if present • Can damage surface being cleaned • Can affect clean down gradient or nearby areas.

4.8.5 Cleanup Techniques – Dispersant

This checklist is intended to aid the Unified Commander (UC) in reaching a decision on whether the use of dispersants is the best course of action for potential or actual oil spill mitigation. It also provides a familiar listing of data to all Regional Response Team (RRT) members involved with the decision to allow the use of dispersants. The following sequence of events should normally be followed for an oil spill in which the UC wishes to use dispersants.

The decision to use dispersants must be made as soon as possible after a spill occurs before substantial weathering takes place or the oil has spread. Therefore, early in the spill response the UR should evaluate the potential use of dispersants. If the UC feels the potential for dispersant use exists, he/she should have their staff gather the information necessary to complete the dispersant checklist. He/she also should request RRT activation to prepare the RRT for review.

If upon completion of the dispersant checklist the UC decides the use of dispersants in the best course of action the checklist information should be passed to the RRT for final decision on its use.

The following steps should be utilized in deciding if the use of dispersants will be required. (An immediate threat to life which can be substantially lessened by the use of dispersants pre-empts the following matrix by the UC).

Dispersant applications in the region will be monitored as a general practice The UC is responsible for designating monitors. The Pacific Strike Team may serve as monitors when available. There are two criteria suggested: required and desirable.

Compilation of Data	
(1) Spill data	
	(a) Circumstances (fire, grounding, collision, etc):
	(b) Time/Date of incident:
	(c) Type of oil product:
	(d) List bulk chemicals carried and their volumes:
	(e) Volume of product released:
	(f) Total potential of release:
	(g) Type of release (instantaneous, continuous, intermittent etc)
(2) Characteristics of the spilled oil	
	(a) Specific gravity:
	(b) Viscosity:
	(c) Pour point:
	(d) Volatility (flash point):
	(e) Relative toxicity:
(3) Weather and water condition/forecasts	
	(a) Air temperature, wind speed, direction:
	(b) Tide and current information:
	(c) Sea conditions:
	(d) Water temperature and salinity:
	(e) Water depth and depth of mixed layer:
(4) Trajectory information	
	(a) 48 hour oil trajectory forecast:
	1. Surface area slick:
	2. Expected areas of landfall:
	(b) 48-hour dispersed oil trajectory forecast:

Compilation of Data	
	1. Oil movement in water column:
	2. Surface oil movement in water column:
	3. Concentrate of dispersant/oil mixture in water column:
(5) Characteristics of available dispersants	
	(a) Characteristics of available dispersants
	Product 1 Product 2 Product 3
	1. Name
	2. Manufacturer
	3. When available
	4. Location(s)
	5. Amount available
	6. Type of containers
	7. Characteristics
	a. Toxicity
	b. Effectiveness
	c. Reactions
	d. Applicability to spilled oil
	e. Other
	8. Application methods
	9. Miscellaneous
	(b) Type of transportation and dispersing equipment:
	Company 1 Company 2 Company 3
	1. Name
	2. Location
	3. Time to arrive
	4. Equipment available
	5. Other
(6) Info about available dispersant and dispersing equipment	
	(a) Name of proposed dispersant on EPA and State acceptance lists:
	(b) Type: (self-mix, concentrate, etc)
	(c) Proposed application methods and rates:
	(d) Efficiency under existing conditions: (% dispersed and volume dispersed)
	(e) Location of the area to be treated:
	(f) Surface area of slick treatable in scheduled time period:
	(g) Estimated time interval between dispersant application and sensitive environments/resources:
(7) Comparison of effectiveness of conventional cleanup methods vs. the use of dispersants:	
	(a) Containment at the source:
	(b) Shoreline protection strategies:
	(c) Shoreline cleanup strategies:
	(d) Time necessary to execute response:
(8) Habitats and resources at risk	
	(a) Shoreline habitat type and rea of impact:
	Dispersant treated spill Untreated spill
	1.
	2.
	3.

Compilation of Data	
	4.
	(b) Resources
	Dispersant treated spill Untreated spill
	1. Endangered/threatened species (state and federally designated)
	2. Critical habitats for the above species
	3. Marine animals (pupping, migration) 1
	4. Waterfowl use (nesting, migration)
	5. Shellfish (spawning, harvesting)
	6. Finfish (spawning, release migration, harvest)
	7. Commercial use (aquaculture, water intakes, etc)
	8. Public use areas (parks, marinas, etc)
	9. Other resources of specific significance
(9) Economic Considerations	
	(a) Costs of dispersant operation:
	(b) Cost of conventional containment and protection:
	1. With dispersant use
	2. Without dispersant use
	(c) Cost of shoreline cleanup: (cost per barrel x number of barrels reaching the shoreline)
	1. With dispersant use
	2. Without dispersant use

Recommendation to the RRT	
(1) Possible options:	
	(a) Do not use dispersants
	(b) Use dispersants on trial basis, but not as control/clean up technique
	(c) Disperse in limited or selected areas
	(d) Disperse to the maximum extent possible with accepted methods and available equipment
(2) Other recommendations/rational:	

Consequences of a dispersant application decision	
	(1) Will application of dispersant remove a significance amount of the slick from the surface of the water?
	(2) Can the extent or location of shoreline impacts be altered in a positive manner?
	(3) Can the damage to endangered or threatened species, marine mammals and waterfowl be lessened?
	(4) Will the damage to habitats and resources resulting from chemical dispersion be less than those resulting without chemical dispersion?
	(5) If recreational, economic and aesthetic considerations are higher priority than natural resource considerations what is the most effective means of their protection?

Dispersant Monitoring	
Required	
(1) Records	
	(a) Dispersant brand
	(b) Equipment and methods used in application
	(c) Dilution of dispersant prior to application, if any
	(d) Rate of application (gallons per acre, dispersant to oil ratio)
	(e) Times and area of application
	(f) Tracts of vessels or aircraft during application
	(g) Wind and wave conditions during application
Effectiveness:: Visual and photographic documentation, by qualified observers of:	
	(a) Oil before and after dispersant application and
	(b) Re-surfacing of dispersed oil.
Environmental Impacts: Visual and photographic surveys of:	
	(a) The extent of shoreline impact by dispersed and undispersed oil
	(b) Mortality or abnormal behavior by fish, birds or mammals.
Desirable	
(1) Effectiveness: Sampling of the water beneath the oil slick and the oil and dispersant combination to determine the level of petroleum hydrocarbons in the water. This sampling could include “in-situ” measurements or sample collection for layer analysis.	
(2) Environmental impacts:	
	(a) Comparison of shoreline areas impacted by oil and oil and dispersant mixtures
	(b) Analysis of oil concentrations in sediments under dispersed oil
	(c) Investigation of water column organisms for signs of adverse impacts due to dispersed oil
	(d) Collection and analysis of birds affected by dispersants or dispersants and oil mixtures.

4.8.6 Cleanup Techniques – In-Situ Treatment

Technique	Description	Recommended Equipment	Applicability	Potential Environmental Impacts
Sediment Tilling	Mechanical equipment or hand tools are used to till lightly to moderately oiled surface sediments to maximize natural degradation processes.	Equipment 1 tractor fitted with tines, dicer, ripper blades, etc. or 1-4 rototillers or 1 set of hand tools Personnel 2-10 workers	• Any sedimentary substrate that can support heavy equipment • Sand and gravel beaches with subsurface oil • Where sediment is stained or lightly oiled • Were oil is stranded above normal high waterline.	• Significant amounts of oil can remain on the shoreline for extended periods of time • Disturbs surface sediments and organisms.
In Situ Bioremediation	Fertilizer is applied to lightly to moderately oiled areas to enhance microbial growth and subsequent biodegradation of oil.	Equipment 1-2 fertilizer applicators 1 tilling device if required Personnel 2-4 workers	• Any shoreline habitat type where nutrients are deficient Moderate to heavily oiled substrates After other techniques have been used to remove free product on lightly oiled shorelines Where other techniques are destructive or ineffective.	• Significant amounts of oil can remain on the shoreline for extended periods of time • Can disturb surface sediments and organisms.
Log/ Debris Burning	Oiled logs, driftwood, vegetation, and debris are burned to minimize material handling and disposal requirements. Material should be stacked in tall piles and fans used to ensure a hot, clean burn.	Equipment 1 set of fire control equipment 2-4 fans 1 supply of combustion promoter Personnel 2-4 workers	• On most habitats except dry muddy substrates where heat may impact the biological productivity of the habitat • Where heavily oiled items are difficult or impossible to move • Many potential applications on ice.	• Heat may impact local near-surface organisms • Substantial smoke may be generated • Heat may impact adjacent vegetation.
Natural Recovery	No action is taken and oil is allowed to degrade naturally.	None required	• All habitat types • When natural removal rates are fast • Oiling is light • Access is severely restricted or dangerous to cleanup crews • When cleanup actions will do more harm than natural removal.	• Oil may persist for significant periods of time • Remobilized oil or sheens may impact other areas • Higher probability of impacting wildlife.

4.8.7 Cleanup Techniques - Decanting

Large quantities of oily fluids can be generated during an oil spill response. These fluids include the products of skimming and vacuuming operations, and usually contain some amount of water. Oil recovery operations can only continue as long as there is place to store the recovered fluids, as such when the field storage capacity is reached, skimming/recovery operations must then cease until additional storage is available.

Decanting is an option for increasing on-site storage capacity by removing the water once the liquids have separated. Separation may occur through the use of on-site vacuum trucks equipped with separator equipment or by allowing the collected fluids to sit in a quiescent state long enough to separate. The separated water can then be siphoned out back to the collection point thus freeing up storage capacity.

The criteria for decanting are outlined below:

- All equipment intended for use in a decanting operation should be inspected to insure that it contains no harmful chemicals from prior use, and cleaned if necessary;
- All decanting should be done in a designated response are within a collection area, skimmer collection well, recovery belt, weir area, or directly in front of a recovery system
- Vessels or operations employing booms with skimmer sin the apex of the boom should decant forward of the skimmer;
- All vessels, motor vehicles and other equipment not equipped with an oil/water separator should allow adequate retention time for oil held in internal or portable tanks before decanting commences
- A containment boom should be deployed around the collection area to minimize potential loss of decanted oil;
- Visual monitoring of the decanting area shall be maintained so that discharge of oil in the decanted water is detected promptly; and
- Records of volumes of oily water processes and il recovered should be maintained

NOTE: Decanting requires regulatory approval.

4.9 Credit for Oil Recovery

If oil is spilled into Washington State waters Kinder Morgan may receive credit for oil that has been recovered. Please see the following pages with information on how to receive this credit and the process of applying for the credit.

Washington Oil Spill Compensation Schedule

Credit for Oil Recovery

From Ecology's Spill Prevention, Preparedness, and Response Program

If you spill oil into state waters, you can receive credit for any oil you recover, IF you follow these guidelines. The volume of oil you recover can directly and significantly affect the amount of the Resource Damage Assessment (RDA) claim made against you. Following these guidelines will make estimating the volume of oil recovered generally simple and cost effective, even for small spills.

1) Weighing is the easiest and least expensive method for determining the volume of oil recovered in absorbent material. Keep an accurate record of the size and number of each type of absorbent materials used because you must be able to determine how much the material weighed before it absorbed the oil. For recovery credit purposes, you do not need to extract the oil from the absorbent material by compression (squeezing) or washing.

2) Place oiled absorbent material in doubled plastic bags so the recovered oil does not leak out or evaporate. Keep absorbent material (pads, sweeps, booms, etc.) separate from other material (garbage, PPE, oiled debris, etc.).

3) Keep track of the length of time the absorbent materials are left in the water. This will help to estimate the amount of water absorbed.

4) Keep the water content as low as possible by allowing surface water to drain off absorbent material before placing it in the bags. Keep the bags closed as much as possible when working in the rain. Close lids on dumpsters to keep out rainwater.

5) In order to receive recovery credit, the oil must be recovered within 24 hours of the time oil first spills into state waters. Keep oil recovered within the first 24 hours separate from oil recovered after that time.

6) You cannot receive credit for oil recovered from areas other than water, such as soil, vegetation, road surfaces, ship decks, etc. Keep oil recovered from water separate from oil recovered from other areas.

7) Store primary and secondary recovery liquids separately. (See attached guidelines for definitions).

8) Do not collect or store recovered oil in tanks or vacuum trucks containing oil from other sources. Do not put oil from other sources into tanks or vacuum trucks containing recovered oil.

9) Oil collected in tanks or vacuum trucks must be allowed to physically separate from any water. The recovered oil volume must be derived using volumetric methods. You cannot use an estimate of the percent of oil in a tank or truck to derive recovery volume.

May 2004 ECY-050-49

Washington Oil Spill Compensation Schedule Credit for Oil Recovery
RDA COMMITTEE RESOLUTION 96-1.1

Adopted May 8, 1996 (Revised May12, 2004)

Intent: The RDA Committee recognizes that early containment and recovery of oil from the environment directly reduces the expected natural resource injuries caused by a spill. In order to acknowledge this fact in the compensation schedule, the RDA Committee developed the following credit provision. The credit reflects the direct avoidance of persistence effects, and likely reduction in mechanical effects, of each gallon of oil **recovered from the water within 24 hours of the time oil first spills into state waters**. The credit also recognizes that the acute impacts of oil in the water column begin immediately and are not sufficiently avoided even by rapid recovery efforts to warrant reduction under the compensation schedule.

Relationship to Other Resolutions: This resolution supersedes Resolution 95-1.

Credit Provision: Formula A shown below shall be used in compensation schedule applications to provide credit for the volume of spilled oil recovered from the water by responders within 24 hours, for any incident which meets the following criteria:

1) Recovered oil is stored and measured in accordance with the attached guidance document, and recorded on the attached data sheet;

2) Oil spilled to water is contained and recovered inside primary containment and within 1,000 feet of either the spill source or the point where the oil first enters state waters (Primary Recovery Liquids).

Formula A: Pursuant to the calculation of damages under WAC 173-183-830(3), WAC 173-183-840(2), WAC 173-183-850(2), and WAC 173-183-860(2), the mechanical injury and persistence components shall be multiplied by the difference between the spill-to-water volume and the total volume of oil recovered from the water by spill responders within 24 hours, such that:

Damages($) = Scaling coefficient * [(SVS_{at}*Oil_{at}*Spill to water volume) + ($SVS_{mi}$$Oil_{mi}$*{ Spill to water volume-Total 24 hour recovery volume}) + (SVS_{per}*Oil_{per}*{ Spill to water volume -Total 24 hour recovery volume})]

If criterion 1 above is met but criterion 2 is not, Formula B shall be used to provide credit for the volume of spilled oil contained and recovered inside primary containment (Primary Recovery Liquids), which is applied to the Mechanical Injury portion of the calculation. The volume of any other oil recovered from the water within 24 hours (Secondary Recovery Liquids) is added to the Primary Recovery Liquids volume and credit for the total volume recovered from the water is applied to the Persistence portion of the calculation.

Formula B: Pursuant to the calculation of damages under WAC 173-183-830(3), WAC 173-183-840(2), WAC 173-183-850(2), and WAC 173-183-860(2), the mechanical injury component shall be multiplied by the difference between the spill to water volume and the Primary Recovery Liquids volume, and the persistence component shall be multiplied by the difference between the spill volume to water and the total volume of oil recovered by spill responders within 24 hours of the time oil first spills into state waters (Primary Recovery Liquids plus Secondary Recovery Liquids), such that:

Damages($) = Scaling coefficient * [(SVS_{at}*Oil_{at}* Spill to water volume) + ($SVS_{mi}$$Oil_{mi}$*{ Spill to water volume-Primary Recovery Volume}) + (SVS_{per}*Oil_{per}*{ Spill to water volume-Total 24 hour recovery volume})] .

This provision applies to all compensation schedule applications which occur after the adoption date of this resolution. Criterion 1 does not apply to spills for which the preassessment screening occurred before the adoption date of this resolution.

Washington Oil Spill Compensation Schedule Credit for Oil Recovery
GUIDELINES

The following guidelines define how recovered oil must be handled, stored, and measured in order to receive credit under the Oil Spill Compensation Schedule. Given the scope of this credit, the guidelines focus on oil and oil-water mixtures recovered within 24 hours of the time oil first enters state waters. The state on-scene coordinator must confirm on the attached documentation form that these guidelines were met.

1. Definitions

- Primary recovery liquids: Oil and oil-water mixes recovered from the water inside the primary containment boom, and within 1,000 feet of either the spill source or the point where oil first spills into state waters, within 24 hours of the time oil first enters state waters.

- Secondary recovery liquids: Any other oil and oil-water mixes recovered from the water within 24 hours of the time oil first enters state waters.

2. General Guidelines

- The volume of primary recovery liquids and secondary recovery liquids shall be measured and recorded on the attached data form. Measurements must be reviewed and accepted by the state/federal OSC or their designee. Primary recovery liquids and secondary recovery liquids shall each be stored separately from each other and from all other materials collected during the spill response (such as oil recovered directly from the spill source) until such time that these measurements are completed.

- Primary and secondary recovery liquids should be stored in containers which have been verified as empty. If it is necessary to use a storage container which already contains water and/or petroleum products, the contents of that container must be identified and properly measured prior to the addition of primary or secondary recovery liquids.

3. Measurement Guidelines – Skimmers//Vacuum Trucks

- The volume of primary and secondary recovery liquids recovered by skimmers and vacuum trucks must be derived from volumetric methods rather than from estimates of removal performance.

- The percentage of oil contained in oil-water mixtures (including emulsions) recovered from the water shall not be measured until debris has been removed and the components have been allowed to physically separate.

4. Measurement Guidelines – Sorbents (boom, pads, etc.) and other oiled materials

- The volume of primary and secondary recovery liquids recovered from sorbents and other oiled materials must be derived from one of the following methods rather than from estimates of removal performance:

  1. **Volumetric:** Liquid shall be extracted from materials by compression or washing. The recovered oil-water mixture shall be measured as described above for skimmers/vacuum trucks.

  2. **Gravimetric:** Weighing of sorbents and other oiled materials shall take into account the pre-oiled weight of the material itself, any absorbed water, and accumulated debris. Density of the recovered oil shall be measured and used to convert the weight of the oil component into a volume.

Rather than measuring all applicable recovered sorbents and other oiled materials, representative sampling and statistical analysis may be used to estimate the volume of primary and secondary recovery liquids if that analysis meets the attached criteria.

Sampling and statistical analysis of recovered sorbents and other oiled materials

Measurement of each and every sorbent recovered during the first 24 hours is often infeasible for larger spills. In such cases, measuring a representative sample of oiled materials is the most effective way to estimate the total recovery. Unfortunately, many sampling and statistical analysis methods - some quite complex - could apply to this effort. Each requires assuming or knowing certain things about the total population of oiled materials from which representative samples are being drawn. For example, does the population follow a normal distribution? How much variance is expected? These attributes will largely be unknown and vary among spills. As a result, it is not practical to provide a "cookbook" approach to collecting and analyzing sample data for oil recovery. In fact, it is difficult to even prescribe acceptable margins of error. Therefore, the below guidelines simply set forth some basic sampling and analysis principles designed to control sampling error and avoid highly complex statistical analyses which would require extensive review. The responsible party must determine which sampling methods, sample sizes, and data analysis methods are most appropriate and provide written justification for those decisions. If a spill presents unusual or complex sampling issues, the responsible party is encouraged to seek approval of a sampling and analysis plan from Ecology staff before beginning to collect data.

Sampling

- Sample sets should be unbiased and representative of the total population. For example, sampling should be random without replacement and represent materials recovered during the entire first 24 hours of the spill event. The responsible party shall document in writing how they determined that the sample sets are unbiased representations of the total population.

- Sample sets should only be composed of like materials. For example, sorbent pad data should be collected and analyzed separately from sorbent boom data.

Two sample sets should be collected for each type of oiled material. The responsible party should determine the most appropriate test for determining sample size and justify that test in writing (e.g., citation of an equation from an acknowledged authority). At a minimum, the sample size for each set should be equal and large enough to be 80% certain (i.e., power $[1-\beta] = 0.80$) of detecting no greater than a 5% difference between the two sample means at the 5% level of significance (i.e., $\alpha = 0.05$). Most general statistics textbooks include equations for estimating required sample sizes, many using an iterative process and involving an estimation of expected variance. If an equation requires estimation of an expected variance or coefficient of variation, the estimate should be appropriate for the oil type, recovery material, and environmental conditions involved.

Analysis

- The total number of units in the population being sampled should be counted (an estimate may be acceptable under certain conditions if justified in writing).

- Once a sufficient sample size has been achieved, a mean volume of primary or secondary recovery liquids per unit of oiled material (e.g., # of gallons per sorbent pad) should be calculated for each sample set. The average of the two mean volumes should then be multiplied by the total number of units in the population in order to extrapolate the total recovery volume.

- Analysis of sampling data should result in an exact recovery volume as well as a range of volumes based on standard deviations from the mean.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Washington Oil Spill Compensation Schedule Credit for Oil Recovery

Recovered Oil Data Form

From Ecology's Spill Prevention, Preparedness, and Response Program

Spill Date: _____ Spill Source: _____

Total gallons spilled (current estimate) _____ Oil Type (one per page): _____

	Skimmer & Vacuum Truck Recovery	
	Primary Recovery Liquids[1]	Secondary Recovery Liquids[2]
Where was recovered oil stored[3]:		
Total gallons oil & water recovered from water:		
Total gallons of water separated from recovered mixture:		
Total gallons of oil recovered:		

	Sorbents & Other Oiled Materials	
	Primary Recovery Liquids[1]	Secondary Recovery Liquids[2]
Where was recovered oil stored[3]:		
Volumetric: Total gallons oil & water collected:		
Total gallons of water separated from recovered mixture:		
Total gallons of oil collected[4]:		
Gravimetric: Total weight of oiled materials:		
Total weight of pre-oiled materials, water, and debris:		
Total weight of recovered oil:		
Density of recovered oil:		
Total gallons of oil collected[4]:		
Total Recovered Oil (Gallons)		

[1] *Oil and oil-water mixes recovered from the water inside the primary containment boom, and within 1,000 feet of either the spill source or the point where oil first spills into state waters, within 24 hours of the time oil first enters state waters.*
[2] *Any other oil and oil-water mixes recovered from the water within 24 hours of the time oil first enters state waters.*
[3] *If not stored in empty container, record types/quantity of existing container contents (attach pages as needed).*
[4] *If calculated using samples and statistical analysis, attach documentation.*

Preparer's Name: _____ Organization: _____

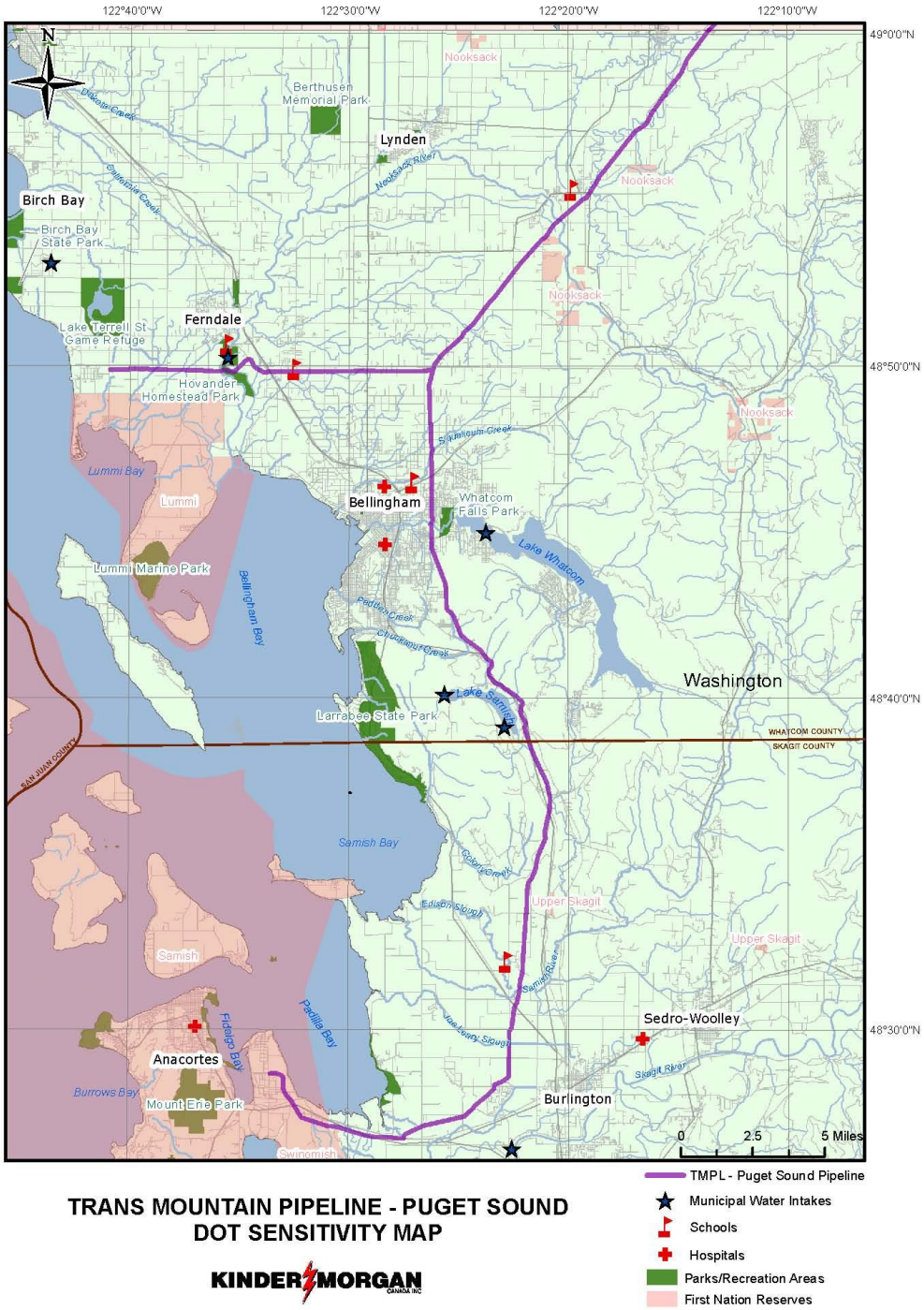
I attest that the above information is accurate to my best knowledge: _____
(signature)

I accept the above information: _____ _____
(signature of state OSC) (date)

If you require this document in alternative format, please contact the Spills Program at (360) 407-7455 (Voice) or (TTY) at 711 or 1-800-833-6388.

5.0 PROTECTION OF SENSITIVE AREAS

Where safety allows, various techniques can be used to protect sensitive areas. Careful consideration of the oil and shoreline types must be given before decisions are made. This will be done through the Environmental Unit with oversight by Federal and/or State Regulatory Agencies. The following map identifies Department of Transportation sensitivities such as Municipal Water Intakes, Schools, Hospitals, Parks, Recreation Areas and First Nation Reserves.



TRANS MOUNTAIN PIPELINE - PUGET SOUND DOT SENSITIVITY MAP

KINDER MORGAN CANADA INC.

5.1 Area Description

There are environmentally and economically important sites in the vicinity of this pipeline. During a spill event the presence or absence of cultural resources is determined by the Environmental Unit. Regulatory agencies will assist with the identifying of any cultural resources at risk from spills at the time of a spill event.

The marine and estuarine waters within the San Juan Islands and Puget Sound are among the most biologically rich and sensitive areas of the State of Washington. A wide diversity of shoreline and marine habitats (estuaries, rocks, reefs and islands), abundant food resources and exceptional water quality all contribute to making this area especially valuable to wildlife.

This region contains a number of small to medium-sized seabird nesting colonies, a multitude of marine mammal breeding and resting sites, rearing and feeding habitat for marine fish and one of the most impressive arrays of marine invertebrates in the world. The region is also a temporary home to many species of marine birds and mammals that are seasonal residents or pass through the area during migration. Flight restriction zones exist in the area to protect sensitive wildlife species.

In addition to this manual there is a Field Handbook and Control Points Manual which identifies control points and access points to water bodies for equipment deployment to prevent migration of oil downstream. In Sections 9 and 10 there is additional information in regards to available equipment. Section 13 has additional information for Wildlife Operations.

5.1.1 Marine Mammals

Common species of whales and dolphins found within the area include gray whale, orca, Dall's porpoise and harbor porpoise. In addition, the harbor seal is a permanent resident of the area. Three addition species occur as regular seasonal residents or migrants: the Steller sea lion, California sea lion and the northern elephant seal. Although relatively few Steller sea lions are found in this area, this species is of special concern because it is listed as a 'State Threatened Species'. This region also supports a large population of river otters which are largely marine in their habits.

The islands, nearshore rocks and beaches of the region provide pupping and resting sites for harbor seals. The largest concentrations are found in the vicinity of Boundary Bay and Padilla Bay. Other smaller sites are scattered throughout the entire area. Nearshore waters are also used as feeding areas by seals, seal lions, gray whales, harbor porpoise and river otters.

5.1.2 Birds

Many species of marine birds and shorebirds are either residents or seasonal visitors with this area. Much of the seabird nesting is scattered throughout the region on offshore rocks, exposed rocky coasts or on pilings.

Bald eagles and peregrine falcons nest in the area and are closely associated with the marine ecosystem because of their feeding habits and choice of resting sites. These birds are either listed as threatened or endangered and are therefore of particular concern. This area hosts a large wintering population of bald eagles.

Marbled murrelets are unique among the area's seabirds because they nest inland in old-growth forests, yet spend much of their time feeding and resting on marine waters in the nearshore environment. This species is of special concern since it's been shown to be highly vulnerable to oil spills and gillnet entanglement and is listed as a threatened species.

In addition to supporting a wide variety of resident birds, Puget Sound is recognized as one of the most important waterfowl wintering areas on the Pacific Flyway for waterfowl. This area has been identified as a key component in the North American waterfowl plan.

5.1.3 Bird Colonies

Most of these species follow the coast during their southward movement, many species winter around these bays, while others stop briefly to rest and feed before continuing their migration to Southern California, Mexico, Central America or South America. During fall and spring migration, as well as winter, large populations of shorebirds and waterfowl inhabit nearshore areas. Consequently in the event of a spill, certain protective measures may be required to minimize the effect on waterbirds. For example, during a critical spill situation, initial efforts should attempt to repel birds from the site with equipment such as bird canons. Depending on the species involved, some repelling devices will successfully deter individuals from the affected area while others will be ineffective.

Subsequent efforts can be reorganized on the basis of these results. The degree of effectiveness decreases as birds become accustomed to the sound system, this process is referred to as habitation. Activities such as people, boats and machinery usually are the most effective deterrents.

5.1.4 Eelgrass

Eelgrass meadows in protected bays provide food source for variety of species within the marine food chain. Additionally, it provides habitat and protection and acts as a nursery for many marine species. In the event of an oil spill near eelgrass meadows, protective measures should be implemented to reduce the impact.

Measures such as booms may be effective when conditions permit deployment. If placed from shore, minimize trampling and dragging equipment over the habitat. Dispersants may be applied in deeper water where dilution will be rapid. If applied in shallow water, use only in areas with adequate flushing from tidal or wave action. If applied directly over seagrass beds, dispersed oil may impact seagrass and organisms associated with seagrass beds. Herding agents may be used between the oil and shoreline.

For cleanup, natural cleansing is still preferable to most cleanup methods. Manual removal results in the removal of sediments and organisms and should be used in the ‘wade zone’ only. Trampling and dragging of equipment over the habitat should be minimized.

Substrate removal may delay or prevent re-establishment of the original ecosystem and vacuum pumping may result in the removal of organisms and sediment. Both methods are not advisable. In intertidal area, low pressure flushing may be viable. Vegetation cropping should be avoided since it modifies the habitat and may kill important habitat plants.

5.1.5 Inlets, Intakes, Harbors and Marinas

Inlet, intakes, harbors and marinas are inhabited by a variety of fish, invertebrates and waterbirds that would be at risk if an oil spill occurs near any of these facilities. Marinas have a great potential for public exposure to hazards and damage claims and should be boomed to exclude oil. Intakes for commercial, industrial and municipal water usage areas are subject to impact due to safety hazards, loss of use and damage claims. Protective measures could include exclusionary booming to prevent or exclude oil from entering these areas. Many of the entrances or channels have tidal currents exceeding 1 knot in the opening. In these cases, booms should be deployed landward from the entrance in quiescent areas. Booms should be placed at an angle to the current to guide oil to an area where it can be recovered.

The deployment of a second boom behind the first may be desirable to contain any oil that escaped under the primary boom.

Diversion booming should be used where the water current in an area greater than 1 knot or if the areas are too large to boom with available supplies. Diversion booms are deployed at an angle from the shoreline closest to the leading edge of the approaching oil slick to deflect oil towards shore, where pickup of pooled oil is more effective.

Since the area is predominantly environmentally sensitive, recommended response strategies are to attempt to limit the extent of shoreline fouling and to limit the area covered by the slick to the maximum extent possible. Since oil is the primary product handled, containment booming operations will be initiated. In addition, shoreline protection boom may be utilized in an attempt to prevent fouling of shorelines.

It is also important to recognize that while certain immediate environment protection response strategies must be planned for in advance, the ongoing protection and cleanup during a major spill would involve professional input from the company's oil spill advisors and the Federal and State On-Scene Coordinators.

5.1.6 Recreational Areas

Publicly accessible recreation areas generally have good water/shoreline access for logistical purposes.

5.1.7 Salmon and other Spawning Streams

Numerous streams throughout the area have been identified as environmentally sensitive due to the presence of spawning areas for salmon and other species.

The following factors are detrimental to spawning fishes, their nests and eggs:

- Changes in water temperature
- Increased siltation or turbidity
- Increased amount of dissolved gases in the water column
- Physical destruction of habitat by personnel and/or equipment.

To reduce the impact of an oil spill and response activities to streams indentified as spawning habitat, the following steps would be taken:

- Attempt to contain spilled product as far upstream of spawning areas as possible
- Minimize or eliminate the use of overflow dams
- Minimize the number of personnel working at each response site
- Minimize use of heavy equipment at each response site
- Eliminate warm/hot water flushing tactics at response sites.

5.2 Spill Containment and Recovery

Containment and recovery refer to techniques that can be employed to contain and recover terrestrial and aquatic petroleum spills.

Terrestrial spills typically result from pipeline or tank leaks. The company is equipped with secondary containment systems for areas with no-pressurized breakout tanks. Spills occurring within the

secondary containment area or along the pipeline areas should be contained at or near their source to minimize the size of the cleanup area and quantity of soil affected.

Containment is most effective when conducted near the source of the spill, where the oil has not spread over a large area and the contained oil is of sufficient thickness to allow effective recovery and/or cleanup. The feasibility of effectively implementing containment and recovery techniques is generally dependent upon the size of the spill, available logistical resources, implementation time and environmental conditions or nature of the terrain in the spill area.

For terrestrial spills, trenches and earthen berms or other dams are most often used to contain oil migration on the ground service. Recovery of free oil is best achieved by using pumps, vacuum sources and/or sorbents.

Spills that reach water spread faster than those on land. They also have greater potential to contaminate water supplies, to affect wildlife and populated areas and to impact manmade structures and human activities. Responses on water should therefore emphasize stopping the spill, containing the oil near its source and protecting sensitive areas before they are impacted.

Sorbents are used to remove minor on water spills. For larger spills, booming is used to protect sensitive areas and to position oil so it can be removed with skimmers or vacuum trucks.

5.3 Booming Techniques

5.3.1 Exclusion Booming

Description

Boom is deployed across or around sensitive areas and anchored in place. Approaching oil is deflected or contained by boom.



Primary Uses

This method is often used across small bays, harbor entrances, inlets, river, and creek mouths with currents less than 1 knot (0.5 m/s) and breaking waves of less than 1.5 ft (0.5 m) high.

Environmental Effects

Typically, effects are limited to minor disturbance to substrate at shoreline anchor points.

5.3.2 Deflection Booming



Description

Boom is deployed at an angle to the approaching slick. Oil is diverted away from the sensitive area to a less sensitive location for recovery.

Primary Uses

Angle across small bays, harbor entrances, inlets, river and creek mouths with currents exceeding 1 kt (0.5 m/s) and breaking waves

of less than 1.5 ft (0.5 m). On straight coastline areas to protect specific sites, where breaking waves are less than 1.5 ft (0.5 m).

Environmental Effects

Typically, effects are limited to minor disturbance to substrate at shoreline anchor points, however, diverted oil may cause shoreline oil contamination down-wind and down-current. A Net Benefit Analysis should be conducted to determine if deflection booming should be conducted.

5.3.3 Along-Shore Booming

Description

Boom is positioned along the shoreline to provide a barrier to floating oil. Oil is diverted away from the sensitive area to a less-sensitive location for recovery. Along-shore booming might be difficult during a falling tide because constant attention is required to ensure the boom doesn't strand.



Primary Uses

This technique can be used in quiet areas with breaking waves of less than 1 ft (0.3 m).

Environmental Effects

Typically, effects are limited to possible shoreline oil contamination down-wind and down-current.

5.3.4 Shore-Seal Booming

Description

Specially-designed, shore-sealing boom is positioned in the inter-tidal zone to deflect oil.



Primary Uses

This technique can be used in a wide range of substrates, but is most often used on mud and sand flats.

Environmental Effects

Typically, effects are limited to minor disturbance to substrate at shoreline anchor points.

5.3.5 Use of Passive Sorbents

Description

Sorbents are positioned in the swash zone to absorb incoming oil.



Primary Uses

This technique can be used in a wide range of low-slope substrates. Pom-Poms normally work best on heavier, weathered crude oil, while sorbent rolls work best on lighter, fresher crudes.

Environmental Effects

The environmental effects of passive sorbents are typically limited to the minor disturbance to the substrate.

5.4 Spill Movement Estimates

Watercourse	Normal Seasonal Minimum Flow Rate (miles/hour)	Normal Seasonal Maximum Flow Rate(miles/hour)	Maximum Velocity Above Normal (miles/hour)
Chuckanut Creek	0.5	1.7	2.3
Deer Creek	0.1	0.8	1.2
Friday Creek	0.8	2.1	2.69
Nooksack River	0.9	2.5	3.1
Samish River	0.4	1.3	1.8
Siler Creek	0.1	0.6	0.9
Squalicum Creek	0.4	1.2	1.6
Sumas River	0.4	1.2	1.8
Tenmile Creek	0.3	0.9	1.3
Tributary to Squalicum Creek	0.3	0.9	1.2
Whatcom Creek	1.0	3.6	3.9

5.5 Historical Climatic Data

	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sept-Oct	Nov-Dec
Max Wind Speed (mph)	S 51	SW 44	SW 32	SW 29	SW 38	S 66
Average Wind Speed (mph)	9.4	9.4	8.7	7.9	8.4	9.2
Min Temperature (F)	36	39	47	55	46	36
Maximum Temperature (F)	49	58	69	75	70	50
Average Temperature (F)	42	48	58	65	57	42
Average Precipitation (inches)	4.6	3.2	1.6	0.9	2.4	5.7
Average Daylight (hours)	8.7	12	15.5	15.4	11.8	8.5

6.0 MULTIPLE HAZARDS

The pipeline and facilities are exposed to multiple types of hazards, including:

- Fire and explosion
- Natural Disasters:
  - Tornadoes
  - Earthquakes
  - Floods
  - Avalanches
- Security Incidents:
  - Bomb Threat
  - Breach of Security

6.1 Fire and Explosion Checklist

- ❑ Notify Control Center/Field Personnel of possible emergency situation
  - ❑ If applicable, refer to the facility-specific Fire Prevention Plan
- ❑ Notify nearest fire department (call 911)
- ❑ Evacuate all non essential personnel and secure area
- ❑ Muster company response personnel at a safe location
- ❑ Shut off fuel source that is feeding fire, if safe to do so
- ❑ If fire is small, use of hand held dry chemical extinguisher may be sufficient to control and extinguish the fire. **Do not take chances**
- ❑ Coordinate response with fire and/or police departments
- ❑ Apply foam and water if available and as directed by Fire Department Personnel
- ❑ Administer medical attention to any injured persons
- ❑ Monitor site weather conditions (particularly wind direction)

6.1.1 Fire Prevention

All company personnel are responsible for monitoring the accumulation of flammable and combustible waste materials and residues that contribute to fires.

- Flammable substances are those liquids, solids or vapors that have flashpoints below 38° C (100° F). Some of the more common flammables are gasoline, natural gas, propane, methanol and certain paints, primers and thinners.
- Combustible substances are those liquids, solids or vapors that have flashpoints greater than 38° C (100° F). Some of the more common combustibles include grasses, paper, wood, paint, certain lubricating oils and greases.

Good housekeeping and equipment maintenance are essential to keep fire hazards to a minimum. Listed below are housekeeping and maintenance requirements for controlling the supply and accumulation of flammable and combustible substances:

- Flammable liquids shall be stored in original or approved containers.
- Larger quantities (95 liters/25 gallons or more) of flammable liquids or vapors shall be stored in an approved container outside of the building or inside the building in an approved fire-rated storage cabinet.
- Each flammable liquid container shall have a bonding and grounding cable attached between it and the receiving container while liquids are being transferred or dispensed.
- Oil-soaked rags shall be stored in UL-approved, covered metal containers.
- Scrap paper and wrapping or packing materials shall be removed from the work area immediately after unpacking. Waste receptacles shall be emptied daily and contents placed in the trash containers provided.
- Weeds and grasses will not be allowed to grow or accumulate around flammable liquid storage facilities (tanks), pumping stations, or manifold areas.
- Using gasoline or condensate for cleaning agents is strictly prohibited.
- Site personnel are responsible for visually inspecting heat-producing equipment and ensuring that good housekeeping and equipment maintenance are being performed to keep fire hazards to a minimum.

6.2 Natural Disaster – Tornado

Definitions

Tornado Watch	A tornado formation is likely in the area
Tornado Warning	A tornado has been sighted or seen on radar

Look For

- Rotary motion at the base of the thundercloud system.
- Rotating cloud of debris or dust near ground.

Listen For

- The roar which can be heard for several miles described as jet aircraft or trains.
- If a natural disaster threatens the Primary Control Center, transfer of operation to the Secondary Control Center shall be initiated.

6.2.1 Tornado Action Checklist

Before the Storm

- ❑ If you see a tornado approaching location, call your Supervisor.
- ❑ Seek shelter, preferably in a cellar, culvert or strong building. Stay away from windows. Take cover under heavy furniture in the center part of building, keep some windows open
- ❑ In open country move away from tornado's path at a right angle. If you cannot escape, lie flat in nearest depression such as a ditch or ravine. If you have to crawl into culverts or under small bridges, beware of flooding, snakes and other animals seeking shelter.
- ❑ Keep listening to radio or television if possible. If you see a tornado, call the weather bureau.

After the Storm

- ❑ Give aid to injured.
- ❑ If damage has occurred to pipeline, follow the Emergency Response Plan found on page I-4, and report to supervisor.
- ❑ Watch for:
  - Downed power lines
  - Flooding
  - Debris

6.3 Earthquake Action Checklist

- ❑ Shutdown petroleum transfer and secure facilities:
  - Close isolation valves and tank valves
  - Close storm-water discharge valves
  - Shut off nonessential power supplies
- ❑ Monitor site for evidence of leaks from pipeline facilities.
- ❑ Notify the Control Center Operator of steps taken and obtain further instructions.
- ❑ Evacuate all nonessential personnel and third parties to a safe location.
- ❑ In the event of earthquake damage:
  - Follow the Emergency Response Philosophy found on page I-4
- ❑ Secure facility for aftershocks; exercise caution when entering damaged buildings
- ❑ Watch for:
  - Downed power lines
  - Flooding
  - Debris

6.4 Flood Action Checklist

A flash flood watch means that flooding is possible - watch out for it and be alert.

A flash flood warning means flooding has been reported - immediately take precautions to insure your safety.

- ❑ Shut down and isolate the section of the pipeline at risk
- ❑ Monitor the pipeline route for potential damage
- ❑ Buoy any above-ground facilities that could become submerged to prevent damage from craft operating in flooded areas
- ❑ Never try to walk, swim or drive through swift water
- ❑ Evacuate if necessary
- ❑ When flooding subsides, perform survey to determine if there is sufficient cover over pipeline
- ❑ Notify landowners of areas of reduced cover
- ❑ In the event of flood damage, follow the Emergency Response Plan found on page I-4
- ❑ Conduct an aerial overflight

6.5 Avalanche Checklist

Response to an avalanche incident must be orderly and efficient, and keep the safety of rescuers uppermost at all times. A successful rescue depends on a rapid response by appropriately trained and equipped personnel.

- At the accident site, rescuers must be able to ensure their own safety while working as a team to accomplish the rescue as rapidly as possible.
- The initial response team may require additional resources to be deployed at the site as the rescue proceeds. In order to accomplish this, a plan has been developed to aid in conducting a rescue with the minimum of wasted time and effort.
- Rescue participants should be trained in and practice rescue techniques utilizing the avalanche rescue equipment available.

The full Avalanche Safety Plan is available by request or on KMonline EHS - Manuals

6.5.1 Avalanche Rescue Card

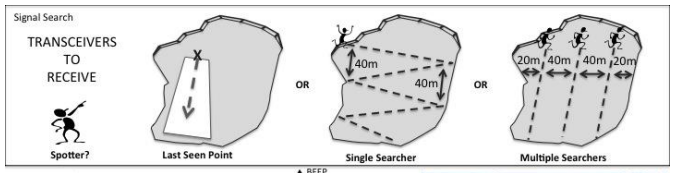
Avalanche Rescue Card - KMC Emergency 1-888-876-6711

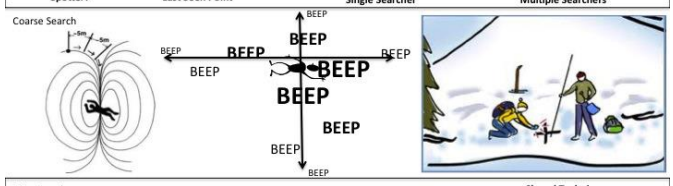
If you are caught in a vehicle – Remain in the vehicle.
Shut off engine and headlights - Leave flashers and radio on.
Confirm location, Call for help.
Ensure transceiver is sending.
Push sectional avalanche probe to the surface.
Await Rescue Team

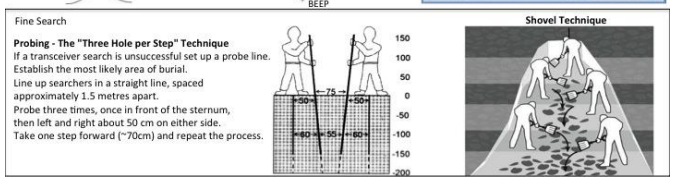
If you witness an avalanche;
Move people to a safe place
Note: Time, Location,
If persons missing or injured, vehicles involved
Notify KMC Emergency 1-888-876-6711
Plan for rescue and hazards, see below & over

Avalanche Search Instructions

1. Move all personnel to a safe location. Avoid contamination of the search area.
2. Retain and question witness.
3. Evaluate further hazard. Can you see the whole slope? Is the weather a factor?
4. Establish escape routes - use spotter and warning signal.
5. Mark the last seen point (if witnessed). Switch transceivers to Receive.
6. Transceiver search below the last seen point, watch for surface clues.
7. Random probe of likely burial locations, use transceivers if applicable.
8. Systematic coarse probe if transceiver search does not locate victims.
9. Mark outline of avalanche deposit and all probed areas with flagging wands.
10. Draw a map of the avalanche showing all areas as they are searched/probed, noting pertinent details (last seen point, clues, victim location).
11. Brief arriving rescuers.
12. Document - arrivals, evacuations, departures, environmental concerns (shelter, food/water, lights), site sketch and photos etc.
13. Maintain communication with rescue base/team.







6.5.2 Avalanche – Preliminary Accident Details

Initial Response

If you witness an avalanche, or an avalanche incident is reported to you:

1 **Retain Witness(es) and ensure safety of personnel**

2 **Note and Record Preliminary Accident Details**

Time and Date	
Reporting Persons Name	
Witness Name (hold witness)	
Time of Accident	
Location of accident (ROW KP or access route) GPS	
Number of persons involved, injured and/or missing	
Number of responders with avalanche equipment	
Vehicular involvement	
Additional relevant information (weather [flyable?] and road condition, special requirements)	
A call back number for reporting personnel.	

3 Relay the above Preliminary Accident Details to

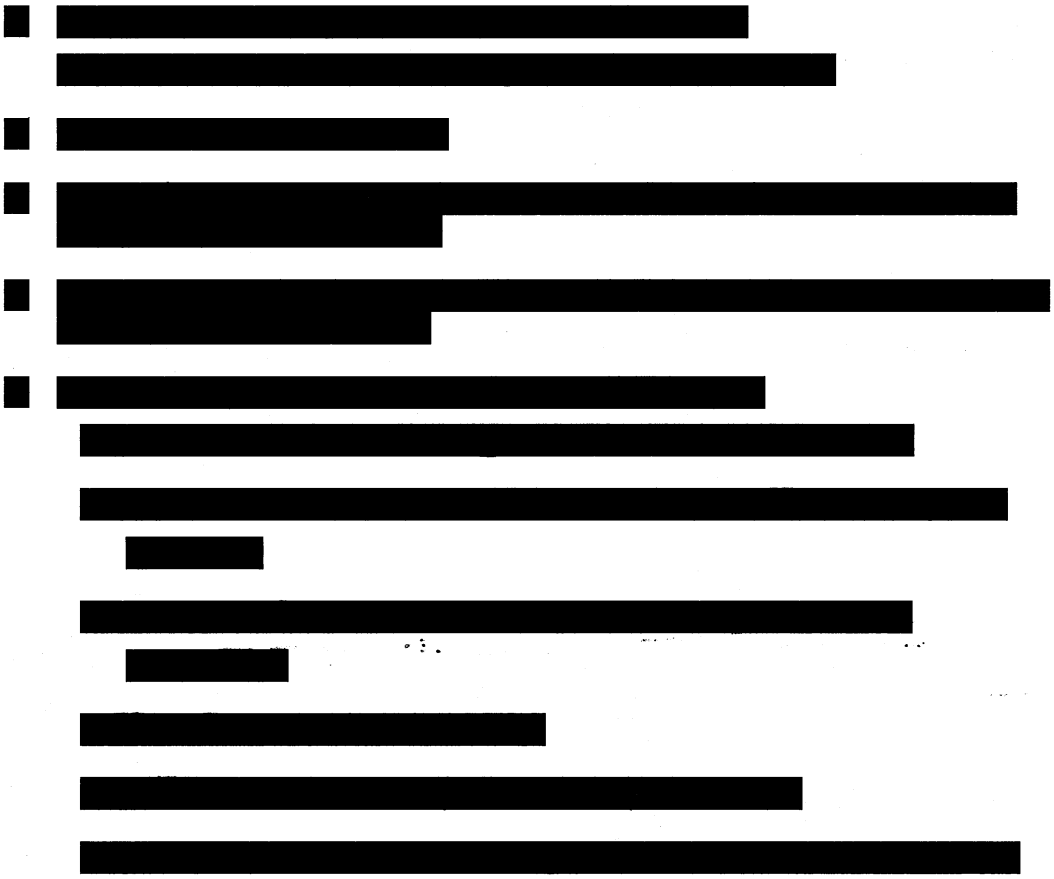
Base Control Centre at (Kinder Morgan Emergency 1-888-876-6711)

Initial Responder/Incident Commander **MAY BE PROMPTED FOR ADDITIONAL INFORMATION** by the Base Control Centre.

6.6 Bomb Threat Action Checklist

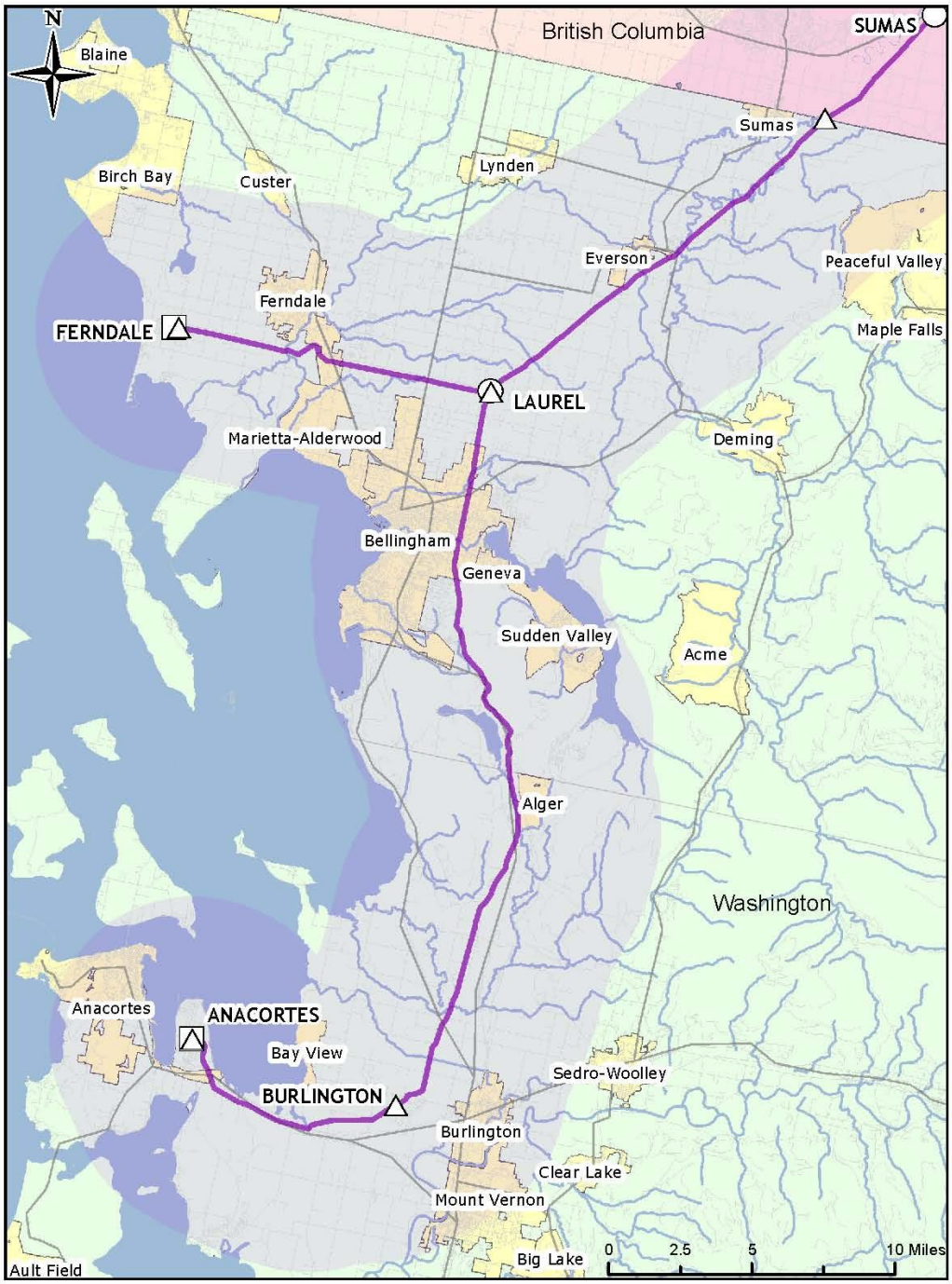
[redacted]

6.7 Breach of Security Action Checklist



7.0 SITE INFORMATION

7.1 Pipeline Overview Map



TRANS MOUNTAIN PIPELINE
PUGET SOUND

KINDER MORGAN CANADA INC.

TMPL - Puget Sound Pipeline
Pump Station
Meter Station
Scraper Trap

7.2 Puget Sound Area Description

The Trans Mountain mainline system from Edmonton to Burnaby transports crude petroleum, refined and semi-refined products together in the same line using a process called batching. The system goes through Kamloops Station which receives crude oil and refined products for shipment to the west coast. The Puget Sound Pipeline system connects with the Trans Mountain mainline system at Sumas, BC on the Canada/USA International Boundary. It delivers Canadian crude oil to four refineries at Ferndale and Anacortes on the west coast of Washington State. Laurel station has two breakout tanks that are used to temporarily store oil while awaiting delivery at refineries in Ferndale and Anacortes.

The geographic area covered by this Oil Spill Contingency Plan extends from the international boundary with Canada near Sumas to Ferndale and Anacortes in northwest Washington State. The land use around the pipeline varies between forested areas, urban areas and agricultural land use.

Spills entering water bodies, with the exception of the Sumas River, flow towards the sea between Lummi Bay and Padilla Bay, including Bellingham Bay, Samish Bay and shorelines in between these coastal areas. Offsite migration of land spills from the pipeline system that does not enter water bodies are likely to be confined to the pipeline right-of-way or immediately adjacent areas. Spills entering the Sumas River flow north into Canada, eventually entering the Fraser River.

The pipeline system facilities include:

- Laurel Station
- Ferndale Meter Station
- Burlington Scraper Trap
- Anacortes Meter Station
- NPS 20 (inch) pipeline from the Canada/ U.S. Border (Mile 5.5) approximately 3 miles east of Sumas, Washington to the Burlington Scraper Trap near Burlington (Mile 48).
- NPS 16 (inch) branch pipeline from the Laurel Station (Mile 20.6) approximately 12 miles to the Ferndale Meter Station adjacent to the ConocoPhillips refinery at Neptune Beach near Ferndale. There is also a connection to the refinery at Cherry Point via a delivery pipeline owned by BP.
- NPS 16 (inch) pipeline connected to the NPS 20 pipeline at the Burlington Scraper Trap, approximately 9 miles to the Anacortes Meter Station adjacent to the Shell and Tesoro Refineries on March Point near Anacortes, Washington.

7.3 Owner/Operator Information

Owner	Trans Mountain Pipeline (Puget Sound) LLC #2700, 300-5th Avenue S.W. Calgary, AB T2P 5J2
Operator	Kinder Morgan Canada Inc. #2700, 300-5th Avenue S.W. Calgary, AB T2P 5J2
Zone Name	Puget Sound
Zone Mailing Address	1009 East Smith Road Bellingham, WA 98226
Zone Telephone/FAX	Phone: 360-398-1541 Fax: 360-398-7432
Qualified Individual	Patrick Davis [redacted]
Alternate Qualified Individual	Dale McClary [redacted]
Start of Operations	The Puget Sound Pipeline has been in operation since 1956.
Response Zones Consists of the Following Counties	Whatcom and Skagit (Washington)
Alignment Maps, etc.	Maintained at: Calgary Head Office, in the Drafting Department
Statement of Significant and Substantial Harm	The response zones in this system all contain pipelines greater than 6 5/8 inches and are longer than ten miles. At least one section of pipeline in each response zone crosses a major waterway or comes within five miles of a public drinking water intake. Therefore, in accordance with 49 CFR 194.103(c), each entire response zone described in this Plan will be treated as if expected to cause significant and substantial harm.
Worst case discharge	Varies based on response zone, see Section 7.5.
PHMSA #	587
Facilities	
Border Scraper Trap	[redacted]
Laurel Station	[redacted]
Ferndale Meter Station	[redacted]
Burlington Scraper Trap	[redacted]
Anacortes Meter Station	[redacted]

7.4 Incident Command Post Location

Kinder Morgan Canada is a private partner in the Whatcom Emergency Joint Coordination Center which will be used for the incident command post for any incident involving the Trans Mountain Pipeline – Puget Sound operations.

This location can accommodate the Incident Management Team, contractors, and agency personnel. The coordination centre has multiple telephone lines already installed, pre-defined setup for the ICS sections, and breakout rooms for Government agencies, Unified Command meetings, etc.

In the unlikely event that the Whatcom Emergency Joint Coordination Center is unavailable one of the following locations may be used.

Name	Meeting Rooms	Phone lines	Rooms	Business Services Available	Cooking Facilities	Nearest City & Distance
[redacted]	20' X 30' 40' X 48' Plus various smaller offices	2 5	None	Yes	Limited None	Bellingham 5 Miles
[redacted]	40' X 60'	1	None	Yes	Full	Bellingham 8 Miles
[redacted]	65' X 36' 44' X 36'	1	None	Yes	Full	Anacortes 7 miles Mount Vernon 5 miles
[redacted]	92' X 70' ballroom 40' X 70' Whatcom 53' X 35' Sehome or Fairhaven 17' X 48' San Juan 38' X 40' Mt. Baker 32' X 60' Board Room	3 1 1 1 1 1	132	Yes	Yes	
[redacted]	22X66 Courtyard 60X56 Pacific 67X49Northwest	3 6 8	102 rooms	Yes 24 hour business center	Yes	

7.5 Response Zones

Zone	Pipeline Section	Diameter	Product	WCD (bbl)
1	Border Scraper Trap to Laurel Station	20”	Crude Oil Blends	6,656
2	Laurel Station to Ferndale Meter Station	16”	Crude Oil Blends	10,500
3	Laurel Station to Burlington Trap	20”	Crude Oil Blends	10,405
4	Burlington Trap to Anacortes Meter Station	16”	Crude Oil Blends	4,500
5	Laurel Station	n/a	Crude Oil Blends	89,455

7.6 Puget Sound Tank Data

Location	Description	Capacity (US Gallons)	Capacity (barrels)
Ferndale Relief Tank (130)	1x Relief Tank	126,000	3000
Laurel Relief Tank (120)	1x Relief Tank	126,000	3000
Laurel Tank 170	Breakout Tank	3,757,110	89,455
Laurel Tank 180	Breakout Tank	3,716,244	85,482

7.7 Trans Mountain Products Summary

Product Name	Product Identifier	Vapor Density	Specific Gravity	API	Oil Group Number	Total Sulfur (wt%)
SUPER LIGHTS						
Caroline Condensate	CCA	>1	0.75	56.0	2	0.49
Fort Sask Condensate	FSC	>1	0.68	76.7	2	0.06
Rangeland Condensate	CRL	>1	0.74	59.9	2	0.35
Premium Gasoline	G91	>1	0.70	70.9	2	0.02
Pembina Condensate	CPM	>1	0.76	54.5	2	0.16
Peace River Condensate	PCON	>1	0.75	57.3	2	0.15
LIGHTS						
BC Light Crude	BCL	>1	0.83	39.8	2	0.60
Boundary Lake Crude	BLK	>1	0.84	36.1	2	0.83
Bonnie Glen Crude	BOG	>1	0.82	41.3	2	0.41
Bonnie Glen Sour Crude	BGS	>1	0.88	29.3	3	1.22
Horizon Synthetic	CNS	>1	0.85	34.4	3	0.08
Central Alberta KOC	KOC	>1	0.85	35.4	3	1.07
Light Sour Oil	LSO	>1	0.83	39.4	2	0.76
Suncor Synthetic A	OSA	>1	0.86	32.7	3	0.20
Suncor Synthetic C	OSC	>1	0.88	30.0	3	0.22
Premium Albian Synthetic	PAS	>1	0.86	33.1	3	0.10
Peace River Crude	PCR	>1	0.83	39.8	2	0.54
Peace River Sour	PCSR	>1	0.87	31.8	3	2.59
Pembina Crude	PEM	>1	0.83	38.9	2	0.43
Pembina North	PNC	>1	0.83	40.0	2	0.45

Product Name	Product Identifier	Vapor Density	Specific Gravity	API	Oil Group Number	Total Sulfur (wt%)
Premium Synthetic	PSC	>1	0.84	37.0	2	0.08
Rainbow Crude	RBW	>1	0.84	37.8	2	0.49
Mixed Sweet Blend	SW	>1	0.84	37.6	2	0.47
Shell Synthetic Light	SSX	>1	0.87	31.6	3	0.22
Syncrude	SYN	>1	0.86	32.4	3	0.18
MEDIUM						
Strathcona Special Stream	SSS	>1	0.90	26.0	3	1.08
HEAVY						
Suncor Synthetic PTCN	OSP	>1	0.91	23.8	3	3.26
Suncor Synthetic S	OSS	>1	0.91	24.0	3	2.83
SUPER HEAVY						
Albian Residual Blend	ARB	>1	0.93	20.5	3	2.70
Albian Heavy Synthetic	AHS	>1	0.94	19.6	3	2.47
Albian Muskeg Heavy	AMH	>1	0.93	20.7	3	3.95
Albian Vacuum Gas Oil	AVB	>1	0.92	22.3	3	3.16
Access Western Blend	AWB	>1	0.92	22.6	3	3.82
Borealis Heavy Blend	BHB	>1	0.92	22.0	3	3.60
Cold Lake Blend	CL	>1	0.93	21.4	3	3.72
Kearl	KRL	>1	0.91	23.7	3	3.29
McKay Heavy	MKH	>1	0.93	21.0	3	2.60
Oil Sands Q	OSQ	>1	0.92	22.3	3	3.90
Long Lake Heavy	PSH	>1	0.93	20.4	3	3.22
Peace Heavy	PH	>1	0.93	21.3	3	5.11
Seal Heavy	SH	>1	0.93	20.5	3	4.79
Statoil Cheecham Blend	SCB	>1	0.93	20.5	3	3.83
Statoil Cheecham Syn-Bit	SCS	>1	0.94	19.0	3	2.86
Statoil Cheecham Mixed Blend	SCM	>1	0.94	19.8	3	3.3
Suncor Synthetic H	OSH	>1	0.94	19.8	3	3.09
Surmont Heavy	SHB	>1	0.94	19.7	3	2.97
Wabasca Crude	WH	>1	0.93	21.2	3	4.02

7.8 Block Valves and Directions

Valve Number	Location
MU 14	[redacted]
MU 15	[redacted]
R-16 D	[redacted]
R-16 M	[redacted]
R-MU 20 Q	[redacted]
ML 6	[redacted]
ML 8	[redacted]
R-16 D	[redacted]
RLTM CNPH	[redacted]
RLTM BP	[redacted]

Valve Number	Location
MU 27	[redacted]
R-MU 43	[redacted]
R-MU 48	[redacted]
MB 3	[redacted]
MB 7	[redacted]
MB 9	[redacted]
R-16 D	[redacted]
R-TM Tesoro	[redacted]
R-TM Shell	[redacted]

7.9 Response Zone Descriptions, Maps and Site Plans

7.9.1 Zone 1 -Border Scraper Trap to Laurel Station

The Border Scraper Trap is located on the Canadian side of the USA/Canada border. The surrounding topography is primarily flat agricultural land. This location has pig loading/unloading facilities. Water is controlled on-site via surface drainage and ditches. If a spill were to occur at the Border Scraper Trap it would likely be very small in size and is not likely to leave the site. Using spill modeling and trajectory analysis any oil migrating off-site from the Border Scraper Trap is most likely to remain on land in the immediate vicinity of the site, within Canada.

The pipeline segment from the Border Scraper Trap to Laurel station is approximately 15.39 miles long and is a 20” diameter pipeline. The worst case spill volume for this segment of line is 6,656 bbl. The land surrounding the section of pipeline is mostly flat agricultural lands less than 100 ft above sea level. The segment of pipeline is within Whatcom County. There are two vales which can be closed remotely, one is north of the Nooksack River and the second is south of the Nooksack River. The 48 hour spill model indicates that the majority of this section will be contained to the pipeline right of way or immediately adjacent, however there are several stream crossings in this section of the pipeline. A spill into the Sumas River would be expected to cross the border into Canada within 48 hours, likewise a spill to the Nooksack River, Tennille Creek, Deer Creek and any of the tributaries/ditches that empty into those bodies of water would be expected to reach Bellingham Bay within 48 hours.

7.9.1.1 Response Zone 1 – Relief map

Removed for security reasons.

7.9.1.2 Border Scraper Trap – Site Plan

Removed for security reasons.

7.9.2 Zone 2 - Laurel Station to Ferndale Meter Station

The pipeline segment from Laurel Station to the Ferndale Meter Station is approximately 11.65 miles long and is a 16" diameter pipeline. The worst case spill volume for this segment of line is 10,500 bbl. The land surrounding the section of pipeline is mostly flat agricultural lands with higher populated areas around Ferndale and Bellingham. The Pipeline also passes through the Lummi Indian Reservation and is located in an area that is 100ft above sea level to the east and nearly at sea level in the west. There are two check valves located midway along this segment of pipeline bordering the Hovander Homestead Park, and Tennant Lake Park. The pipeline segment is located in Whatcom County. The 48 hour spill model indicates that the majority of this section will be contained to the pipeline right of way or immediately adjacent, however there are several stream crossings along this route and a spill into the Nooksack River or one of its tributaries or storm water system would be expected to enter Bellingham Bay within 48 hours. Additionally spills to the Lummi River or any of its tributaries or drainage ditches would result in a spill reaching Lummi Bay. The surface water flow direction for the Ferndale Meter Station can be viewed on the Ferndale Meter Station Site Plan

7.9.2.1 Response Zone 2 – Relief Map

Removed for security reasons.

7.9.2.2 Ferndale Meter Station – Site Plan

Removed for security reasons.

7.9.3 Zone 3 – Laurel Station to Burlington Scraper Trap

The pipeline segment from Laurel Station to the Burlington Scraper Trap is approximately 27.63 miles long and is a 20" diameter pipeline. The worst case spill volume for this segment of line is 10,405 bbl. The land surrounding the section of pipeline varies from flat agriculture near Laurel Station to steep hillsides from 100 to 300 ft above sea level back to flat agricultural use land and near sea level at the Burlington Scrap. The pipeline also passes through Bellingham, and densely populated rural areas, Whatcom County and Skagit County. There one check valve, and one manual block valve near mile 27. The 48 hour spill model indicates that a spill in several sections of pipe will be contained to the pipeline right of way or immediately adjacent, however there are several stream crossings along this route. A spill into Squalicum Creek, Whatcom Creek, or one of the many tributaries, ditches, and Bellingham storm water system would be expected to reach Bellingham Bay within 48 hours. Spills to Chuckanut Creek its tributaries, drainage ditches or storm water drains would be expected to reach Chuckanut Bay within 48 hours. Spills between MP31 and 35 would be expected to enter Lake Samish within 48 hours. Spills entering Friday Creek, Samish River, Joe Leary Slough, any of the tributaries, drainage ditches or storm water systems would also be expected to reach Samish Bay and/or Padilla Bay within 48 hours. The surface water flow direction for the Burlington Scraper Trap can be viewed on the Burlington Scraper Trap Site Plan

7.9.3.1 Response Zone 3 – Relief Map

Removed for security reasons.

7.9.3.2 Burlington Scraper Trap – Site Plan

Removed for security reasons.

7.9.4 Zone 4 – Burlington Scraper Trap to Anacortes Meter Station

The pipeline segment from the Burlington Scraper Trap to the Anacortes Meter Station is approximately 9.09 miles long and is a 16" diameter pipeline. The worst case spill volume for this segment of line is 4,500 bbl. The land surrounding the section of pipeline is mostly flat agriculture with some steep hillsides less than 100 ft above sea level. This portion of pipeline is in Skagit County. There are two manual block valves near mile 3 and 7. The 48 hour spill model indicates that a spill in several sections of pipe will be contained to the pipeline right of way or immediately adjacent, however there are several stream crossings along this route and a spill into any of the creeks, or one of the many tributaries or storm water ditches would be expected to reach Padilla Bay within 48 hours. Additionally if a spill were to occur between mile 4 and 7 it would likely enter the Swinomish Chanel, Skagit Bay and Padilla Bay within 48 hours. The surface water flow direction for the Anacortes Meter Station can be viewed on the Anacortes Meter Station Site Plan.

7.9.4.1 Response Zone 4 – Relief Map

Removed for security reasons.

7.9.4.2 Anacortes Meter Station – Site Plan

Removed for security reasons.

7.9.5 Zone 5 – Laurel Station

Laurel Station is a response zone. There are two 90,000 bbl, and one 3,000 bbl relief tanks on site, with a working capacity of 89,455 bbl, 85,482 bbl, and 0 bbl. The worst case spill volume for Laurel Station is 89,455 bbl. The land surrounding Laurel Station is flat agricultural land less than 100 ft above sea level. Laurel Station is in Whatcom County. The tanks at Laurel Station are within containment which can hold 110% of the tank volume, as such a spill from the tanks is not expected to leave the site, or enter waters of the state[3]. Water is managed on-site through a system of ditches and sumps. All sumps are equipped with hydrocarbon alarms which sound if there is product mixed into the water. The water is tested to ensure when it leaves the site it falls within acceptable environmental guidelines. The combination of surface water runoff control and containment berms around the tanks means that a spill would not be expected to leave the Laurel Station site within 48 hours. The surface water flow direction for the Laurel Station can be viewed on the Laurel Station Site Plan.

[3] Waters of the State means all lakes, rivers, ponds, streams, inland waters, underground water, salt waters, estuaries, tidal flats, beaches and lands adjoining the seacoast of the state, sewers and all other surface waters and watercourse within the jurisdiction of the state of Washington.

7.9.5.1 Response Zone 5 – Relief Map

Removed for security reasons.

7.9.5.2 Laurel Station – Site Plan

Removed for security reasons.

8.0 INCIDENT MANAGEMENT

Kinder Morgan Canada has a pre-defined Incident Command Structure with role descriptions defined and personnel pre-assigned to the key roles. The ICS structure is similar in nature to the Northwest Area Contingency Plan and uses the same terminology to the Section Chief level. Below the Section Chief level the teams and positions outlined in this emergency response plan are an example of how things may be set up, in accordance with previous experience with spill response. However, during an actual incident each section will determine the best set up in accordance with the principals of ICS with the direction of the Section Chief, taking into account the section roles and responsibilities contained in the Northwest Area Contingency Plan.

In the state of Washington the Information Officer, Liaison Officer, Wildlife Branch Director, and the Environmental Unit Leader may be lead by a state agency or trustee of the state if they are best qualified. Please refer to the Northwest Area Contingency Plan and the Kinder Morgan ICS Guide for the staffing policies of the Washington State Department of Ecology for these positions.

8.1 Initial Response Team

Initial Response resources are managed by the Senior On-Site Individual who assumes the role of Incident Commander until such time as a more senior employee takes over.

8.2 Local Incident Management Team

The Local Incident Management Team (IMT), which is comprised of District personnel in each response area, will respond to incidents beyond the capability of the Initial Responders.

If deployed, the Local IMT's primary tasks are to:

- Ensure the safety of all workers in the area of the spill
- Assess the situation (i.e., incident size, severity, likely impacts)
- Take appropriate action to mitigate the impacts to life safety, the environment, and property

The Local IMT will perform these tasks until relieved or replaced by a higher level of management within the response organization

8.3 Kinder Morgan Incident Management Team

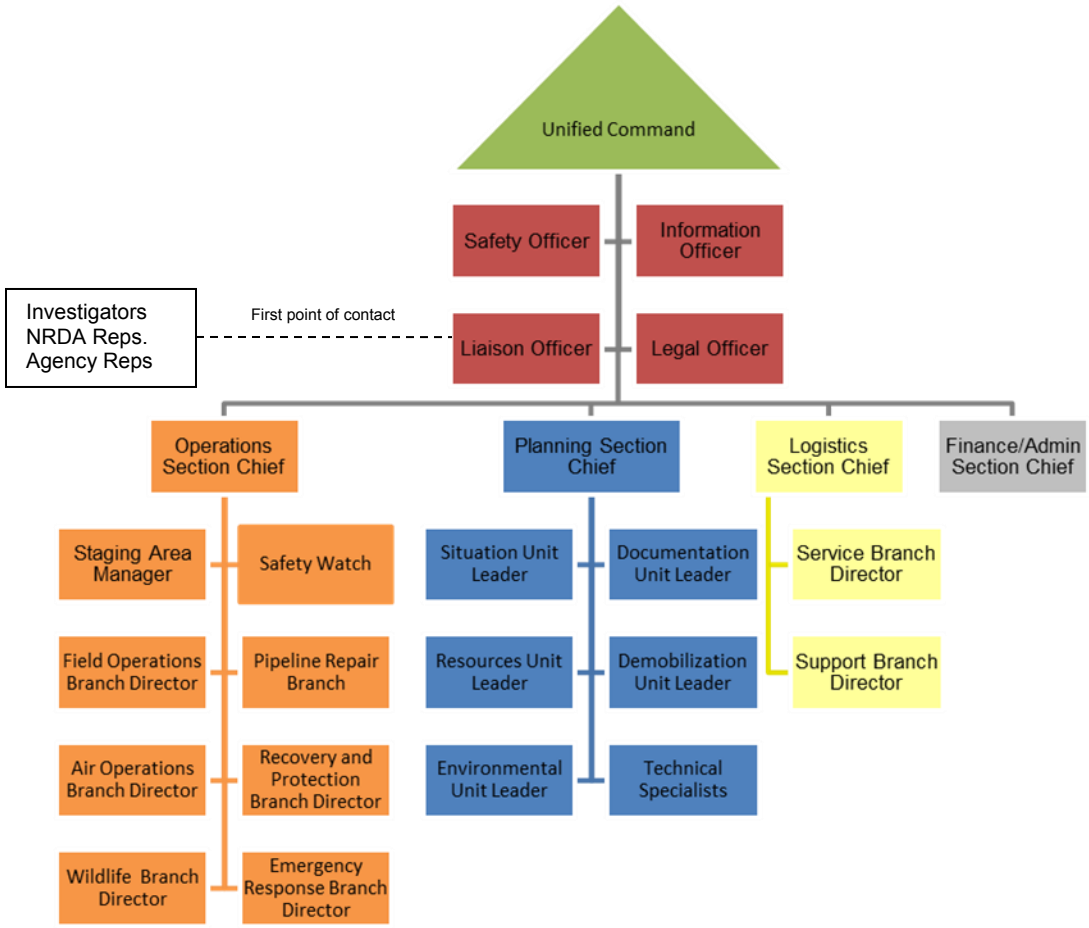
On larger spills, where the local IMT cannot manage a response without assistance, additional IMT personnel will we asked to attend from within Kinder-Morgan's company-wide support system.

The IMT is headed by the Incident Commander who directs and coordinates all response activities and resources. The Deputy Incident Commander provides on-site staff support to the Incident Commander through the Command Staff and relieves the Incident Commander as required.

Each Section is headed by a Section Chief reporting directly to the Incident Commander. The Initial Response Team and initial IMT may be absorbed into the response organization as additional IMT personnel arrive on the scene. The Operations Section Chief is also responsible for directing the activities of outside contractors called in to assist with the response.

8.4 Response Team Organization

The following diagram depicts a typical response organization to the branch director/unit leader level. If a position below a specific chief, director, supervisor, manager, or unit leader is not filled then the chief, director, supervisor, manager, or unit leader must complete the tasks of reporting position as well. For further information on each position and the supporting roles, please see the Kinder Morgan ICS Guide or the Northwest Area Contingency Plan.



8.5 Initial Response

The initial response will be carried out by local Kinder Morgan personnel.

These are employees who are present at or near the scene of a spill who are properly trained in emergency response, defensive fire-fighting, safety and first aid. All other employees should be cleared from the incident scene immediately.

The senior person at the scene is automatically designated as the Incident Commander. Depending on the circumstances, the person-in-charge may be replaced by the Supervisor.

The initial responder's primary tasks are to:

- Ensure the safety of all workers and public in the area of the spill
- Assess the situation (i.e., incident size, severity, likely impacts)
- Notify the Supervisor immediately to activate the response organization and resources
- Take appropriate action to mitigate the impacts to life safety, the environment, and property until the Qualified Individual arrives.

Initial responders will perform these tasks until relieved or replaced by a higher level of management within the response organization.

In the event of a Level 1 incident, the initial responders may conduct the entire response effort.

On larger incidents, the initial responders will typically be incorporated into the Operations Section of the IMT organization.

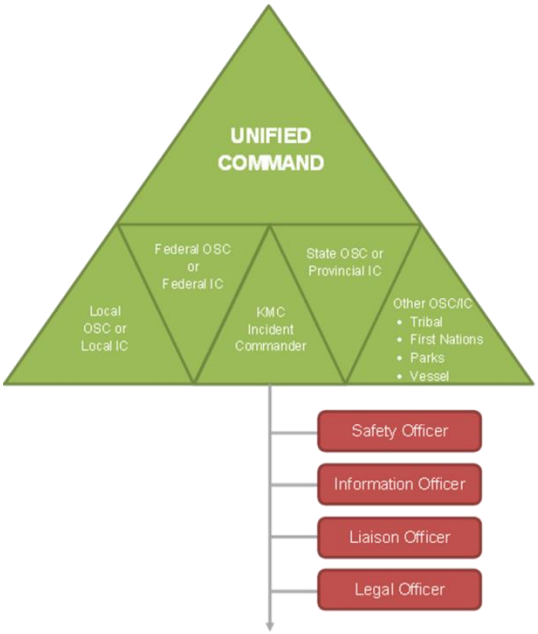
8.6 Transfer of Command

The Kinder Morgan Response Organization is designed to work on a 24-hour basis. If 24-hour coverage is required, Command Staff and other response personnel will normally be relieved on a 12-hour shift schedule. Briefing meetings for Command Staff and other essential response personnel will be held at the time of each shift change. The Planning Section will be responsible for providing a summary of the ending shift activities along with a plan for the next shift. Written plans will be made in consultation with government agencies. Key ICS positions will be transferred on a 4-7 day rotation as needed after the initial transfer of command. The resources unit has the responsibility to identify and obtain any additional personnel required.

Whether internal or external, transfers of command for ICS positions will overlap to ensure that operations are not interrupted. The individual incoming and the individual leaving are required to meet and discuss any relevant information so that the position can be properly filled in and necessary task accomplished.

8.7 Unified Command

Wherever possible, the IMT will establish, and operate within, a Unified Command structure as warranted by the circumstances of an incident. When a federal or state agency arrives on-scene to participate in managing a response action, the agencies will utilize a unified command structure to jointly manage the spill incident. In the unified command, decisions with regard to the response will be made by consensus and documented through a single Incident Action Plan (IAP) for each operational period. In the event that the Unified Command is unable to reach consensus, the FOSC has ultimate decision making authority. The unified command may incorporate additional tribal or local government on-scene coordinators into the command structure as appropriate.



Incident Commanders for oil discharges and hazardous substance releases will, whenever possible and practical be organized under the Unified Command Structure which includes, but not limited to:

- The pre-designated Federal On Scene Coordinator (FOSC);
- The State On Scene Coordinator (SOSC);
- The representative of the Responsible Party (RP); and
- The local and/or tribal On Scene Coordinators, as appropriate.

To be considered for inclusion as a UC member, the following criteria must be considered:

- The organization must have jurisdictional authority or functional responsibility under a law or ordinance for the incident; and
- The organization must be specifically charged by law or ordinance with commanding, coordinating or managing a major aspect of the incident response; and
- The incident or response operations must have impact on the organization's Area Of Responsibility; and
- The organization should have the resources to support participation in the response organization.

Actual Unified Command makeup for a specific incident will be determined on a case-by-case basis taking into account:

- The specifics of the incident;
- Determinations outlined in the four criteria listed above; and
- Decisions reached during the initial meeting of the Unified Command.

The Unified Command is responsible for the overall management of the incident. The Unified Command directs incident activities including the development and implementation of strategic decisions, approval of the incident action plan, and approves the ordering and releasing of resources. It is expected that each Unified Command member will have the authority to make decisions and commit resources on behalf of their organization.

8.8 Qualified Individual

Response Plans for Onshore Oil Pipelines (49 CFR Part 194) defines Qualified Individual as "An English-speaking representative of an operator, located in the United States, available on a 24 hour basis, with full authority to: activate personnel and equipment maintained by the operator; act as liaison with the Incident Commander; and obligate any funds required to carry out all required or directed oil response activities".

The QI has the following responsibilities and authorities as required by the Oil Pollution Act of 1990 (OPA 90):

- Activate internal alarms and hazard communication systems to notify all appropriate personnel
- Notify all response personnel as needed
- Identify character, exact source, amount and extent of the release and other necessary items needed for notifications
- Notify and provide information to appropriate Federal, State and Local authorities
- Assess the interaction of the spilled substance with water and/or other substances stored at the Facility and notify on-scene response personnel of assessment
- Assess possible hazards to human health and the environment
- Coordinate rescue and response actions
- Assess and implement prompt removal actions
- Access company funds to initiate cleanup activities
- Direct cleanup activities until properly relieved of responsibility or incident is terminated
- Maintain contact with the OSC responsible for monitoring or directing the response actions via the Operations Section Chief.
- The QI may fill the role of Incident Commander, Deputy Incident Commander, as such the QI will be monitoring all response actions.

8.9 Incident Commander/Deputy Incident Commander

The Incident Commander's responsibility is the overall management of the incident. On Level 1 incidents, the command activity will likely be carried out by a single (Kinder Morgan Canada) Incident Commander. On larger, Level 2 and 3 incidents, a Unified Command structure will be employed, with additional Incident Commanders from key agencies.

The initial IC is the senior person witnessing the incident. One or more changes of the IC role might take place during the initial phase of the incident, as more-senior personnel arrive on-scene until the ultimate IC takes over and the ICP is established.

The Incident Commander may have a deputy, who may be from Kinder Morgan Canada, or from an assisting agency. Deputies must be fully qualified to take over that position at any time.

The Incident Commander/Deputy IC Responsibilities can be found in the ICS Guide; in general the duties are to:

- Ensure that adequate safety measures are in place.
- Assess the situation and/or obtains a briefing from the prior Incident Commander.
- Determine Incident Objectives and strategy.
- Establish the immediate priorities.
- Establish an Incident Command Post.

- Establish an appropriate organization.
- Ensure planning meetings are scheduled as required.
- Approve and authorize the implementation of an Incident Action Plan.
- Coordinate activity for all Command and General Staff.
- Coordinate with key people and officials.
- Approve requests for additional resources or for the release of resources.
- Keep agency administrator informed of incident status.
- Approve the use of trainees, volunteers, and auxiliary personnel.
- Authorize release of information to the news media.
- Order the demobilization of the incident when appropriate.

8.10 Safety Officer

The Safety Officer's function on the Command Staff is to develop and recommend measures for assuring personnel safety, and to assist and/or anticipate hazardous and unsafe situations.

Only one Safety Officer will be assigned for each incident. The Safety Officer may have assistants as necessary, and the assistants may also represent assisting agencies or jurisdictions. Safety assistants may have specific responsibilities such as air operations, hazardous materials, etc.

The specific duties related to the Safety Officer's responsibilities can be found in the ICS Guide, in general the duties are to:

- Develop a Site-Specific Health and Safety Plan.
- Participate in planning meetings.
- Identify hazardous situations associated with the incident.
- Review the Incident Action Plan for safety implications.
- Exercise emergency authority to stop and prevent unsafe acts.
- Investigate accidents that have occurred within the incident area.
- Assign assistants as needed.
- Review and approve the Medical Plan.

8.11 Control Centre Operator (CCO) and SCCO (Supervisor)

The Control Centre Operator will:

- Initiate the ECR
- Advise caller as appropriate
- Contact first responders, as required
- Contact "affected" Field Supervisor(s)
- Contact the Supervisor, Control Centre Operations
- Record all events in the "Additional Information" section of the ECR for the full duration of the incident
- Assume notification role of the Supervisor, Control Centre Operations, if no contact acknowledgment is received

The Supervisor, Control Centre Operations (SCCO) will:

- Send an ERL/ERL + using the appropriate ERL list
- If the ERL system in unavailable, contact personnel as shown on the ECR by phone using E-Contacts, and notify Incident Commander of notification status within 30 minutes

- Call into 1 800-525-3752, 73005 to start the Initial Information Exchange
- Participate in conference calls as required
- Send additional ERL updates as needed or required
- Forward the completed ECR to the Manager, Technical Services and Control Centre, for approval

8.12 Information Officer

The Information Officer is responsible for implementing the external communications plan during any emergency incident.

The external communications plan objectives are to:

- Provide information about the incident and the related response effort to all stakeholders in a timely, accurate, and responsible fashion.
- Ensure that information about the incident is clear, factual and consistent with that provided by other responders and government agencies.
- Minimize unnecessary speculation, rumour, or concerns about the incident and potential risks to the public.

The Information Officer is supported by a team of pre-assigned employees to assist in implementing the communications plan. This group is known as the External Communications Team. The specific duties related to the Information Officer can be found in the ICS Guide including activation of the JIC.

Note: The Information Officer position is a Government Representative or other individual designated by Unified Command for incidents within Washington State.

8.13 Liaison Officer

The Liaison Officer is the contact point for agency representatives assigned to the incident by assisting or cooperating agencies. These are personnel other than those on direct tactical assignments or those involved in a Unified Command. The specific duties for the Liaison Officer can be found in the ICS Guide.

In General the Liaison Officer's responsibilities are to:

- Be a contact point for Agency representatives.
- Maintain a list of assisting and cooperating agencies and Agency Representatives.
- Assist in establishing and coordinating interagency contacts.
- Keep agencies supporting the incident aware of the incident status.
- Monitor incident operations to identify current or potential inter-organizational problems.
- Participate in Planning Meetings, providing current resource status, including limitations and capability of assisting agency resources.

Note: Liaison Officer position is a Government Representative or other individual designated by Unified Command for incidents within Washington State.

8.14 Government Agency Representatives

Agency Representatives assigned to an incident from Federal, State or local government agency report to the Liaison Officer or to the Incident Commander in the absence of a Liaison Officer. These representatives should have full authority to make decisions on all matters affecting that agency's participation at the incident.

8.14.1 Agency Representatives Responsibilities

- Ensure that all agency resources are properly checked-in at the incident.
- Attend briefings and planning meetings as required.
- Provide input on the use of agency resources unless resource technical specialists are assigned from the agency.
- Cooperate fully with the Incident Commander and the General Staff on agency involvement at the incident.
- Ensure the well-being of agency personnel assigned to the incident.
- Advise the Liaison Officer of any special agency needs or requirements.
- Report to home agency dispatch or headquarters on a prearranged schedule.

Ensure that all agency personnel and equipment are properly accounted for and released prior to departure.

8.15 Legal Officer

The Legal Officer is responsible for providing advice and direction on all matters that may have a legal impact on Kinder Morgan Canada. The specific duties for the Legal Officer can be found in the ICS Guide, in general the duties include:

- Legal requirements in execution of agreements
- Incident investigation report reviews/meetings
- Environmental damage assessments
- Claims, where applicable
- Any major contracts that are not standard to the operation
- Any insurance issues/concerns
- Major health & safety issues/injuries
- Information releases
- Government Agency requests
- Reporting to Incident Commander

Note: Legal maintains contact information for Insurance other agencies for claims in the Calgary office.

8.16 Response Planning (Short-Term and Initial Phase of Long-Term Events)

Short-term responses that are small in scope and/or duration, and require few resources can often be managed using only the Incident Command Briefing (ICS 201 Form). Responses to longer-term events will also begin with the completion of the ICS 201 and Incident Briefing.

8.16.1 Incident Briefing

During the transfer of command process, an Incident Briefing provides the incoming Incident Commander with basic information regarding the incident situation and the resources allotted to the incident. Most importantly, it is the de facto Incident Action Plan (IAP) for the initial response and remains in force and continues to develop until the response ends or the Planning Section generates the incident's first IAP. It is also suitable for briefing individuals newly assigned to Command and General Staff, as well as needed assessment briefings for the staff.

When	• Upon the arrival of a new Incident Commander a transfer of Command will take place. The Incident Briefing also serves as an opportunity to provide initial information to incoming key IMT and agency personnel.
Facilitator	• The Incident Briefing is facilitated by the Current (and often initial) Incident Commander.
Attendees	• The Incident Briefing is attended by the incoming IC, the Command and General Staffs, as well as any senior responding Government Agency personnel and senior contractor representatives.
Agenda	• Situation (note territory, exposures, safety concerns, etc. use map/charts) • Objectives and priorities • Strategy(s) and tactics • Current organization • Resource assignments • Resources enroute and/or ordered • Facilities established

8.17 Response Planning (Long-Term Events)

Kinder Morgan Canada follows the ICS model for incident response planning. The planning cycle and associated meetings can be found in the Kinder Morgan Canada Incident Command System Guide located on e:\manuals.

8.18 Terminating/Downgrading the Response

The decision to terminate and/or downgrade emergency operations and to demobilize personnel and equipment shall be made on a site-specific basis, based on the status of the incident. Factors that may affect the decision to terminate the response include the following:

- The emergency condition has been controlled and immediate threats to the health and safety of the public have been eliminated
- Any leaks or spills have been contained, and all remaining free oil, petroleum products, or hazardous materials have been recovered from the site
- Repair operations have been undertaken to prevent further leaks or spills from occurring
- Further emergency operations at the site will cause more damage to property and the environment than that which resulted from the leak or spill initially.

The Regional Director or designee shall consult appropriate government agencies and other involved parties before making any decisions related to terminating response activities. These agencies and involved parties include representatives from federal, state and/or municipal agencies with jurisdiction in the emergency.

Prior to terminating the response the following issues should be considered by the Unified Command:

- Demobilize equipment and personnel at the first opportunity in order to reduce cost
- Consider which resources should be demobilized first; for example, berthing expenses can be saved by demobilizing out-of-area contractors before local ones
- Equipment may need both maintenance and decontamination before being demobilized
- All facilities (staging area, Incident Command Post, etc.) should be returned to their pre-spill condition before terminating operations
- Determine what documentation should be maintained, where, and for how long
- Contract personnel may be more susceptible to "suffering" injuries as they approach termination
- Some activities will continue after the cleanup ends; examples include incident debriefing, bioremediation, claims, and legal actions
- Consider expressing gratitude to the community, police department, fire department, and emergency crews for their work during the response.

9.0 OPERATIONS SECTION

The Operations Section is responsible for the oversight of all tactical assignments in the response. These include all contractors or other agencies that supply tactical resources in response to the incident. These might include representatives from the Fire Department, the police, the Ambulance Service as well as response organizations. Detailed duties and responsibilities for individuals in the Operations Section can be found in the Kinder Morgan Canada Incident Command System Guide on e:\manuals. The Operations Section may consist of numerous (functional) Groups and Branches, (geographic) Divisions. If Staging Areas are used, these are also managed by the Operations Section.

9.1 Response Objectives

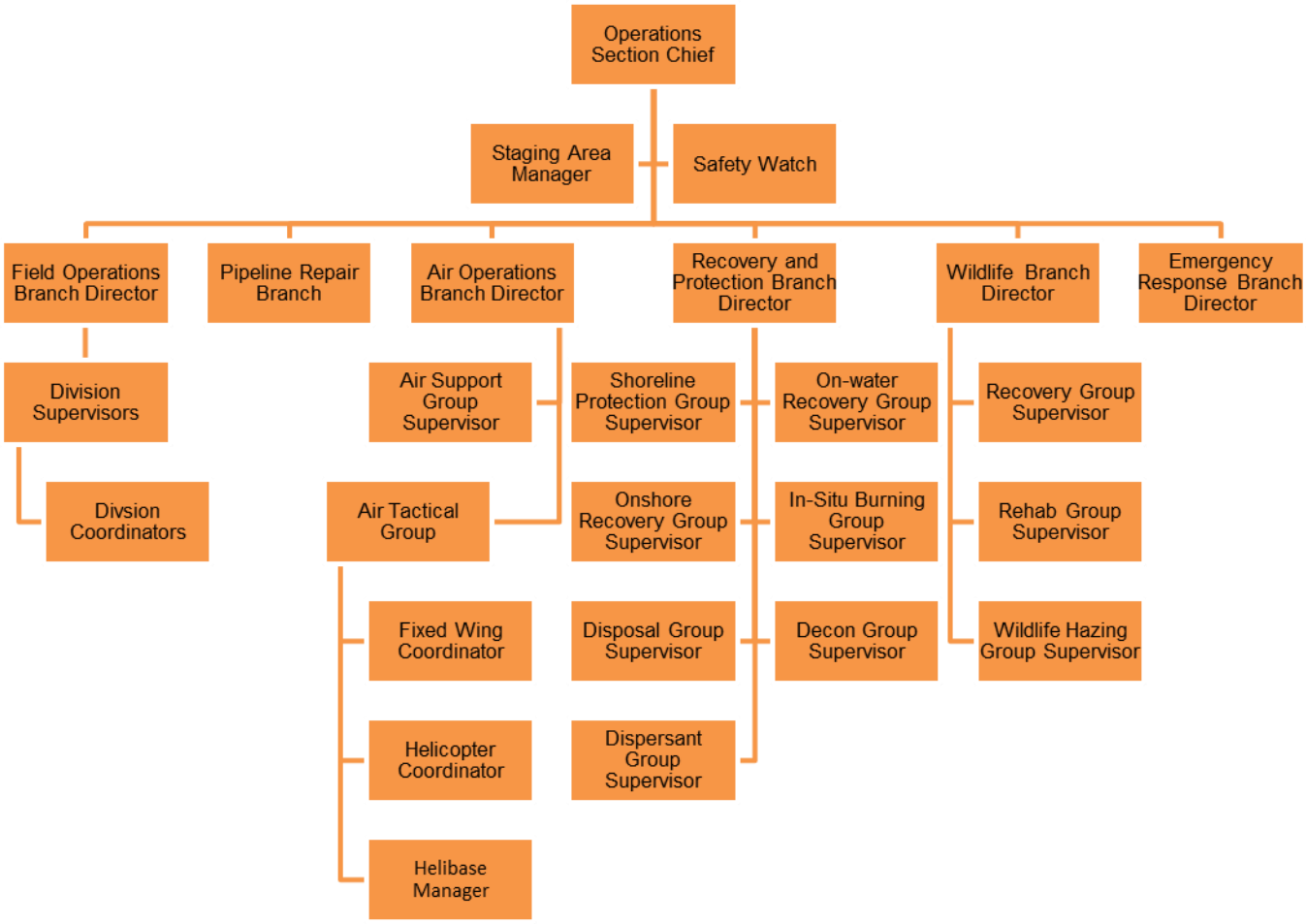
Once the safety of all personnel has been ensured, the source of discharge is secured, and initial notification has been activated, the overall tactical priorities covered are:

- Containment and Recovery of Spilled Oil
- Protection of Sensitive Resources
- Site and Shoreline Clean-Up

Response objectives and priorities will be determined by the Incident Commander, Unified Command, and the Planning and Operations Section members. Critical advice will be provided by representatives of key government agencies.

9.2 Operations Section Organization Chart

Not all roles will be filled for all incidents; however the following chart is an outline of the possible positions to be filled. Detailed descriptions of each position and its duties can be found in the Kinder Morgan ICS Guide (e:\manuals) and the Northwest Area Contingency Plan (http://rrt10nwac.com/NWACP/Default.aspx)



9.3 Operations Section Chief/Deputy Operations Section Chief

The Operations Section Chief, a member of the general staff, is responsible for managing all operations directly applicable to the primary mission. The Operations Chief activates and supervises elements in accordance with the Incident Action Plan and directs its execution; activates and executes the Site Safety and Health Plan; directs the preparation of unit operational plans, requests or releases resources, makes expedient changes to the Incident Action Plans as necessary, and reports such to the Incident Commander.

9.4 Air Operations Branch

Surveillance and tracking is used to monitor spill movement in both near-shore and offshore areas using visual observations. Typically air surveillance from helicopters is used to track oil movement and to direct on-water booming and skimming operations. Air surveillance will be used at a minimum of

three ten hour operational periods during the initial seventy-two hours of the discharge. For information on aviation companies please see *Section 2.12 Additional Resources Suppliers,* or this service will be provided by one of the Primary Resource Contractors listed in *Section 2.10 Support Services - Primary Response Contractors (PRC).*

9.5 Temporary Storage

All waste materials collected from a spill should be sorted and stored in separate containers or piles that are clearly marked showing the type of waste they contain. Temporary storage locations on the premises should be totally contained and secure to prevent further leakage or migration of spilled product.

9.5.1 Temporary Storage Methods

Method of Containment	Product						
	OIL	Oily Water	Oily Soil	Oil/Debris (Small)	Oil/Debris (Medium)	Oil/Debris (Large)	Capacity
Drums	✓	✓	✓				0.2-0.5 yd^3
Bags		✓	✓	✓			1.0-2.0 yd^3
Boxes			✓	✓			1-5 yd^3
Open top roll-off	✓	✓	✓	✓	✓	✓	8-40 yd^3
Roll top roll-off	✓	✓	✓	✓	✓	✓	15-25 yd^3
Vacuum box	✓	✓					15-25 yd^3
Frac tank	✓	✓					500-20,000 gal
Poly tank	✓	✓					200-4,000 gal
Vacuum truck	✓	✓	✓				2,000-5,000 gal
Tank trailer	✓	✓					2,000-4,000 gal
Barge	✓	✓					3,000+gal
Berm, 4 ft		✓	✓	✓	✓	✓	1 yd^3
Bladders	✓	✓					25 gal-1,500 gal

9.5.1.1 Initial Handling and Storage

Initial oil handling and storage needs may be overlooked in the emergency phase of a response, which could result in delays and interruptions of cleanup operations. Initially, waste management concerns should address:

- Equipment capacity
- Periodic recovery of contained oil
- Adequate supply of temporary storage capacity and materials.

The following action items should be conducted during a spill response:

- Development of a Site Health and Safety Plan (see Section 1)
- Development of a Disposal Plan in accordance with any federal, provincial, and/or local regulations
- Continuous tracking of oil disposition in order to better estimate amount of waste that could be generated over the short and long-term
- Organization of waste collection, segregation, storage, transportation, and proper disposal
- Minimization of risk of any additional pollution
- Regulatory review of applicable laws to ensure compliance and (if appropriate) obtain permits
- Documentation of all waste handling and disposal activities
- Disposal of all waste in a safe and approved manner.

Good hazardous waste management includes:

- Reusing materials when possible
- Recycling or reclaiming waste
- Treating waste to reduce hazards or reducing amount of waste generated.

The management of the wastes generated in cleanup and recovery activities must be conducted with the overall objective of ensuring:

- Worker safety
- Waste minimization
- Cost effectiveness
- Minimization of environmental impacts
- Proper disposal
- Minimization of present and future environmental liability.

Solid wastes such as sorbents, PPE, debris, and equipment will typically be transported from the collection site to a designated facility for:

- Storage
- Waste segregation
- Packaging
- Transportation

Once this process is complete, the waste will be shipped off-site to an approved facility for required disposal.

9.6 Waste Disposal

9.6.1 Types of Spill-Related Waste Materials

The most common types of waste likely to be generated from an oil spill are:

- Contaminated Liquids - Mixture of oil and water recovered from the surface of the water usually by skimmer
- Contaminated Debris - Twigs, leaves, vegetation/seaweed, dead animals or birds coated with pollutant
- Contaminated Sediment - Sand or gravel removed from the shoreline or spill site
- Clean-up Materials - Oily/contaminated rags, oiled sorbents, oil PPE and clothing worn by response team personnel

9.6.2 Waste Management Plan

Before any waste materials are transported off the site for disposal, a Waste Management Plan should be prepared in consultation with the state agencies. Responsibility for working with the state authorities to develop a proper Waste Management Plan lies with the Environmental Unit Leader. More information on the duties of the Disposal (Waste Management) Technical Specialist can be found in the Incident Command System Guide on e:\manuals. The generic Disposal Plan will be provided to WDOE on request. A copy of the generic Disposal Plan, which includes forms for tracking, can be found in e:\manuals or on:
http://kmonline/business_units/KMC/Pages/EHS_Emergency_Response.aspx

9.6.3 Waste Transport Procedures

Once a decision has been made to transport wastes off the site for final disposal, KMC, as the Consignor or generator of the waste, is responsible for:

- Ensuring that the person or company transporting the waste is qualified and licensed.
- Ensuring that the place where the waste is transported to is approved as a waste storage and/or disposal site.
- Completing all necessary documentation (e.g., transport manifest) and retaining records for two years.

9.7 Decontamination Plan

All personnel and equipment must go through a decontamination process to ensure spilled material does not contaminate a larger area than needed. The Decontamination Group Supervisor will work under the Recovery and Protection Branch Director. The Decontamination Group Supervisor is responsible for creating and implementing the Decontamination Plan. A copy of the Decontamination Plan form can be found in e:\manuals or on:
http://kmonline/business_units/KMC/Pages/EHS_Emergency_Response.aspx

9.8 Public Evacuation Plan

If the public is immediately threatened in the initial stages of the incident and evacuation is required before local response agencies arrive at the scene of the emergency, the Incident Commander must ensure public protection and may request available company personnel to initiate an evacuation. Evacuation duties should be turned over to local response agencies as soon as possible.

The Incident Commander and other company employees shall cooperate and work closely with responding emergency agencies. Appropriate information will be provided as required to enable community emergency operations to be conducted.

KM personnel, together with local authorities, i.e., police/fire, will prepare an initial plan of evacuation. This plan will take into consideration the following:

- Weather conditions
- Evacuation sites for receiving evacuees
- Ensuring that all residents of the area to be evacuated receive emergency instructions
- Time it will take for evacuation
- Method for evacuation
- Evacuation routes
- Capacity of the evacuation routes
- Awareness of the needs of "special needs" people
- Awareness of the needs of farm animals and pets
- Security of evacuated properties
- Notification for controlled re-entry into the area.

9.8.1 Post Evacuation Procedures

The Incident Commander, together with local emergency agencies and pertinent government agencies, will make the decision to return residents to the area. The company will notify the affected people and ensure that:

- Residences are ventilated and checked
- Return transportation to the homes is provided
- Follow up meetings are conducted with the evacuees to address any concerns they may have.

9.9 Spill Response Equipment

9.9.1 Puget Sound Spill Response Equipment

Kinder Morgan owns and maintains response equipment placed strategically for easy access and deployment during an incident. There are two response trailers located in the Puget Sound Region and other equipment available via NRCES and Kinder Morgan operations in Canada. There is 2000 ft of boom available for fast water deployment within 2 hours at any point on the pipeline per WAC 173-182-365 (2), stored at Laurel Station 1200ft and 800ft at Anacortes Station. In addition to available boom there is recovery and storage equipment available in the two OSCAR units. The equipment used to meet the planning standards for this ERP is outlined in Section 18.2 Planning Standards. For a full detailed list of the OSCAR contents please refer to the spreadsheet associated with this plan on e:\manuals.

9.9.2 Nearby Kinder Morgan Canada Spill Response Equipment

In addition to the OSCAR trailers in the Puget Sound Region there are trailers located at Sumas Station, Burnaby, Westridge, Kamloops in Canada. The estimated response time to Laurel Station from Sumas Station is about 2 hours, and up to 6 hours from Kamloops. The OSCAR units in each of these locations contain similar equipment to those at Laurel Station and Anacortes Meter Station. Additionally Kinder Morgan Canada has equipment in Blue River, BC, and the following Alberta locations; Jasper, and Edmonton which could be deployed if needed.

9.9.3 Primary Response Contractor Spill Response Equipment

Kinder Morgan Canada relies upon third party contractors to supply additional manpower and equipment to meet the planning standards set out by the Washington State Department of Ecology and the Department of Transportation Pipeline Hazardous Material Safety Administration. In doing so the equipment available is listed in Section 18 of this document.

Note: the area in which the Puget Sound pipeline operates, in-situ burn would not normally be considered as a response tactic, however if in the planning process in consultation with WDOE it is determined that in-situ burn is the most effective tactic, the equipment will be supplied by NRCES, and the processes in the Northwest Area Contingency Plan will be followed.

9.9.4 Western Response Resource List (WRRL)

The WRRL is a database that stores data on various types of oil spill response equipment in the Pacific Northwest. The advantage of the WRRL is that it provides a uniform system to describe and list equipment. Each piece of equipment that is entered in the database is given a unique "WRRL ID" that provides a standard way of tracking and listing equipment in the region. The database can be accessed via the internet and downloaded in a variety of formats. Once the information is downloaded the data can be used in a number of different ways. The WRRL can be used to locate and order response equipment during a drill or spill, provide an overall picture of the regions response resources, be used for developing and reviewing oil spill contingency plans, assist in cost accounting, or by an organization to track their own resources.

The WRRL list can be located at: http://www.wrrl.us

9.9.5 Response Equipment Maintenance

KM response equipment is tested and inspected as noted below. The Manager of Operations is responsible for ensuring that the following response equipment and testing procedures are implemented, and records kept for a period of at least 5 years. Equipment maintenance records will be made available to Ecology personnel, if requested. These consist of:

- **Containment boom -** During boom deployment exercises, boom will be inspected for signs of structural deficiencies. If a tear in fabric or rotting is observed, boom will be repaired or replaced. In addition, end connectors will be inspected for evidence of corrosion. If severe corrosion is detected, equipment will be repaired or replaced.
- **Miscellaneous equipment -** Other response equipment identified in this Plan will be inventoried and tested on an annual basis to ensure that the stated quantities are in inventory and in proper working order. The equipment inspection and deployment exercises are recorded and maintained at the facility and retained for a period of five years.

9.9.6 Contractors, Contractor Equipment and Labor

Kinder Morgan's primary response contractors' names and phone numbers, as well as other companies who can provide spill response services are provided in Section 2. Kinder Morgan has ensured by contract the availability of private personnel and equipment necessary to respond, to the maximum extent practicable, to the worst case discharge or the substantial threat of such discharge.

DECONTAMINATION PLAN - PERSONNEL

Incident Name	Location
Effective Date of Plan	**Effective Time Period of Plan**
Spill Location	**Plan Prepared By**

Work Zones:

Hot (Exclusion) Zone:

- This zone is where contamination does or could occur
- All access and egress will be through a designated control point
- All personnel entering the Exclusion Zone must use the buddy system and must wear the required level of protection
- Personal protective equipment worn will be based on site-specific conditions including the type of work to be done, weather and the hazards that might be encountered
- When the outer edge of the Exclusion Zone has been determined it shall be physically secured, fenced or well-defined by land markers and/ or tape
- A safety station is set up in this zone with the following items: a wind sock, an emergency eye-wash bottle, and a megaphone or air-horn.

Warm (Contamination Reduction) Zone:

- This zone is situated between the Exclusion Zone and the Support Zone and provides a transition between contaminated and clean zones
- Decontamination stations will be established for personnel and equipment
- Exit from the Exclusion Zone will be through a decontamination station.

Cold (Support) Zone:

- This zone is at the outermost area of the spill site and will be considered a non-contaminated or clean area
- The support equipment (Field Command Post, etc.) will be located in this zone. Traffic is restricted to authorized response personnel in this zone.

These zones are identified by signs, barrier tape or other means. Decontamination is performed in the contamination reduction zone. When responders exit the exclusion zone they must be decontaminated. Crews are available to assist in decontamination procedures as needed. The crews must wear appropriate personal protective equipment (PPE), and are responsible for packaging and labelling of contaminated PPE.

Decontamination Stations:

Decontamination is performed within the contamination reduction zone, which is appropriately lined to prevent the spread of contaminants. Dikes are installed under the lining to contain runoff.

SAMPLE

DECONTAMINATION PLAN - PERSONNEL

MEASURES FOR DECONTAMINATION		
STATION 1	Segregated Equipment drop	Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
STATION 2	Outer garment/boots/ gloves rinse and wash	Scrub outer boots, outer gloves, and splash suit with decontamination solution or detergent and water. Rinse off using copious amounts of water.
STATION 3	Outer boot and glove removal	Remove outer boots and gloves. Deposit in container with plastic liner.
STATION 4	Tank change	If worker leaves exclusion zone to change canister (or mask) or this is the last step in the decontamination procedures; worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, the worker returns to duty.
STATION 5	Inner boots/gloves/ garment removal	Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
STATION 6	SCBA/respirator removal	Face piece is removed. Avoid touching face with fingers. Face piece deposited on plastic sheet.
STATION 7	Field wash	Hands and face are thoroughly washed. Shower as soon as possible.

SAMPLE

DECONTAMINATION PLAN - EQUIPMENT

Incident Name	Location
Effective Date of Plan	**Effective Time Period of Plan**
Spill Location	**Plan Prepared By**

PURPOSE
This plan identifies the general procedures to be followed for the decontamination of response vessels, equipment and boom involved in the response to the _____ spill.

This plan will be used for all Kinder Morgan-owned and support equipment, either contaminated or suspected of being contaminated with oil, to return it to a non-oiled state.

SAFETY
Health and safety for the site will be the responsibility of _____.
Describe the health and safety plan and where it will be posted.

DECON SITE SPECIFICS (describe for each site)

Site Location:
Description:
Contact Person:

OVERVIEW
Provide a brief overview of the decontamination project and methods.

CLEANING METHODS AND EQUIPMENT
Describe cleaning methods, equipment and personnel requirements

PROJECT TIMING
Describe schedule from start to finish.

EQUIPMENT TO BE CLEANED AND PRIORITY
Describe and prioritize equipment to be cleaned. Consider operational need and cost when setting priorities.

SAMPLE

DISPOSAL PLAN

INCIDENT INFORMATION	
Incident Name:	
Spilled Material:	☐ MSDS Attached
Spill Volume (estimate):	
Spill Location:	
Spill Date/Time:	
Submitted by:	
Report Update Date/Time:	

Disposal Plan Authorization

Kinder Morgan ("The Company") will recover the maximum feasible amount of oil spilled during the above named incident while minimizing impacts to human health and the environment. In addition an unknown quantity of oily waste debris (including plastics, sands, etc.) will be recovered. When disposing of this material, The Company will abide by all applicable laws and regulations. Disposed material will be tracked to provide an accurate means of estimating total oil recovered.

This plan may be amended as necessary to ensure compliance with all applicable laws and regulations. Amendment may occur only upon mutual agreement of The Company and Federal and/or Province/State On Scene Commanders.

Plan Reviewed/Approved by:

	Agency/Representative	Name	Signature	Date
Federal				
Provincial/State				
Other (optional)				
Other (optional)				
Kinder Morgan IC	Kinder Morgan			

SECTION I WASTE HANDLERS

The following licensed transporters and approved treatment and disposal facilities are to be used for waste handling and disposition unless otherwise directed. All waste handlers must have read and are working in accordance with this plan.

Company Name	Disposal Functions	Company Representative Signature

SAMPLE

DISPOSAL PLAN

SECTION II WASTE CLASSIFICATION

The material was classified as Designation (F1 for help) waste based on the following:

A. Waste Analyticals

The following wastes were tested to confirm disposal criteria and contamination levels. Lab reports attached ☐

Sample No./Description	Lab	COC Form	Analyte	Disposal Method	Disposal Criteria

SECTION III INTERIM STORAGE, SEGREGATION AND TRACKING

A. Interim Storage

Interim Storage sites will be located at:	1.
	2.
	3.
	4.

Below provide a description of each of the above sites, lined roll-off boxes, etc. Describe how each site was constructed, bermed, covered, etc. to minimize infiltration of rainwater and prevent leaching.

1.

2.

3.

4.

SAMPLE

DISPOSAL PLAN

B. Segregation

Material recovered must be segregated in the following manner unless otherwise directed by the State/Provincial or Federal On Scene Commander. (Washington State requires further segregation for volume of oil recovered during the first 24 hours (see Attachment 2 – Area 6 Only).

1. Oil collected from sources other than waters/shorelines (e.g. on vessels or pier).
2. Oil and oil/water mixtures recovered from waters/shorelines.
3. Oiled organic debris: wood, aquatic vegetation. Oily debris must be of should be placed in clear plastic bags for ease of identifying contents and segregation. To the extent possible efforts should be made to homogenize recovered organic debris e.g., heavy oiled eel grass should be kept separate from dissimilar debris.
4. Oiled sorbent material: oil snares, pads and booms.
5. PPE and other typically non-sorbent materials.

Describe measures taken to ensure material recovered was properly segregated.

C. Tracking

Wastes generated, stored and requiring treatment/disposal will be tracked by shipment on the tracking forms (Attachment 1). Any transported waste will be accompanied by the appropriate documentation (i.e. bill of lading, waste manifest, etc.) Copies of the waste tracking forms and consignor copies of shipping documentation must be submitted to the Disposal Technical Specialist (or Environmental Team) in Incident Command at the end of each operational period.

SECTION IV PERMITS/AUTHORIZATIONS

List all permits that have been considered/obtained for any waste management activities to be executed (i.e. decanting, in-situ burning, soil relocation, etc.)

Agency	Permit	Obtained (Date/Time)	Comments

SECTION V DECONTAMINATION

Describe the areas designated for decontamination including location, set up and pollution prevention measures.

SAMPLE

DISPOSAL PLAN

SECTION VI ANIMAL CARCASSES

If applicable describe the number of animal carcasses disposed of and methods used for their disposal.

SECTION VII WASTE DISPOSITION AND FINAL DISPOSAL

A. Waste Disposition

The following priorities for the collection, handling and management of wastes should be followed in descending order as applicable and practical:

1. Recovery/recycling
2. Bioremediation
3. Incineration/Thermal Treatment
4. Burial/Landfill

Copies of completed waste tracking forms, transportation documentation and receipts from disposal facilities must be appended to this plan. The ICS Form 209 Final Waste Status Summary will be used to track the total oil liquids recovered, stored and disposed on a "real time" basis.

B. Final Disposal

Describe the types of waste that will be generated and their final disposal.

Waste	Waste Disposal/ Treatment Method	Transporter(s)		Facility
Oil/water	Oil recovery			
Oily absorbents				
Oily soil				

SAMPLE

Attachment 1
Tracking Forms

SAMPLE

INCIDENT INFORMATION			
Incident Name:		**Spill Location:**	
Spilled Material:		**Spill Date:**	
Spill Volume (estimate):		**Report Update Date/Time:**	

RECOVERY TRACKING

Recovery Location(s)	Source	Time Recovered From:	Time Recovered To:	Total Volume (Gallons*)	Volume as Product	Volume as Aqueous	Type of Waste	Projected Interim Storage Demand**

* Cubic yards for solids
** Means to address demand per location per time

SAMPLE

INCIDENT INFORMATION			
Incident Name:		**Spill Location:**	
Spilled Material:		**Spill Date:**	
Spill Volume (estimate):		**Report Update Date/Time:**	

INTERIM STORAGE TRACKING

Interim Storage Location(s)	Received From Location(s):	Transportation*: Document Type:	Transportation*: Number(s):	Time Received:	Volume (Gallons**)	Type of Waste

* If applicable
** Cubic yards for solids

SAMPLE

INCIDENT INFORMATION			
Incident Name:		**Spill Location:**	
Spilled Material:		**Spill Date:**	
Spill Volume (estimate):		**Report Update Date/Time:**	

FINAL DISPOSAL TRACKING

Disposal Facility Location:	Receipt Number(s)*:	Received From Location(s):	Transportation Document Type:	Transportation Number(s):	Time Received:	Volume (Gallons**)	Type of Waste

* If applicable
** Cubic yards for solids

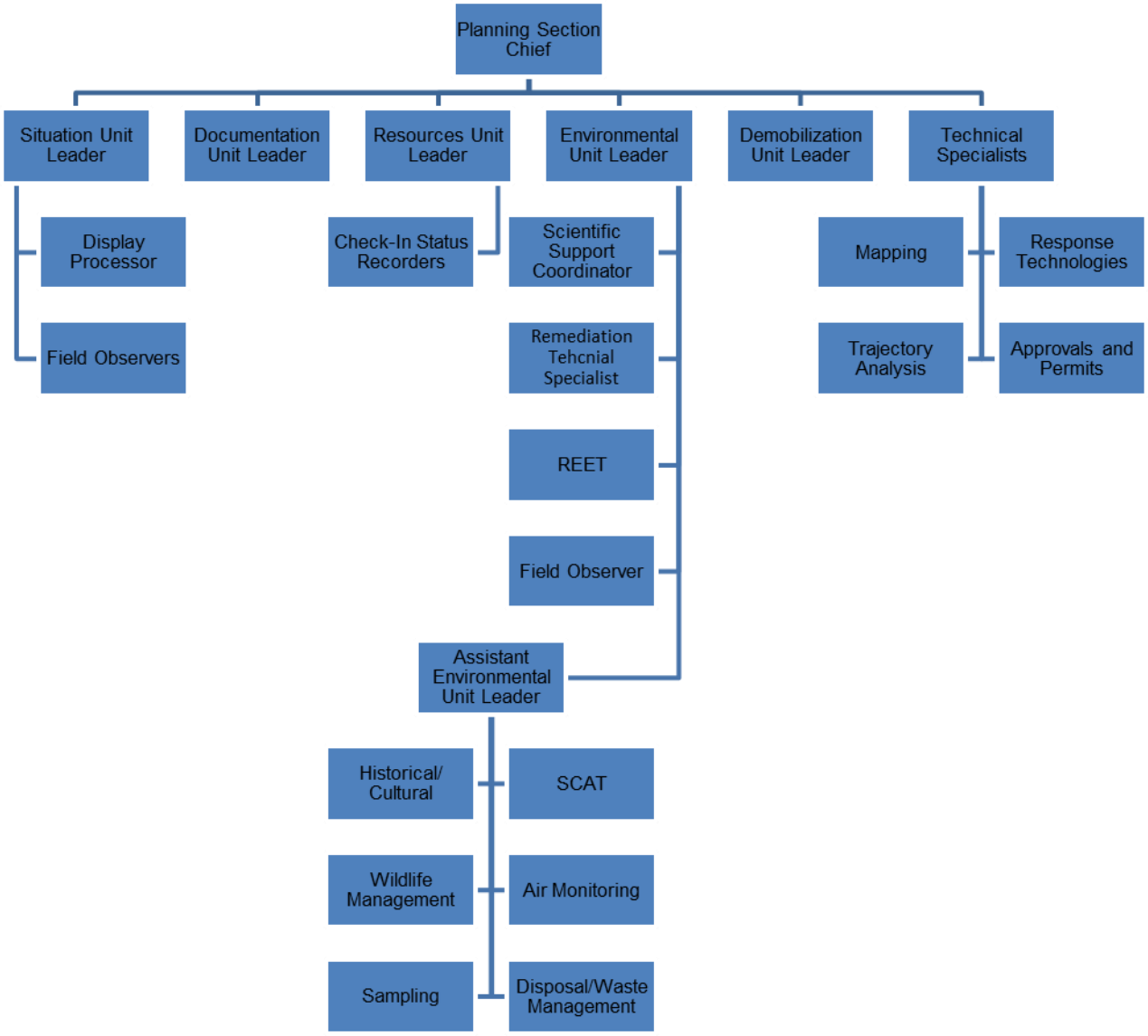
SAMPLE

10.0 PLANNING SECTION

The Planning Section is responsible for the gathering of incident intelligence, and the development of Incident Action Plans. This includes the tracking of incident information and resources, and the documentation of the incident. Detailed duties and responsibilities for individuals in the Planning Section can be found in the Kinder Morgan Canada Incident Command System Guide on e:\manuals. Technical Specialists, i.e., fire or oil spill specialists will also be assigned to the Planning Section.

10.1 Planning Section Organization Chart

Not all roles will be filled for all incidents; however the following chart is an outline of the possible positions, and reporting structure. Detailed descriptions of each position and its duties can be found in the Kinder Morgan ICS Guide (e:\manuals) and the Northwest Area Contingency Plan (http://rrt10nwac.com/NWACP/Default.aspx).



NOTE: This is an example of possible reporting structure, the actual reporting structure will be determined at the time of an incident by the Section Chief and Unit Leaders.

10.2 Planning Section Chief

The Planning Section Chief, a member of the General Staff, is responsible for collecting, evaluating, disseminating, and using information about the incident and status of resources. Information is needed to:

1) understand the current situation,
2) predict probable course of incident events, and
3) prepare alternative strategies for the incident.

10.3 Environmental Unit Leader

The Environmental Unit Leader is responsible for environmental matters associated with the response, including strategic assessment, modeling, surveillance, and environmental monitoring and permitting. The Environmental Unit prepares environmental data for the Situation Unit. Most Technical Specialists engaged during the response will be assigned to the EUL. For a detail description of the duties associated with the Environmental Unit Leader please see the Kinder Morgan ICS Guide (e:\manuals) and the Northwest Area Contingency Plan (http://rrt10nwac.com/NWACP/Default.aspx).

Note: In Washington State, the Environment Unit Leader is a government natural resource trustee agency representative OR other individual designated by Unified Command.

10.4 Monitoring and Sampling

10.4.1 Spill Monitoring

Visual observations of spilled product will be reported using a standard format on a map. If weather allows, the best surveillance is done from helicopter overflights. Overflights should be planned at least twice per day; at first light and just prior to sunset to provide timely input to operations plans. Overflight observations should be annotated on maps or charts of the area, and preferably include photography or video recordings of the oiled and non-oiled areas. In low light and/or fog conditions KMC will request NRCES to deploy their tracking buoys in marine waters and/or rivers to assist with tracking oil movements.

10.4.2 Sampling

Oil samples will be collected from the source of the spill and from key concentrations of oil in the environment. Source samples should be collected as soon as possible after the incident to help characterize the spilled oil. Field samples should be collected to characterize the oil that has impacted shorelines or sensitive areas.

All samples for chemical analysis must be collected in chemically clean jars, sealed, labelled, and kept refrigerated until processed in the laboratory. **Chain-of-Custody** forms must be initiated by the person collecting the samples and maintained through delivery to the laboratory. Specific lab analyses to be performed will depend on the situation and needs to be established at the time of the incident. Accredited laboratories, to be recommended by Technical Advisors at the time of an incident, are to be used for all analyses.

10.4.3 Air Monitoring

Air monitoring will take place immediately upon confirmation of a release. Initial monitoring will occur downwind of the incident using personal air monitoring equipment carried by all KMC personnel. The initial air monitoring will occur continuously, and results recorded if the personal air monitor alarms. Any

alarm levels will be recorded along with the location and time on the gas detection record form. The person responsible for air monitoring will then begin to move away from the source in a down wind direction to determine the extent of potential air contamination. This will assist first responders with setting up a response zone. As more equipment and personnel arrive in the area a more detailed air monitoring plan will be developed under the direction of Unified Command to allow responders to evaluate air contamination for human health impacts. Air monitoring contractors will be called to assist with the development of the air monitoring plan, and collect field samples with additional specialized equipment. All records will be forwarded to the Command Post at the end of each shift. Real time air monitoring will be reported directly to Safety Watch immediately if occupational and/or human health criteria are exceeded, or upon request. Safety Watch will report any result that exceeds occupational health criteria to the Safety Officer immediately, and any other air monitoring results upon requested by the Safety Officer, as needed. The public will be informed of air monitoring results, as they become available via regular updates from the Information Officer and/or the Joint Information Center.

10.5 Demobilization

KMC will develop a Demobilization Plan, to ensure the resources available are what is required. Therefore, emphasis must be placed on establishing efficient demobilization procedures. Further information on he Demobilization Unit Leader is available in the Incident Command System Guide located on e:\manuals

10.5.1 Demobilization Procedures

- Operations Section will determine which resources are ready for release from a specific collection site
- The Planning Section will provide guidance on release priorities and demobilization recommendations
- Information maintained by the Planning Section will be utilized to assist in the prioritization
- Decontaminated equipment will be returned to appropriate staging area for release or re-deployment
- Transports for equipment will be required if remote from staging area
- The Planning Section will document all demobilization and decontamination activities
- Equipment designated for re-assignment will be mobilized to the appropriate staging area
- The Division Supervisor will ensure a log is maintained documenting that proper decontamination procedures are performed for each piece of equipment
- The Operations Section will ensure that redeployed personnel receive proper rest prior to returning to duty. The Planning Section Chief will monitor personnel redeployment activities to ensure number of hours worked is within acceptable guidelines Planning Section Resources

10.6 Planning Section Resources

10.6.1 Northwest Area Contingency Plan

This plan is intended for use as a guideline for coordination of spill response actions and to ensure consistency in response to spills. Federal and state rules require that a Responsible Party (RP), or spiller, must be able to manage spills with a pre-designated response management organization that accommodates a unified command structure in recognition of federal, state, tribal or local jurisdiction.

The plan will assist the Planning Section with area specific information and can be found at:
http://rrt10nwac.com/NWACP/Default.aspx

10.6.2 Washington State Geographic Response Plans

Geographic Response Plans (GRPs) are geographic-specific response plans for oil spills to water. They include response strategies tailored to a specific beach, shore, or waterway and meant to minimize impact on sensitive resources threatened by the spill. Each GRP has two main priorities:

- To identify sensitive natural, cultural or significant economic resources.
- To describe and prioritize response strategies in an effort to minimize injury to sensitive natural, cultural, and certain economic resources at risk from oil spills.

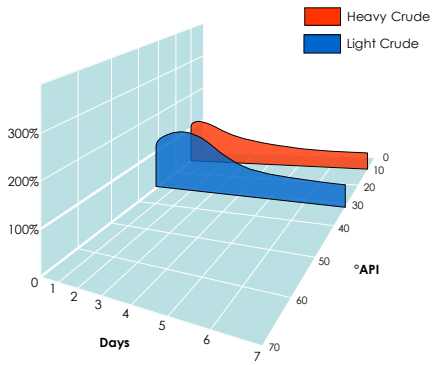
More information and the GRPs can be found at:
http://www.ecy.wa.gov/programs/spills/preparedness/GRP/Introduction/introduction.htm

10.6.3 Washington State Department of Ecology – Spills

The Spill Program's **vision** is to prevent, prepare for and respond aggressively to oil spills; to be our best for the State of Washington. Our goal is "**zero spills**". The Spills Program's **mission** is to protect Washington's environment, public health, and safety through a comprehensive spill prevention, preparedness, and response program. The Spills Program was created by the Washington Legislature in 1997 to prevent, prepare for and respond to oil and hazardous material releases from regulated oil-handling facilities and vessels. The spills website has many links that may be useful, which is found at:
http://www.ecy.wa.gov/programs/spills/spills.html

10.7 Fate of Spilled Oil

Different oil products behave very differently when spilled. The below chart provides an estimate of how each product would behave in a marine spill. In some cases, i.e., a Jet Fuel spill, emulsification can increase the volume of oily mixture to be recovered. With heavier products, such as Crude Oil, evaporation will reduce the volume of oil requiring recovery to a maximum of about 50%. In all cases, predictive models, should be run in the event of a spill, based on specific spill conditions.



Volume of oil and water-in-oil emulsion remaining on the sea surface is shown as a percentage of the original volume spilled

10.8 Shoreline Cleanup Assessment Technique (SCAT)

The SCAT process is conducted as part of the overall planning activity to identify sensitive shoreline resources, develop appropriate protection plans as outlined above, and identify recommended pre-treatment and cleanup techniques. A SCAT Team Leader, under the Environmental Unit Leader, is responsible for coordinating and directing these activities.

The specific goals of the SCAT process are to:

- identify the shoreline areas that are, and are not, oiled as a result of the spill through aerial surveys
- conduct ground surveys of these areas if necessary to define precise oil conditions, operational limitations, and to establish clean-up locations and priorities
- determine the most environmentally-suitable methods of clean-up based on shoreline type and characteristics
- conduct and monitor shoreline clean-up operations

A comprehensive, practical description of the SCAT process is contained in Environment Canada's *Oil Spill SCAT Manual for the Coastlines of British Columbia*, and in the Northwest Area Contingency Plan Section 9421 – Shoreline Cleanup and Assessment (SCAT) Response Tools

10.9 Regional Environmental Emergency Team (REET)

The Regional Environmental Emergencies Team (REET) provides consolidated and coordinated environmental advice, information and assistance in the event of an environmental emergency. REET is normally used in Canada; however it may be applicable during a spill event that crosses the Canada, USA border, most likely if the event originates in Canada. REET members represent several federal, provincial and municipal government departments, aboriginal communities, private sector agencies, and local individuals.

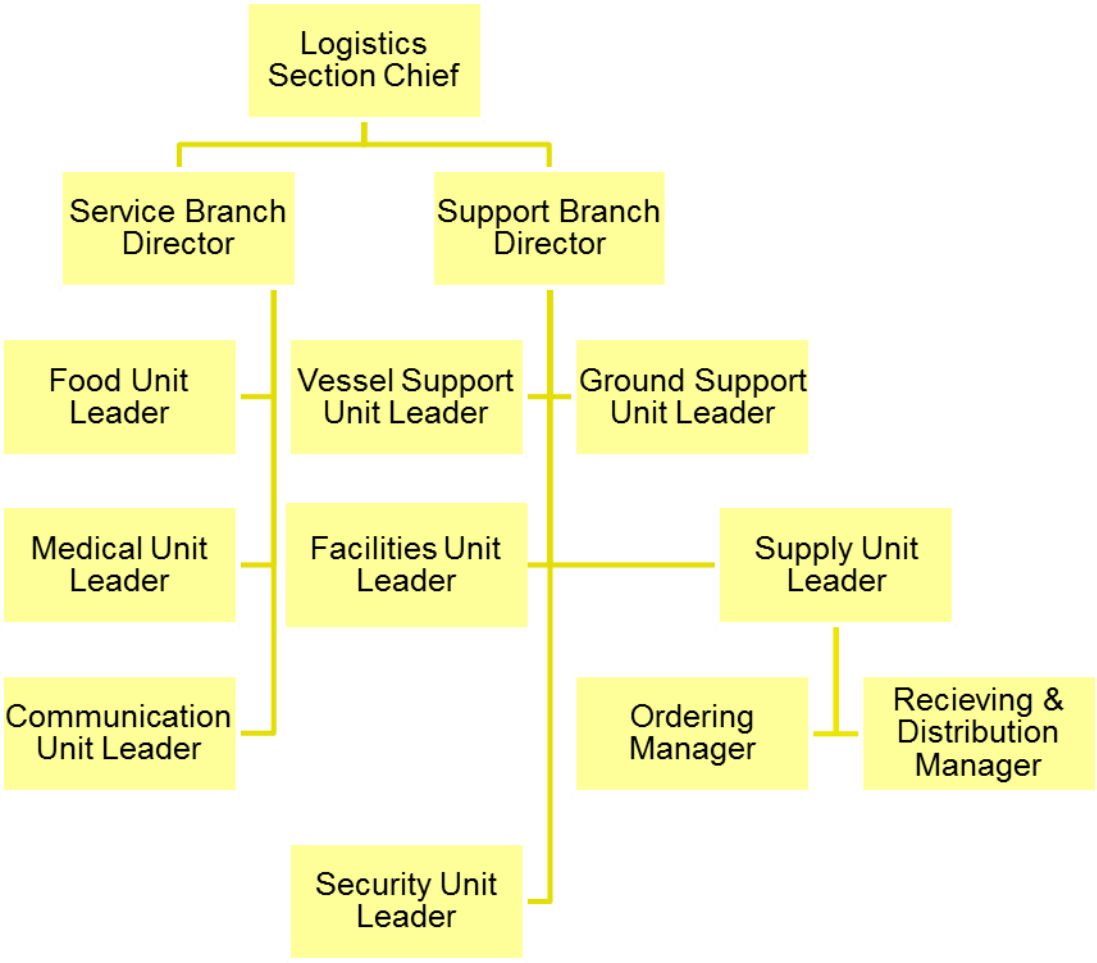
In an emergency situation REET operates as a multi-disciplinary and multi-agency team that provides comprehensive and coordinated environmental advice, information and assistance to the Unified Command, REET can address and prioritize the environmental, cultural, economic, property and human issues. REET effectively eliminates agency overlap and utilizes all resources to identify and action the resources at risk.

11.0 LOGISTICS SECTION

The Logistics Section is responsible for providing support to the incident, including all incident facilities (including the Incident Command Post). The Logistics Section will also source all required resources, including both personnel and equipment, accommodations, food and supplies. Detailed duties and responsibilities for individuals in the Logistics Section can be found in the Kinder Morgan Canada Incident Command System Guide on e:\manuals.

11.1 Logistics Section Organization Chart

Not all roles will be filled for all incidents; however the following chart is an outline of the possible positions to be filled. Detailed descriptions of each position and its duties can be found in the Kinder Morgan ICS Guide (e:\manuals) and the Northwest Area Contingency Plan (http://rrt10nwac.com/NWACP/Default.aspx)



11.2 Logistics Section Chief

The Logistics Section Chief, a member of the General Staff, is responsible for providing facilities, services, and material in support of the incident response. The Logistics Section Chief participates in developing and implementing the Incident Action Plan and activates and supervises Branches and Units within the Logistics Section.

11.3 Facilities

11.3.1 Incident Command Post

Typically, the ICP is located near the incident site and is the focus for the conduct of direct, on-scene control of tactical operations. Incident planning is also conducted at the ICP; an incident communications center also would normally be established at this location. The ICP may be collocated with the incident base, if the communications requirements can be met. The ICP may perform local Emergency Operations Center-like functions in the context of smaller jurisdictions or less complex incident scenarios.

Upon arrival at the site, IMT members should go directly to the primary ICP location. The IMT will assemble at the designated Command Post as soon as possible following notification. If another location is being utilized, team members will be notified upon arrival.

11.3.2 Media Relations Centre

The designated Media Relations Centre in the event of an emergency will be designated at the time of an emergency, based on the location of the ICP.

11.3.3 Staging Areas

A number of locations may serve as the key staging areas for response activities, the actual location of the staging area will depend on the type of emergency event. It is important to note that Logistics is responsible for establishing staging areas but once established, Operations is responsible for their continued operation and staffing.

Factors considered in the selection of staging areas include:

- Safety and security
- Accessibility by road, water
- Available space for storing equipment
- Suitability for landing helicopters
- Ease of providing long-term logistics support (personnel changes, fueling, and provisioning)

11.4 Communications

11.4.1 Emergency Communications System

During a spill response, communications will take place through one of the following modes:

- Landline and/or cellular telephones
- Radio System
- Satellite Communication

This section describes the overall communications plan and procedures followed in the event of an oil spill or other emergency.

11.4.2 Telephone Communications

Regular or cellular telephones will be the primary mode of communications between team members to whom cellular or car phones have been assigned, and the Incident Command Post, and between the Incident Command Post and various outside agencies and organizations. Regular and cellular telephone contacts for all IMT personnel and agencies are provided in Section 2.

11.4.3 Radio Communications

The radio system utilizes Motorola portable radio units. Separate channels may be used for the incident response and normal operations. Also, different contractors operate a number of radios on separate channel. When necessary to facilitate communications between Kinder Morgan and contract personnel, radios may be shared during an incident. During an incident, all radio frequencies used will be tracked using the ICS 205.

11.4.4 Additional Resource Suppliers

Suppliers and contact information is provide for a range of resources that might be required in the event of a spill in Section 2.

11.5 Security

Due to the large amount of public attention created at an incident site, additional security measures are required. Security needs to be considered for any command post, staging area as well as the incident site. Additional duties for security can be found in the Incident Command System Guide located on e:\manuals and additionally the security plan form can be found on http://kmonline/business_units/KMC/Pages/EHS_Emergency_Response.aspx or e:\manuals or in hardcopy with the documentation unit.

INCIDENT SECURITY PLAN
(Complete form for each location requiring security)

Incident name:		Date:
Incident location:		
Prepared by:	Position:	Date:

Indicate type of incident facility or area:

- ☐ Command post
- ☐ Joint information center
- ☐ Media briefing room
- ☐ Staging area
- ☐ Offshore zone
- ☐ Onshore work site
- ☐ Other:

Incident facility location:

Hours security required at this location: ☐ Daylight ☐ Night ☐ 24 hours

Security forces at this location:

☐ Private ☐ Local agency ☐ State agency ☐ Federal agency

Description:

Off-site traffic control required: ☐ Yes ☐ No

If yes, describe:

Site access controlled by:

☐ Personnel ☐ Barricades ☐ Gates ☐ Other:

Describe:

Security forces at this location:

☐ Check-in list ☐ Badges ☐ ID Card ☐ Other:

Describe:

SAMPLE

INCIDENT SECURITY PLAN, CONTINUED (Complete form for each location requiring security)			
Security forces at this location:			
☐ Personnel	☐ Locked storage	☐ 24 hr manned site	☐ Other:
Describe:			
Describe EPA, USCG, FAA, or other agency implemented safety or security zones:			
Additional comments:			
Security issue notifications:			
Site security manager:		Phone number:	
Local law enforcement:		Phone number:	
State law enforcement:		Phone number:	
Federal law enforcement:		Phone number:	
Incident security officer:		Phone number:	

SAMPLE

12.0 FINANCE AND ADMINISTRATION SECTION

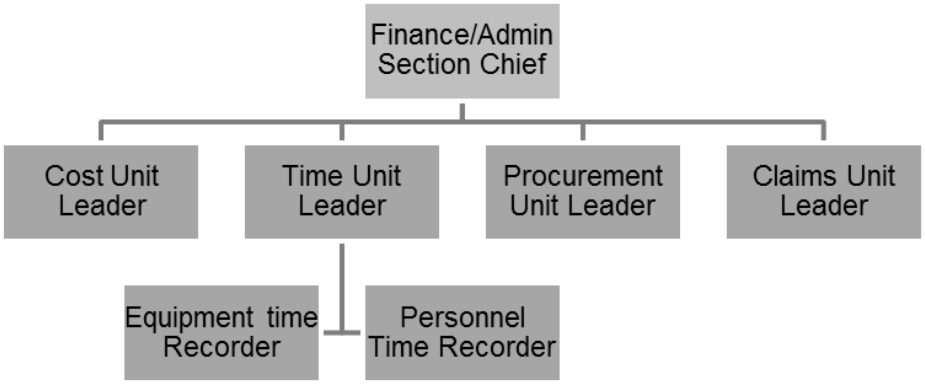
The Finance and Administration Section is responsible for all financial aspects of the response, including assisting in establishing contracts with suppliers, and setting up systems to monitor time and costs. Detailed duties and responsibilities for individuals in the Finance Section can be found in the Kinder Morgan Canada Incident Command System Guide on e:\manuals.

12.1 Finance Section Organization Chart

Not all roles will be filled for all incidents; however the following chart is an outline of the possible positions to be filled. Detailed descriptions of each position and its duties can be found in the Kinder Morgan ICS Guide (e:\manuals) and the Northwest Area Contingency Plan (http://rrt10nwac.com/NWACP/Default.aspx)

12.2 Finance Section Chief

The Finance/Administration Section Chief, a member of the General Staff, is responsible for all financial and cost analysis aspects of the incident and for supervising members of the Finance/Administration Section. In the absence of a Claims Unit Leader the Finance/Administration Section Chief will begin the claims process.



12.3 Managing Spill Liability Claims –Claims Unit Leader

The Insurance/Risk Management Department will do the following things while managing spill liability claims. The Claims unit leader will work closely with the Kinder Morgan Insurance Risk Management Department, or the Insurance/Risk Management Department will deploy specific personnel to the ICP. There is a formal and informal claims process, whenever possible KMC will use the informal process as a means of directly and immediately compensating individuals impacted by the incident.

- Participation in the initial ERL+ conference call to gather information.
- Provide notice of incident to appropriate insurers.
- Coordinate with legal, operations & procurement to investigate any contractual protections available.
- Establish contact with the Risk Management group
- Establish contact with liability adjuster and instruct them to proceed immediately to the incident site. Adjuster(s) can be on site within 4-12 hours of notification.
- Member of Risk Management group will travel to site to work with the adjuster and act as the liaison with the incident commander on site.
- Adjuster can make contact with the displaced residents at the discretion of KM or the local authorities. Adjuster will gather pertinent information (phone no., address, damage assessments, costs incurred) and will provide contact information to them for later follow-up.
- Set up an 800 number for the intake of damage claims to be funneled back through the adjuster for processing. This would be coordinated through the Communications Department, and advertised with public information communications and on the website.
- Adjuster and/or Risk Management to follow-up with displaced residents to address concerns regarding damage claims or out of pocket expenses that resulted from the incident.
- Risk Management to coordinate with the business unit to set up a property damage/liability AFE to cover the costs of damage claims of third parties.
- Instruct adjuster to gather documentation from third party claimants in order to settle and/or resolve any damage claims arising from the incident.
- Risk Management to coordinate with legal department on those third party claims in which KM is sued or third party has legal representation.
- Claims will be processed in the order they are received.
- Each claim will be given a unique tracking number and claimants will be able to track the progress of their claim with this number.
- If incomplete, claimants will be provided a thorough explanation of the deficiencies and a timeframe to submit the necessary information to continue processing the documents.
- Once processed, will a release need to be signed by claimant before payment.

12.4 Managing Spill Liability Claims – Informal Claims Process

A land agent (“Adjustor” in this context) enters the field as soon as possible after the report of the incident, often within hours. The land agent begins identifying and communicating with parties that are either directly affected by the incident or close enough to warrant communications on what is occurring. This land agent has the authority to immediately compensate or make arrangements with affected parties to mitigate the negative effect the event has had on their lives. Examples of this “immediate compensation” might be: Short term accommodations for displaced persons; water, food or groceries provision or compensation; short term lost income payment (in cases where the party has limited resources); payment for boarding of livestock or household pets; rental vehicle compensation necessitated due to loss of access to their own car; travel costs to stay with relatives or to get away

from trauma of situation; compensation for short term counseling; payment for destroyed tools/equipment that might prevent the person from carrying on their livelihood until replaced.

These immediate "claims" are identified in the field, settled immediately (with consultation with the Claims Unit Leader, or under agreed terms of reference) and either cash or check is done up on the spot, or company credit cards are used to procure things like hotel rooms. Formal paperwork is not required on these payments, the party must sign a receipt acknowledging the payment. If there are additional claims, the formal process in Section 12.5 will be followed.

12.5 Managing Spill Liability Claims –Formal Claims Process

In the event that the informal process cannot settle claims by individuals, this formal process will be followed.

12.5.1 Oil Spill Claims Event Tiers

Oil spill claims events can be generally classified by the number of claims anticipated rather than the quantity of product released. These tiers are defined as follows:

- Tier 1 – up to 50 oil spill claims anticipated
- Tier 2 – between 50 and 500 spill claims are anticipated
- Tier 3 – over 500 spill claims are anticipated

12.5.2 7.2 Oil Spill Claims Management

Management of oil spill claims will be provided by the Claims Unit Leader and the KM Insurance/Risk Management Department representatives in cooperation with the Incident Commander (Refer to Section 2 for contact information). Outside contractors will support claims processing during all events.

12.5.3 Insurance

KMC is insured in excess of the oil spill liability requirements for onshore facilities outlined in the Oil Pollution Act of 1990.

12.5.4 Oil Spill Claims Handling Process

After an oil spill occurs, KMC will advertise for claims following the information provided in Section 12.5.5. Oil spill claims information and forms will be made available through local claims centers, if established, or via the internet. Sample claims forms and internal claim check and tracking forms are presented in Section 12.5.11. Examples of documentation needed for various types of claims can be found in Section 12.5.10. Section 12.5.9 explains the KMC claims adjudication process and provides related timeframes. Depending on the anticipated number of claims related to the spill, KMC will establish local claim centers. Oil spill claims will be accepted by KMC up to 3-years from the date that KMC began advertising for claims or 3-years from the date that the injury or damage being claimed was reasonably discovered – whichever date is earlier. Natural Resources Damage Assessment (NRDA) claims are handled separately from other claims, and may be accepted by KMC in a manner and timeframe agreed to by the company and the lead federal and/or state trustee agency.

12.5.5 Oil Spill Claims Advertisements

KMC will advertise for claims after being advised to do so by our legal department, or within 15-days after being designated as the Responsible Party for an oil spill by the Federal On-Scene Coordinator (FOSC) or the USCG National Pollution Funds Center (NPFC). The geographic extent of the oil spill will dictate the publications in which claim advertisements will be placed. The length of time

advertisements will run in local publications will be based on recommendations provided by our legal department or the length of time specified by FOSC or the NPFC. A sample claims advertisement is presented in Section 12.5.11.4.

12.5.6 Oil Spill Claims Contact Information

In the event of an oil spill contact information for oil spill claims, location of local claim centers and mailing address for claims submission will be available via the toll free Public Information Line, established at the time of an incident, and on the website established at the time of an incident, as well as in advertisements placed in local publications.

12.5.7 Local Claims Centers

Local claims centers will be established based on community need and/or the number anticipated claims. Local claims centers will remain in operation for as long as warranted by workload and community need.

12.5.8 Oil Spill Claims Forms

The claims form used by KMC is presented in Section 12.5.11.1. A sample Claims Tracking Form is presented in Section 12.5.11.2. Other forms may be used if they provide an equivalent level of information as that found in Section 12.5.11.1. Information entered in the claim form must be typed or legibly hand-written in blue or blue-black ink. The claim form must include the "sum-certain" monetary amount being claimed and be signed by the claimant in black or blue-black ink. The Claims Tracking Sheet presented in Section 12.5.11.2 is used in the claims adjudication process to track the status of claims received and Claim Check Sheet presented in Section 12.5.11.3 is used to record the type of documentation provided with each claim.

12.5.9 Oil Spill Claims Adjudication and Timeframe

KMC will process claims in the order they are received. Each claim will be assigned a unique identification number which will be used to track the claim internally. The identification number can also be used by claimants who wish to provide additional information to support their claim, or inquire about the status of a claim. KMC will review each claim received to ensure, as much as possible, that all needed information to make a claim decision has been provided by the claimant. If additional information is needed, we will request that the claimant forward that information to us so it can be added to the claim and considered during adjudication. If the information requested is not received within 90 days, KMC will adjudicate the claim with the available information. This may result in a reduction of possible claim compensation or an outright denial of the claim.

Once KMC sends the claimant a claim determination, the claimant must either accept or reject the offer within 60 days. The claimant must sign a release before the claim will processed for payment. If the claimant takes no action within 60 days after receiving the claim determination, the offer to pay the claim will be voided and the claim will be closed. If the claimant rejects the offer, they can provide additional information and ask KMC to reconsider the claim determination; typically, this would start an entirely new review process with another claim determination made as a result of the reconsideration. Claims submitted to KMC will be paid in the order that accepted offers (with signed releases) are received. Claims are usually paid with 30-days from the date KMC receives the claimant's signed release.

12.5.10 Oil Spill Claims Documentation

The amount and type of documentation needed to make a claim determination depends on many factors, including the claim type and the monetary amount claimed.

The following types of claims may be submitted to KMC. Example types of documentation are also included below within the listing of each claim type. The examples provided are for reference only; they may or may not represent everything needed to adjudicate a claim.

12.5.11 Removal Costs

Costs to prevent, minimize, mitigate, or clean up the oil spill. Examples of Proof and Documentation that may be needed:

- Proof that actions were coordinated with the FOSC.
- Witness statements
- Detailed description of actions
- Dates on which work was performed
- Analysis of spill substance
- Map of area
- Pictures of area, damage, and spill
- Receipts, invoices, or similar records with description of work
- How rates were determined and any comparison of rates
- Daily records of personnel costs including details on labor rates, hours, travel, and transportation
- Daily records of equipment costs including description and use
- Signed disposal manifests and proof of payment for disposal
- Payroll verification of hourly rate at the time of spill
- Verification of equipment rates for equipment used

12.5.12 Property Damage

Injury or damage to or economic loss resulting from destruction of real property (land or buildings) or other personal property including a boat. Examples of Proof and Documentation that may be needed:

- Proof of ownership or leasehold interest in the property; lease or rental agreement of any substitute property used
- Proof or evidence that property was injured, destroyed, or not usable because of the oil spill
- Report of any expenses or money lost while the property was unavailable because of spill damage
- Proof of value of property both before and after the spill or injury
- Documented cost of repair or replacement of the property
- Proof of value of property before and after the spill
- Documentation that shows whether or not substitute property was available, and related costs of substitute property if used.
- Documentation that shows how claimant lost money from the damage to the property
- Witness statements
- Copy of title, deed, lease, or license to property in claimant's name
- Pictures or videotape of property and/or damage
- Maps or legal documents showing the location of the property within the spill area
- Professional property appraisals for the value of the property prior to and after the spill, actual selling price of the property, and evidence connecting the depressed selling price to the oil spill rather than to other economic or real property factors
- Copies of bills paid for repair of damage or two estimates showing activities and costs to repair the damage

12.5.13 Loss of Profits or Earning Capacity

Damages equal to the loss of profits or impairment of earning capacity due to the injury, destruction, or loss of property or natural resources. Examples of Proof and Documentation that may be needed:

- Proof that property or natural resources that were damaged, destroyed or lost, resulted in claimant's loss
- Proof the claimant's income was reduced due to the damage or loss of the property or natural resources and how much it was reduced
- Documentation showing the amount of profits and earnings in similar time periods
- Documentation showing any alternative employment or business during the period claimed and any income received during that period
- Documentation showing and savings to overhead costs or other normal expenses - those not paid as a result of the spill (commuting costs, utility fees, employee salaries)
- Photos of damaged property (before and after the spill)
- Witness Statements on how the spill led to loss of business income or earning capacity; explain any earnings anomalies
- Statement on how the spill caused a loss in income
- Affidavit from claimant's employer about the impact the spill had on an employees work or income, and if the employer intends to file a claim for lost profits or earning capacity.
- Copies of pay stubs, receipts, timesheets from before, during, and after the spill
- Personnel records from claimant's employer before, during, and after the spill, showing employment
- Claimant's description of efforts to reduce loss, including job search
- Copies of any job-hunting expenses (e.g., travel costs)
- Signed copies of income tax returns and schedules for at least two years prior to spill
- Details of employment expenses not paid during period being claimed (e.g., commuting costs)
- Copies of pay stubs, receipts, timesheets from alternative employment during time of spill (including unemployment compensation)
- Description and documentation of business losses due to spill
- Copies of letters of business cancellations caused by the spill damage
- Maps or descriptions of the area showing the business location and the spill impact area
- Financial statements for at least two years prior to spill and from the year of the spill
- Signed copies of business income tax returns and schedules for at least three years prior to spill
- Details on efforts to mitigate business losses or why no efforts were taken
- For hotels, daily and monthly occupancy information for two years prior to spill and the year of the spill
- Description of marine charter business losses caused by the spill
- Evidence that charter vessel(s) was in the area impacted by the spill and were unable to carry on their business due to the spill
- Maps or descriptions of the area showing charter business location within spill area
- Signed copies of income tax returns (for charter boat business) and schedules for at least three years prior to spill
- Details on expenses not paid out during period being claimed (e.g., wages)
- Booking records for three years prior to spill and year of spill
- List of charter rates, including any services the business specializes in (e.g., sport fishing)
- Copies of any logs relating to boating activities for the year prior to and the year of the spill
- Registration documents for the vessel

12.5.13.1 Loss of Subsistence Use of Natural Resources

Loss of subsistence use claim if natural resources claimants depend on for subsistence use purposes that have been injured, destroyed, or lost by an oil spill event. Examples of Proof and Documentation that may be needed:

- Proof that injury, destruction, or loss of natural resources would have been used by the claimant to obtain food, shelter, clothing, medicine, or other minimum necessities of life.
- Documentation identifying each specific natural resource for which compensation for loss of subsistence use is being claimed
- Description of the actual subsistence use you make of each specific natural resource you identify;
- Description of how and to what extent claimant's subsistence use of the natural resource was affected by the injury to, destruction of, or loss of, each specific natural resource;
- Description of claimant's efforts to mitigate subsistence use loss
- Description of alternative source(s) or means of subsistence available to claimant during the period

12.5.13.2 Loss of Government Revenue:

Net loss by Federal, State, or Local Governments of taxes, royalties, rents, fees, or net profit shares due to the injury, destruction, or loss of real property, personal property, or natural resources. Examples of Proof and Documentation that may be needed:

- Information showing that the loss of revenue was caused by the injury to, destruction of, or loss of real or personal property or natural resources caused by the discharge
- Information showing the amount, identity, and description of the revenue loss for which compensation is claimed, including the applicable authority for collecting the revenue, method of assessment, applicable rate, and dates of collection or periods of loss
- Documentation showing expenditures saved because revenue was not collected
- The total assessment or revenue collected and related expenditures for comparable revenue periods, typically covering two years
- Description of what revenues were impacted and how the spill caused a loss of revenues
- Copies of statutes, regulations, ordinances, etc., outlining applicable authority to raise such revenues, property affected, method of assessment, rate of assessment, and method and dates of collection of assessment
- Government financial reports showing total assessment or revenue collected for comparable periods, typically covering two years
- Details of any expenses not paid out by government

12.5.13.3 Increased Public Service Costs

Net costs by State & Local Governments for providing increased or additional public services during or after removal activities, including protection from fire, safety, or health hazards, caused by a discharge of oil or directly attributable to response to the oil spill Event. *Examples of Proof and Documentation that may be needed:*

- Documentation showing justification for the public services provided, including documentation of what specific services were provided and the relationship to the spill.
- Documentation showing when services were provided during and after the oil spill removal.
- Documentation showing services were in addition to services normally provided
- Documentation showing the net cost for the services and the methods used to compute those costs
- Reports showing the increased public services were required and if the services were due to fire, health, or safety hazards
- Detailed description of what increased services were necessary and why, including a distinction between removal activities, safety acts, and law enforcement acts, and if the increase was actually incurred or if normal resources were diverted for use
- Daily reports on the activities of the government personnel and equipment involved Government Labor and Equipment Rates:
- Payroll verification of the government hourly rate at the time
- Verification of the standard government equipment rates for any equipment claimed
- Signed and dated records of the spill including hourly rates for labor and equipment
- Explanation as to whether rates are fully loaded or not and formulas used
- Certification that rates used reflected actual costs incurred and did not include punitive damages or fees

12.5.14 Oil Spill Claims Forms

12.5.14.1 ACORD General Liability Notice of Occurrence/Claim - SAMPLE

ACORD® GENERAL LIABILITY NOTICE OF OCCURRENCE / CLAIM

DATE (MM/DD/YYYY)

AGENCY	INSURED LOCATION CODE / DATE OF LOSS AND TIME (AM / PM)
	CARRIER / NAIC CODE
	POLICY NUMBER
CONTACT NAME:	
PHONE (A/C, No, Ext):	
FAX (A/C, No):	
E-MAIL ADDRESS:	
CODE: / SUBCODE:	
AGENCY CUSTOMER ID:	

INSURED

NAME OF INSURED (First, Middle, Last)	INSURED'S MAILING ADDRESS
DATE OF BIRTH / FEIN (if applicable)	
PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL / SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL	PRIMARY E-MAIL ADDRESS:
	SECONDARY E-MAIL ADDRESS:

CONTACT ☐ CONTACT INSURED

NAME OF CONTACT (First, Middle, Last)	CONTACT'S MAILING ADDRESS
PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL / SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL	
WHEN TO CONTACT	PRIMARY E-MAIL ADDRESS:
	SECONDARY E-MAIL ADDRESS:

OCCURRENCE

LOCATION OF OCCURRENCE STREET:	POLICE OR FIRE DEPARTMENT CONTACTED
CITY, STATE, ZIP:	REPORT NUMBER
COUNTRY:	
DESCRIBE LOCATION OF OCCURRENCE IF NOT AT SPECIFIC STREET ADDRESS:	
DESCRIPTION OF OCCURRENCE (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)	

TYPE OF LIABILITY

PREMISES: INSURED IS ☐ OWNER ☐ TENANT	TYPE OF PREMISES
OWNER'S NAME & ADDRESS (If not insured)	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL / SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:
	SECONDARY E-MAIL ADDRESS:
PRODUCTS: INSURED IS ☐ MANUFACTURER ☐ VENDOR	TYPE OF PRODUCT
MANUFACTURER'S NAME & ADDRESS (If not insured)	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL / SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:
	SECONDARY E-MAIL ADDRESS:
WHERE CAN PRODUCT BE SEEN?	

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AGENCY CUSTOMER ID: _____

INJURED / PROPERTY DAMAGED

NAME & ADDRESS (Injured/Owner)		EMPLOYER'S NAME & ADDRESS	
PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
PRIMARY E-MAIL ADDRESS:		PRIMARY E-MAIL ADDRESS:	
SECONDARY E-MAIL ADDRESS:		SECONDARY E-MAIL ADDRESS:	
AGE / SEX / OCCUPATION		DESCRIBE INJURY	
WHERE TAKEN		WHAT WAS INJURED DOING?	
DESCRIBE PROPERTY (Type, model, etc.)	ESTIMATE AMOUNT / WHERE CAN PROPERTY BE SEEN?		

WITNESSES

NAME AND ADDRESS	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL / SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:
	SECONDARY E-MAIL ADDRESS:
NAME AND ADDRESS	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL / SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:
	SECONDARY E-MAIL ADDRESS:
NAME AND ADDRESS	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL / SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:
	SECONDARY E-MAIL ADDRESS:

REMARKS (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

REPORTED BY	REPORTED TO

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AGENCY CUSTOMER ID: _____

APPLICABLE IN ALABAMA

Any person who knowingly presents a false or fraudulent claim for payment of a loss or benefit or who knowingly presents false information in an application for insurance is guilty of a crime and may be subject to restitution fines or confinement in prison, or any combination thereof.

APPLICABLE IN ALASKA

A person who knowingly and with intent to injure, defraud, or deceive an insurance company files a claim containing false, incomplete, or misleading information may be prosecuted under state law.

APPLICABLE IN ARIZONA

For your protection, Arizona law requires the following statement to appear on this form. Any person who knowingly presents a false or fraudulent claim for payment of a loss is subject to criminal and civil penalties.

APPLICABLE IN ARKANSAS, DELAWARE, KENTUCKY, LOUISIANA, MAINE, MICHIGAN, NEW JERSEY, NEW MEXICO, NEW YORK, NORTH DAKOTA, PENNSYLVANIA, RHODE ISLAND, SOUTH DAKOTA, TENNESSEE, TEXAS, VIRGINIA, AND WEST VIRGINIA

Any person who knowingly and with intent to defraud any insurance company or another person, files a statement of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact, material thereto, commits a fraudulent insurance act, which is a crime, subject to criminal prosecution and [NY: substantial] civil penalties. In LA, ME, TN, and VA, insurance benefits may also be denied.

APPLICABLE IN CALIFORNIA

For your protection, California law requires the following to appear on this form: Any person who knowingly presents a false or fraudulent claim for payment of a loss is guilty of a crime and may be subject to fines and confinement in state prison.

APPLICABLE IN COLORADO

It is unlawful to knowingly provide false, incomplete, or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance, and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policy holder or claimant for the purpose of defrauding or attempting to defraud the policy holder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado Division of Insurance within the Department of Regulatory Agencies.

APPLICABLE IN THE DISTRICT OF COLUMBIA

Warning: It is a crime to provide false or misleading information to an insurer for the purpose of defrauding the insurer or any other person. Penalties include imprisonment and/or fines. In addition, an insurer may deny insurance benefits, if false information materially related to a claim was provided by the applicant.

APPLICABLE IN FLORIDA

Pursuant to S. 817.234, Florida Statutes, any person who, with the intent to injure, defraud, or deceive any insurer or insured, prepares, presents, or causes to be presented a proof of loss or estimate of cost or repair of damaged property in support of a claim under an insurance policy knowing that the proof of loss or estimate of claim or repairs contains any false, incomplete, or misleading information concerning any fact or thing material to the claim commits a felony of the third degree, punishable as provided in S. 775.082, S. 775.083, or S. 775.084, Florida Statutes.

APPLICABLE IN HAWAII

For your protection, Hawaii law requires you to be informed that presenting a fraudulent claim for payment of a loss or benefit is a crime punishable by fines or imprisonment, or both.

APPLICABLE IN IDAHO

Any person who knowingly and with the intent to injure, defraud, or deceive any insurance company files a statement of claim containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN INDIANA

A person who knowingly and with intent to defraud an insurer files a statement of claim containing any false, incomplete, or misleading information commits a felony.

AGENCY CUSTOMER ID: _____

APPLICABLE IN KANSAS

Any person who, knowingly and with intent to defraud, presents, causes to be presented or prepares with knowledge or belief that it will be presented to or by an insurer, purported insurer, broker or any agent thereof, any written statement as part of, or in support of, an application for the issuance of, or the rating of an insurance policy for personal or commercial insurance, or a claim for payment or other benefit pursuant to an insurance policy for commercial or personal insurance which such person knows to contain materially false information concerning any fact material thereto; or conceals, for the purpose of misleading, information concerning any fact material thereto commits a fraudulent insurance act.

APPLICABLE IN MARYLAND

Any person who knowingly or willfully presents a false or fraudulent claim for payment of a loss or benefit or who knowingly or willfully presents false information in an application for insurance is guilty of a crime and may be subject to fines and confinement in prison.

APPLICABLE IN MINNESOTA

A person who files a claim with intent to defraud or helps commit a fraud against an insurer is guilty of a crime.

APPLICABLE IN NEVADA

Pursuant to NRS 686A.291, any person who knowingly and willfully files a statement of claim that contains any false, incomplete or misleading information concerning a material fact is guilty of a felony.

APPLICABLE IN NEW HAMPSHIRE

Any person who, with purpose to injure, defraud or deceive any insurance company, files a statement of claim containing any false, incomplete or misleading information is subject to prosecution and punishment for insurance fraud, as provided in RSA 638:20.

APPLICABLE IN OHIO

Any person who, with intent to defraud or knowing that he/she is facilitating a fraud against an insurer, submits an application or files a claim containing a false or deceptive statement is guilty of insurance fraud.

APPLICABLE IN OKLAHOMA

WARNING: Any person who knowingly and with intent to injure, defraud or deceive any insurer, makes any claim for the proceeds of an insurance policy containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN WASHINGTON

It is a crime to knowingly provide false, incomplete, or misleading information to an insurance company for the purpose of defrauding the company. Penalties include imprisonment, fines and denial of insurance benefits.

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12.5.14.2 Claims Tracking Sheet- SAMPLE

Claims Number _____

Claimant's Name _____

Claimant's Address _____

Claimant's Contact Phone# _____

Claimant's Email _____

Claim Type _____

Amount Claimed ($) _____

Date Claim Received _____

Name of Adjudicator (Lead) _____

Adjudicator Phone# _____

Adjudicator Email _____

Date Follow-Up _____

Information Requested (N/A if Not Applicable) _____

Claim Determination Date (Sent) _____

Claim Determination Amount ($) _____

Date Release Received (N/A if Not Applicable) _____

Date Rejection Received (N/A if Not Applicable) _____

Date Payment Approved (N/A if Not Applicable) _____

Date Claim Closed _____

12.5.14.3 Claims Check Sheet - SAMPLE

Claims Number _____

Claimant's Name _____

Date Claim Received _____

Documents Provided		
1	Claim Form - Signed (Accord, GL Notice of Occurrence or Equivalent)	
2	Affidavit from employer on the impact on work or income due to the spill and if the company will be filing a claim for lost profits	
3	Analysis of spill substance	
4	Any expenses or money lost while the property was unavailable because of spill damage	
5	Beach closures or fishing advisories	
6	Booking records for three years prior to spill and year of spill	
7	Certification that rates used reflected actual costs incurred and did not include punitive damages or fees	
8	Copies of any job-hunting expenses (e.g., travel costs)	
9	Copies of any logs relating to boating activities for the year prior to and the year of the spill	
10	Copies of bills paid for repair of damage or two estimates showing activities and costs to repair the damage	
11	Copies of letters of business cancellations caused by the spill damage	
12	Copies of pay stubs and other documentation showing income Claimant received before, during, and after the spill and oil spill response	
13	Copies of pay stubs, etc., from alternative employment during time of spill	
14	Copies of pay stubs, receipts, etc., from before, during, and after the spill	
15	Copies of statutes, regulations, ordinances, etc., outlining applicable authority to raise such revenues, property affected, method of assessment, rate of assessment, and method and dates of collection of assessment	
16	Copy of title, deed, lease, or license to property in Claimant's name	

Documents Provided		
17	Daily records of equipment costs including description and use	
18	Daily records of personnel costs including details on labor rates, hours, travel, and transportation	
19	Daily reports on the activities of the government personnel and equipment involved	
20	Dates on which work was performed	
21	Describe any compensation available to Claimant for the subsistence loss Claimant suffered	
22	Describe each alternative source or means of subsistence available to Claimant during the period of time for which Claimant claim a loss of subsistence	
23	Describe each effort Claimant made to mitigate Claimant's subsistence use loss	
24	Describe how and to what extent Claimant's subsistence use of the natural resource was affected by the injury to, destruction of, or loss of, each specific natural resource	
25	Describe the actual subsistence use Claimant make of each specific natural resource Claimant identify	
26	Description and documentation of business losses due to spill	
27	Description of business losses caused by the spill	
28	Description of efforts to reduce Claimant's loss, including job search	
29	Description of what revenues were impacted and how the spill caused a loss of revenues	
30	Detailed description of actions	
31	Detailed description of what increased services were necessary and why, including a distinction between removal activities, safety acts, and law enforcement acts, and if the increase was actually incurred or if normal resources were diverted for use	
32	Details and explanation of net loss of revenue	

Documents Provided		
33	Details of any expenses not paid out by government during the period being claimed	
34	Details of employment expenses not paid during period being claimed (e.g., commuting costs)	
35	Details on efforts to mitigate losses or why no efforts were taken	
36	Details on expenses not paid out during period being claimed (e.g., wages)	
37	Evidence connecting the depressed selling price of a property to the oil spill rather than to other economic or real property factors	
38	Evidence that vessel(s) were in the area impacted by the spill and were unable to carry on their business due to the spill	
39	Explanation as to whether rates are fully loaded or not and formulas used; states should provide rates under OMB Circular A-87	
40	Financial statements for at least two years prior to spill and from the year of the spill	
41	For hotels, daily and monthly occupancy information for two years prior to spill and the year of the spill	
42	FOSC report	
43	FOSC, natural resource trustee and newspaper reports describing the oil spill and response, and the resulting injury, destruction or loss of natural resources	
44	Government financial reports showing total assessment or revenue collected for comparable periods, typically covering two years	
45	Government Labor and Equipment Rates	
46	How rates were determined and any comparison of rates	
47	Identify each specific natural resource for which compensation for loss of subsistence use is being claimed	
48	Information in EPA or USCG notifications, and claims advertising	
49	Information on EPA or USCG notification	

Documents Provided		
50	Lease or rental agreement of any substitute property used	
51	List of charter rates, including any services the business specializes in (e.g., sport fishing)	
52	Map of area	
53	Maps or descriptions of the area showing business location within spill area	
54	Maps or descriptions of the area showing the business location and the spill impact area	
55	Maps or legal documents showing the location of the property within the spill area	
56	Maps	
57	Newspaper reports describing the spill	
58	Payroll verification of hourly rate at the time of spill	
59	Payroll verification of the government hourly rate at the time	
60	Personnel records from Claimant's employer before, during, and after the spill, showing employment	
61	Photographs and videos	
62	Photos of damaged property (before and after the spill)	
63	Pictures of area, damage, and spill	
64	Pictures or videotape of property and/or damage	
65	Professional property appraisals for the value of the property prior to and after the spill	
66	Published accounts, witness statements and other written records documenting Claimant's use of natural resources for subsistence purposes before, during, and after the spill and oil spill response	
67	Receipts, invoices, or similar records with description of work	
68	Records showing compensation Claimant received for Claimant's loss	

Documents Provided		
69	Records showing the expenses Claimant avoided during the time Claimant were not able to carry out Claimant's subsistence use of the affected natural resource	
70	Registration documents for the vessel(s), copies of business license, vessel license, fishing license, captain's license	
71	Reports showing the increased public services were required and if the services were due to fire, health, or safety hazards	
72	Signed and dated records of the spill including hourly rates for labor and equipment	
73	Signed copies of income tax returns and schedules for at least three years prior to spill	
74	Signed copies of income tax returns and schedules for at least two years prior to spill	
75	Signed disposal manifests and proof of payment for disposal	
76	Statement from Claimant or witnesses on how the spill caused the loss of income; explain any earnings anomalies	
77	Statement from Claimant or witnesses on how the spill led to loss of income or earning capacity; explain any earnings anomalies	
78	Statement on how the spill caused a loss in income	
79	Store and barter receipts showing the replacement costs Claimant claim;	
80	Verification of standard equipment rates for equipment used	
81	Verification of the standard government equipment rates for any equipment claimed	
82	Witness statements and documents showing the alternative sources of subsistence available to Claimant, and Claimant's efforts to reduce the damages resulting from Claimant's loss of subsistence use, including receipts from job-hunting expenses (e.g., travel costs)	
83	Witness statement(s)	

Documents Provided		
84	Other	
85	Other	
86	Other	

12.5.14.4 Claims Advertisement - SAMPLE

Advertisement for Oil Spill Claims

CompanyX
Oil Spill - January 24, 2010
4300 Gallons Heavy Oil
Budd Inlet (Olympia, WA)
South Puget Sound

The U.S. Coast Guard National Pollution Funds Center has designated CompanyX as the Responsible Party for an oil spill that occurred around 7:00AM (PST) on January 24, 2010, impacting the waters of Budd Inlet and South Puget Sound. An estimated 4,300 gallons of heavy fuel oil was released from our facility on Boston Harbor Road (in Olympia) into Budd Inlet and South Puget Sound.

CompanyX is receiving claims related to this incident. Information about claims and the claims process is available on-line at the CompanyX website (see link below). You can also call, email, or mail us if you need additional assistance or information.

Website: **www.companyx.com\claims.htm**

Email: **claims@companyx.com**

Phone: **(360) 407-0007** (Mon-Sat, 8am to 5pm PST)

Mail: CompanyX – Oil Spill Claims
PO Box 4912876, Olympia, WA 98503

13.0 WILDLIFE CARE

The key objective of wildlife response is to minimize animal suffering. Prompt initiation of oiled wildlife response operations will help achieve this objective by facilitating greater efficiency throughout the wildlife operations.

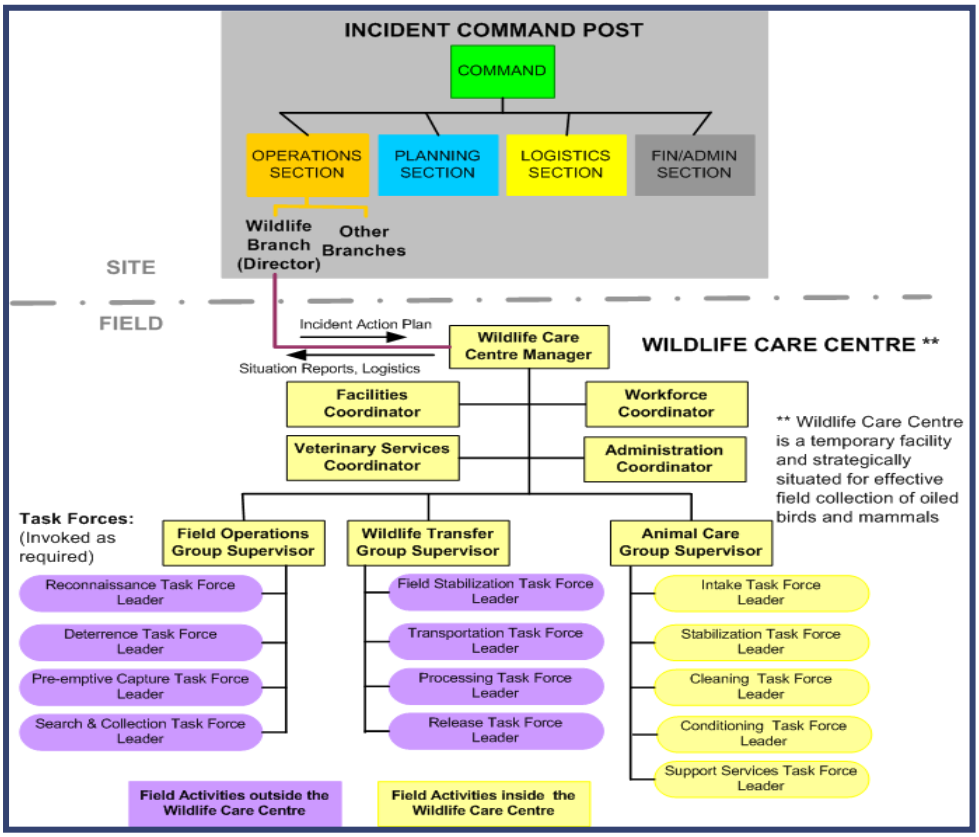
There are, however, other objectives to consider, including the provision of an organized, transparent, stakeholder-inclusive and fair process. Application of proven incident management and wildlife care protocols are fundamental in achieving these objectives.

Kinder Morgan Canada recognizes that a Wildlife Response Plan is essential in order to have systems and procedures in place with adequate resources to promote an effective response; thus reducing wildlife suffering.

When an oil spill occurs, wildlife can become a primary focus of the media and the general public and may be perceived as the highest priority for response attention. Birds are often the most visual of impacted and at-risk wildlife; however other groups of animals, including invertebrates, fish, reptiles and mammals can also be affected.

13.1 Wildlife Operations

The organizational structure of wildlife branch operations within the Incident Command System is depicted below. In addition to the full development of the Wildlife Branch within the Operations Section, wildlife might also have specialists in the Planning and Logistics sections of the ICS to ensure the unique needs of the wildlife response are met.



13.2 Wildlife Response Strategies

Proactive wildlife response strategies are the key to mounting a wildlife response that minimizes wildlife impacts. Immediate appraisal and monitoring of the spill in relation to wildlife resources allows for timely, efficient and effective activities. Generally, the best response strategy is to prevent wildlife from being impacted by the product via an effective monitoring, reconnaissance and hazing program. If wildlife impacts are unavoidable, proactive search and collection to quickly retrieve contaminated animals is imperative. The sooner an animal is brought into care for treatment, the healthier it is, and the faster it will progress through the wildlife care centre and return to the wild.

13.3 Operational Aspects

When live animals are impacted or potentially impacted by an oil spill, time is of the essence. There is also the matter of public attention, which can be greatly exaggerated by media interest. A number of operational aspects that require careful planning follow:

13.3.1 Mobilization

An initial wildlife impact assessment should be performed as soon as safely possible following the spill event. This initial assessment will provide information and opportunity for proactive deterrence activities to prevent wildlife impacts, while also providing invaluable information regarding the scale of potential response activities. If wildlife impact occurs, depending on the rate of recovery from the field, response will either occur while the organizational structure is being established, or after the response organization has had an opportunity to create the wildlife plan.

13.3.2 Coordination

The Wildlife Care Centre (WCC) is the place from where all oiled wildlife response activities are monitored and directed. It is a space where principal officers meet and where they can be contacted. The WCC is ideally integrated with the Incident Command Post in some way. The WCC is typically a temporary facility, developed at the time of a wildlife response to accommodate the particular needs of the spill.

Those managing the WCC need to be aware of, and have access to, every level of the wider response organization. In turn, each key player in the response organization needs to know how the WCC can be contacted. For the WCC to be an effective coordinating unit, communication and reporting protocols must be established. All response units must report in accordance with protocols to allow for efficient data processing.

13.3.3 Facilities

There are very specific and well-documented facility requirement for the successful care of oiled wildlife. These requirements must be incorporated into the development of the Wildlife Care Centre to ensure a successful response effort.

13.3.4 Phasing

Upon activation, responders and equipment must be mobilized and facilities developed. This is the emergency response phase of the wildlife response. At this point, decisions are guided by pre-defined priorities which will facilitate wildlife response managers to efficiently perform their duties.

The next phase of the response will arise gradually, incident-dependent. Once the operational structure is developed and effective, the main influx of wildlife will normally have peaked. Ongoing, but smaller,

intake peaks might occur according to weather, animal movements, fate and effects of the product, spill cleanup progress and degree of search and collection activities. At this stage, the WCC can begin to transition from emergency response to project management, including demobilization.

13.3.5 Workforce

Volunteer manpower is often required to ensure adequate operations of the time and energy intensive requirements of successful oiled wildlife response. For liability reasons, those interested and qualified to assist response operations volunteer to be 'hired' as workforce personnel. As such, these personnel receive a nominal fee in exchange for their participation in response operations. This group of people is referred to as workforce personnel.

13.3.6 Health and Safety

Oiled wildlife response presents many unique concerns regarding personnel health and safety. Along with general issues pertaining to product exposure, there are additional issues relating to exposure to wild animals. Considerations for zoonotic disease factors, personal protective equipment, safety protocols should be addressed in pre-determined guidelines for wildlife response personnel.

Cleanup personnel should also be made aware of health and safety concerns pertaining to wildlife in case they are exposed to them in the field. All field personnel should understand the reporting line to ensure that impacted wildlife discovered in the field is dealt with safely, efficiently and in accordance with the wildlife plan.

13.4 Wildlife Assistance

13.4.1 US Fish and Wildlife Contact

The Trans Mountain Pipeline runs through USFW Region 1

Region 1 - Pacific Region
Chief, Division of Endangered Species
U.S. Fish and Wildlife Service
911 NE 11th Ave
Portland, Oregon 97232
(503) 231-6120
http://www.fws.gov/pacific/

13.4.2 Wildlife Contractors

- Focus Wildlife 1-800-578-3048
- Tri-State Bird Rescue 1-302-737-9543

13.5 Washington Department of Fish and Wildlife

13.5.1 Priority Habitats and Species List

The Washington Department of Fish and Wildlife publishes a Priority Habitats and Species (PHS) list. The PHS List is a catalog of habitats and species considered to be priorities for conservation and management.

Priority species require protective measures for their survival due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority species include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations (e.g., heron colonies, bat colonies) considered vulnerable; and species of recreational, commercial, or tribal importance that are vulnerable.

Priority habitats are habitat types or elements with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type (e.g., shrub-steppe) or dominant plant species (e.g., juniper savannah), a described succession stage (e.g., old-growth forest), or a specific habitat feature (e.g., cliffs).

There are 20 habitat types, 152 vertebrate species, 41 invertebrate species, and 10 species groups currently in the PHS List. These constitute about 17% of Washington's approximately 1000 vertebrate species and a fraction of the state's invertebrate fauna.

Numerous individuals and groups use the PHS List as well as associated PHS products (e.g., PHS Data) to inform conservation-related activities. Typical users include cities and counties that use PHS to fulfill planning requirements under the Growth Management Act and Shoreline Management Act, non-profit organizations such as land trusts that use PHS information to prioritize habitat protection, community groups working on local biodiversity planning initiatives, as well as other state and federal government agencies.

You can access the current list and online mapping at: http://wdfw.wa.gov/conservation/phs/list/

13.5.2 Species of Concern

The following list includes those species listed as State Endangered (SE), State Threatened (ST), State Sensitive (SS), or State Candidate (SC), as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service (Federal Endangered (FE), Federal Threatened (FT), Federal Candidate (FC), or Federal Species of Concern (FCo)) . This list is current as of October 2012, the most current information can be obtained from the following website: http://wdfw.wa.gov/conservation/endangered/All/

			Species Status	
Common Name	**Scientific Name**	**Type**	**State**	**Federal**
American white pelican	Pelecanus erythrorhynchos	Bird	SE	none
Bald eagle	Haliaeetus leucocephalus	Bird	SS	FCo
Beller's ground beetle	Agonum belleri	Other Insect	SC	FCo
Black rockfish	Sebastes melanops	Fish	SC	none
Black-backed woodpecker	Picoides arcticus	Bird	SC	none
Black-tailed jackrabbit	Lepus californicus	Mammal	SC	none
Blue whale	Baleonoptera musculus	Mammal	SE	FE

			Species Status	
Common Name	**Scientific Name**	**Type**	**State**	**Federal**
Bluegray Taildropper	Prophysaon coeruleum	Mollusk	SC	none
Bocaccio rockfish	Sebastes paucispinis	Fish	SC	FE
Bog idol leaf beetle	Donacia idola	Other Insect	SC	none
Brandt's cormorant	Phalacrocorax penicillatus	Bird	SC	none
Brown pelican	Pelecanus occidentalis	Bird	SE	FCo
Brown rockfish	Sebastes auriculatus	Fish	SC	FCo
Bull trout	Salvelinus confluentus	Fish	SC	FT
Burrowing owl	Athene cunicularia	Bird	SC	FCo
California floater	Anodonta californiensis	Mollusk	SC	FCo
California mountain kingsnake	Lampropeltis zonata	Reptile	SC	none
Canary rockfish	Sebastes pinniger	Fish	SC	FT
Cascade red fox	Vulpes vulpes cascadensis	Mammal	SC	none
Cascade torrent salamander	Rhyacotriton cascadae	Amphibian	SC	none
Cassin's auklet	Ptychoramphus aleuticus	Bird	SC	FCo
China rockfish	Sebastes nebulosus	Fish	SC	none
Chinook salmon (Lower Columbia)	Oncorhynchus tshawytscha	Fish	SC	FT
Chinook salmon (Puget Sound)	Oncorhynchus tshawytscha	Fish	SC	FT
Chinook salmon (Snake R. Fall)	Oncorhynchus tshawytscha	Fish	SC	FT
Chinook salmon (Snake R. Sp/Su)	Oncorhynchus tshawytscha	Fish	SC	FT
Chinook salmon (Upper Columbia Sp)	Oncorhynchus tshawytscha	Fish	SC	FE
Chinquapin hairstreak	Habrodais grunus herri	Butterfly or Moth	SC	none
Chum salmon (Hood Canal Su)	Oncorhynchus keta	Fish	SC	FT
Chum salmon (Lower Columbia)	Oncorhynchus keta	Fish	SC	FT
Clark's grebe	Aechmophorus clarkii	Bird	SC	none
Coho salmon (Lower Columbia/SW WA)	Oncorhynchus kisutch	Fish	none	FT
Columbia clubtail (dragonfly)	Gomphus lynnae	Other Insect	SC	FCo
Columbia oregonian	Cryptomastix hendersoni	Mollusk	SC	none
Columbia pebblesnail	Fluminicola columbiana	Mollusk	SC	FCo
Columbia River tiger beetle	Cicindela columbica	Other Insect	SC	none
Columbia spotted frog	Rana luteiventris	Amphibian	SC	none
Columbian Sharp-tailed Grouse	Tympanuchus phasianellus	Bird	ST	FCo
Columbian white-tailed deer	Odocoileus virginianus leucurus	Mammal	SE	FE
Common loon	Gavia immer	Bird	SS	none
Common murre	Uria aalge	Bird	SC	none
Copper rockfish	Sebastes caurinus	Fish	SC	FCo

			Species Status	
Common Name	**Scientific Name**	**Type**	**State**	**Federal**
Dalle's Sideband	Monadenia fidelis minor	Mollusk	SC	none
Dunn's salamander	Plethodon dunni	Amphibian	SC	none
Eulachon	Thaleichthys pacificus	Fish	SC	FT
Ferruginous hawk	Buteo regalis	Bird	ST	FCo
Fin whale	Baleonoptera physalus	Mammal	SE	FE
Fisher	Martes pennanti	Mammal	SE	FC
Flammulated owl	Otus flammeolus	Bird	SC	none
Giant Columbia River limpet	Fisherola nuttalli	Mollusk	SC	none
Giant Palouse earthworm	Driloleirus americanus	Annelid	SC	none
Golden eagle	Aquila chrysaetos	Bird	SC	none
Gray whale	Eschrichtius robustus	Mammal	SS	none
Gray wolf	Canis lupus	Mammal	SE	FE
Gray-tailed vole	Microtus canicaudus	Mammal	SC	none
Great arctic	Oeneis nevadensis gigas	Butterfly or Moth	SC	FCo
Greater Sage-grouse	Centrocercus urophasianus	Bird	ST	FC
Green sea turtle	Chelonia mydas	Reptile	ST	FT
Green sturgeon	Acipenser medirostris	Fish	none	FT
Greenstriped rockfish	Sebastes elongatus	Fish	SC	none
Grizzly bear	Ursus arctos	Mammal	SE	FT
Hatch's click beetle	Eanus hatchi	Other Insect	SC	FCo
Humpback whale	Megaptera novaeangliae	Mammal	SE	FE
Island Marble	Euchloe ausonides	Other Insect	SC	FCo
Johnson's hairstreak	Mitoura johnsoni	Butterfly or Moth	SC	none
Juniper hairstreak	Mitoura grynea barryi	Butterfly or Moth	SC	none
Keen's myotis	Myotis keenii	Mammal	SC	none
Killer whale	Orcinus orca	Mammal	SE	FE
Kokanee (Lk Sammamish)	Oncorhynchus nerka	Fish	none	FC
Lake chub	Couesius plumbeus	Fish	SC	none
Larch Mountain salamander	Plethodon larselli	Amphibian	SS	FCo
Leatherback sea turtle	Dermochelys coriacea	Reptile	SE	FE
Leopard dace	Rhinichthys falcatus	Fish	SC	none
Leschi's Millipede	Leschius mcallisteri	Arthropod	SC	none
Lewis' woodpecker	Melanerpes lewis	Bird	SC	none
Loggerhead sea turtle	Caretta caretta	Reptile	ST	FE
Loggerhead shrike	Lanius ludovicianus	Bird	SC	FCo

			Species Status	
Common Name	**Scientific Name**	**Type**	**State**	**Federal**
Lynx	Lynx canadensis	Mammal	ST	FT
Makah copper	Lycaena mariposa charlottensis	Butterfly or Moth	SC	FCo
Mann's Mollusk-eating Ground Beetle	Scaphinotus mannii	Other Insect	SC	none
Marbled murrelet	Brachyramphus marmoratus	Bird	ST	FT
Mardon skipper	Polites mardon	Butterfly or Moth	SE	FC
Margined sculpin	Cottus marginatus	Fish	SS	FCo
Mazama (Western) pocket gopher	Thomomys mazama	Mammal	ST	FC
Merriam's shrew	Sorex merriami	Mammal	SC	none
Mountain sucker	Catostomus platyrhynchus	Fish	SC	none
North Pacific Right Whale	Eubalaena japonica	Mammal	SE	FE
Northern abalone	Haliotis kamtschatkana	Mollusk	SC	FCo
Northern goshawk	Accipiter gentilis	Bird	SC	FCo
Northern leopard frog	Rana pipiens	Amphibian	SE	FCo
Northern Spotted Owl	Strix occidentalis	Bird	SE	FT
Olympia oyster	Ostrea lurida	Mollusk	SC	none
Olympic marmot	Marmota olympus	Mammal	SC	none
Olympic mudminnow	Novumbra hubbsi	Fish	SS	none
Oregon silverspot butterfly	Speyeria zerene hippolyta	Butterfly or Moth	SE	FT
Oregon spotted frog	Rana pretiosa	Amphibian	SE	FC
Oregon vesper sparrow	Pooecetes gramineus affinis	Bird	SC	FCo
Pacific clubtail	Gomphus kurilis	Other Insect	SC	none
Pacific cod (S&C Puget Sound)	Gadus macrocephalus	Fish	SC	FCo
Pacific hake (Pacific-Georgia Basin DPS	Merluccius productus	Fish	SC	FCo
Pacific harbor porpoise	Phocoena phocoena	Mammal	SC	none
Pacific herring	Clupea pallasi	Fish	SC	FCo
Peregrine falcon	Falco peregrinus	Bird	SS	FCo
Pileated woodpecker	Dryocopus pileatus	Bird	SC	none
Poplar oregonian	Cryptomastix populi	Mollusk	SC	none
Preble's shrew	Sorex preblei	Mammal	SC	FCo
Puget blue	Plebejus icarioides blackmorei	Butterfly or Moth	SC	none
Purple martin	Progne subis	Bird	SC	none
Pygmy rabbit	Brachylagus idahoensis	Mammal	SE	FE
Pygmy whitefish	Prosopium coulteri	Fish	SS	FCo

			Species Status	
Common Name	**Scientific Name**	**Type**	**State**	**Federal**
Quillback rockfish	Sebastes maliger	Fish	SC	FCo
Redstripe rockfish	Sebastes proriger	Fish	SC	none
River lamprey	Lampetra ayresi	Fish	SC	FCo
Rocky Mountain Tailed Frog	Ascaphus montanus	Amphibian	SC	FCo
Sage sparrow	Amphispiza belli	Bird	SC	none
Sage thrasher	Oreoscoptes montanus	Bird	SC	none
Sagebrush lizard	Sceloporus graciosus	Reptile	SC	FCo
Sand-verbena moth	Copablepharon fuscum	Butterfly or Moth	SC	none
Sandhill crane	Grus canadensis	Bird	SE	none
Sea otter	Enhydra lutris	Mammal	SE	FCo
Sei whale	Baleonoptera borealis	Mammal	SE	FE
Sharptail snake	Contia tenuis	Reptile	SC	FCo
Shepard's parnassian	Parnassius clodius shepardi	Butterfly or Moth	SC	none
Short-tailed albatross	Diomedea albatrus	Bird	SC	FE
Silver-bordered fritillary	Boloria selene atrocostalis	Other Insect	SC	none
Slender-billed white-breasted nuthatch	Sitta carolinensis aculeata	Bird	SC	FCo
Snowy plover	Charadrius nivosus	Bird	SE	FT
Sockeye salmon (Ozette Lake)	Oncorhynchus nerka	Fish	SC	FT
Sockeye salmon (Snake R.)	Oncorhynchus nerka	Fish	SC	FE
Sperm whale	Physeter macrocephalus	Mammal	SE	FE
Steelhead (Lower Columbia)	Oncorhynchus mykiss	Fish	SC	FT
Steelhead (Middle Columbia)	Oncorhynchus mykiss	Fish	SC	FT
Steelhead (Puget Sound)	Oncorhynchus mykiss	Fish	none	FT
Steelhead (Snake River)	Oncorhynchus mykiss	Fish	SC	FT
Steelhead (Upper Columbia)	Oncorhynchus mykiss	Fish	SC	FT
Steller sea lion	Eumetopias jubatus	Mammal	ST	FT
Streaked horned lark	Eremophila alpestris strigata	Bird	SE	FC
Striped whipsnake	Masticophis taeniatus	Reptile	SC	none
Tacoma pocket gopher - Mazama	Thomomys mazama tacomensis	Mammal	none	FC
Taylor's checkerspot	Euphydryas editha taylori	Butterfly or Moth	SE	FC
Tiger rockfish	Sebastes nigrocinctus	Fish	SC	none
Townsend's big-eared bat	Corynorhinus townsendii	Mammal	SC	FCo
Townsend's ground squirrel	Urocitellus townsendii townsendii	Mammal	SC	FCo

			Species Status	
Common Name	**Scientific Name**	**Type**	**State**	**Federal**
Tufted puffin	Fratercula cirrhata	Bird	SC	FCo
Umatilla dace	Rhinichthys umatilla	Fish	SC	none
Upland sandpiper	Bartramia longicauda	Bird	SE	none
Valley silverspot	Speyeria zerene bremnerii	Butterfly or Moth	SC	FCo
Van Dyke's salamander	Plethodon vandykei	Amphibian	SC	FCo
Vaux's swift	Chaetura vauxi	Bird	SC	none
Walleye pollock (So. Puget Sound)	Theragra chalcogramma	Fish	SC	FCo
Washington ground squirrel	Urocitellus washingtoni	Mammal	SC	FC
Western gray squirrel	Sciurus griseus	Mammal	ST	FCo
Western grebe	Aechmophorus occidentalis	Bird	SC	none
Western pond turtle	Actinemys marmorata	Reptile	SE	FCo
Western toad	Anaxyrus boreas	Amphibian	SC	FCo
White-headed woodpecker	Picoides albolarvatus	Bird	SC	none
White-tailed jackrabbit	Lepus townsendii	Mammal	SC	none
Widow rockfish	Sebastes entomelas	Fish	SC	none
Wolverine	Gulo gulo	Mammal	SC	FC
Woodland caribou	Rangifer tarandus	Mammal	SE	FE
Yellow-billed cuckoo	Coccyzus americanus	Bird	SC	FC
Yelloweye rockfish	Sebastes ruberrimus	Fish	SC	FT
Yellowtail rockfish	Sebastes flavidus	Fish	SC	none
Yuma skipper	Ochlodes yuma	Butterfly or Moth	SC	none

13.6 Wildlife Protection and Rehab

In the event of a spill, wildlife may come into contact with oil – especially on the surface of water or along shorelines. The numbers and types of animals affected will depend on factors such as: the size and distribution of the spill; the weather; wind and current conditions; the habitats affected by the oil; and the time of year that the spill occurs. Birds have historically been the most likely wildlife to be affected during on-water spills in Washington, but both aquatic and marine mammals may also come into contact with the oil. In addition to direct oiling, birds and mammals may become indirectly impacted if they feed on oiled animals.

All spill response personnel should refer to the Northwest Wildlife Response Plan and Policy, as found in Chapters 3000 and 9970 of the Northwest Area Contingency Plan (NWACP), regarding wildlife response operations, which are incorporated into this plan by reference.

13.6.1 Notifications

Report any observation of oiled wildlife to the Washington Emergency Management Division (800-258-5990) if an ICS has not been established. The Washington Emergency Management Division will forward any reports of oiled wildlife to the Washington State Department of Fish and Wildlife (WDFW).

Once an ICS has been established, all observations of oiled wildlife will be reported to the Wildlife Branch Director (or their designee) within the Operations Section.

Contact the United States Fish and Wildlife Service (USFWS) Response Coordinator to initiate the process of obtaining spill-specific authorizations related to oiled wildlife (see Migratory Bird Treaty Act below) prior to initiating any oiled wildlife activities other than reconnaissance.

Contact private oiled wildlife care contractors according to the number and type of species affected. These contractors have varying abilities to provide service and personnel during response activities and will be engaged as needed by the Wildlife Branch.

13.6.2 Permits

All wildlife collection and rehabilitation activities carried out during a spill response will be done in accordance with established NWACP procedures and all applicable federal and state laws. This section identifies the state and federal permits that are required and generally describes their purpose.

13.6.3 Migratory Bird Treaty Act (Federal)

The Migratory Bird Permit Act makes it illegal for anyone to 'take' or possess any migratory bird except under the terms of a valid Migratory Bird Permit. The USFWS is responsible for issuing Federal Migratory Bird Rehabilitation permits to qualified applicants for the recovery, temporary possession, transportation and rehabilitation of migratory birds.

In additional to the Federal Migratory Bird Rehabilitation permit, a rehabilitator must also secure a separate *spill-specific* authorization from the USFWS at the time of the spill for the recovery of both live and dead oiled bird. In Washington State, this authorization must be requested from the USFWS Response Coordinator in Lacey.

13.6.4 Endangered Species Act (Federal)

Listed species that become oiled are subject to Endangered Species Act requirements. For migratory birds, the Migratory Bird Rehabilitation Permit and the spill-specific authorization (see above) authorizes the recovery, temporary possession, transport and rehabilitation of *threatened and endangered* species of migratory birds that have become oiled with no additional ESA permits required. For marine mammals, all response actions will be coordinated by the Wildlife Branch Director and appropriate federal agencies.

13.7 Marine Mammal Protection Act (Federal)

Federal, state and local government officials, or designees of the relevant Secretaries of the Departments of the Interior and Commerce may 'take' marine mammals during the course of the official response duties under certain conditions. Contractors may also receive authorization to take marine mammals under special circumstances (see NWACP 9970). All marine mammal response actions will be coordinated by the Wildlife Branch Director and appropriate federal agencies.

13.7.1 Washington State Rehabilitation Permit (Washington State)

Washington State law makes it illegal for any person to possess wildlife for the purpose of rehabilitation unless they have a valid wildlife rehabilitation permit or they are working under the supervision of a person who has a valid wildlife rehabilitation permit. This rule (WAC 232-12-175) also required that any facilities used for oiled bird rehabilitation must meet certain infrastructure requirements.

As of this writing, the organizations listed below possess all permits needed to conduct oiled bird rehabilitation operations in Washington State. Note that the USFWS Spill specific authorizations will also be required:

- Focus Wildlife
- The International Bird Rescue Research Center (IBRRC)
- The Progressive Animal Welfare Society (PAWS)

13.7.2 Wildlife Branch

The Wildlife Branch functions within the Operations Section of the ICS and is more fully described in the NWACP. The Wildlife Branch Director is responsible for overseeing all activities related to oiled wildlife recovery and rehabilitation during a response. It is the policy of the Northwest Area Committee (NWAC) that representatives of the USFWS will assume the position of Director and Deputy Director of the Wildlife Branch.

Unless otherwise indicated, USFWS will delegate the Wildlife Branch Director and Deputy Branch Director positions to WDFW for spills that occur within Washington State. Appointment of other parties (including representatives of Responsible Parties) to one or both of these positions may be made by a USFWS representative or their designee at any time during an accident and for such periods of time as may be deemed appropriate.

The Wildlife Branch typically uses wildlife contractors to provide care of affected wildlife. All persons who serve as part of rehabilitation or field crews must be trained in accordance with the site safety plan established for the incident and should be familiar with generally accepted published guidelines for collecting, cleaning and rehabilitating oiled birds.

13.8 Oiled Wildlife Care Procedures

Federal (USFWS) policy requires that rehabilitation activities involving oiled birds comply with the care standards as described in *'Best Practices of Migratory Bird Care during Oil Spill Response'* (US Fish and Wildlife Service. 2002). This document is incorporated by reference as part of the NWACP. Additional animal care and husbandly information may also be obtained in the Oiled Wildlife Care Network manual *'Protocols for the Care of Oil Affected Birds'* (UC Davis.2000).

13.8.1 Oiled Wildlife Facilities, Equipment and Personnel

The equipment and personnel needed for oiled wildlife operations will be deployed through the ICS as needed during a spill response. The NWACP establishes four response levels for oiled bird operations: level 4 (up to 15 birds), level 3 (up to 100 birds), level 2 (up to 500 birds) and level 1 (more than 500 birds). Note*: The number of birds refers only to birds in captivity.*

13.8.2 Facilities

An oiled-wildlife mobile rehabilitation unit (MRU), capable of providing the equipment and infrastructure necessary to support a level 3 response has been jointly developed by the Clean Rivers Cooperative and the Marine Spill Response Corporation. When needed, this equipment will be deployed within 24 hours of spill awareness to a location approved by the Wildlife Branch Director. This equipment is included within the online Western Regional Response List (WRRL) and is available via the ICS or Primary Response Contractors. (http://www.wrrl.us/fmi/wp_auth.html)

Wastewater generated by the wildlife cleaning and rehabilitation operations contaminants that may include surfactants, oil and biological waste and must be appropriately treated prior to discharge. All

wastewater produced by oiled wildlife operations will be stored using temporary storage tanks delivered to the site. Based upon the results of sampling and analysis, the wastewater will be treated and disposed of on-site or transported to an off-site facility. This determination will be made by the Disposal Group Supervisor and approved by the Washington Department of Ecology.

13.8.3 Equipment

The MRU described above is equipped with sufficient supplies and equipment to Support the initial few days of an oiled wildlife response. Replacement supplies and equipment will be obtained as needed using the established channel within the ICS.

Additional mobile wildlife equipment may be also available at the time of a spill incident from the Washington Department of Fish and Wildlife Oil Spill Team and National Response Corporation Environmental Services.

13.8.4 Personnel

The personnel requirements described in the NWACP will be met through the use of the oiled wildlife care contractors listed in the Oiled Wildlife contact information table (above). Personnel support space will be provided using existing buildings or mobile structures brought to the site for this purpose.

14.0 MATERIAL SAFETY DATA SHEETS

MSDSs for products shipped thru the Trans Mountain Pipeline are available at

- http://kmonline/business_units/kmc/pages/ehs_home.aspx or
- https://www.whmis.com/msds/home.do?user=Kinder&pass=GHva8Gu765mp4TfG

15.0 ENVIRONMENT, HEALTH AND SAFETY POLICY



Environment, Health and Safety Policy

Every employee is expected to share Kinder Morgan's commitment to pursue the goal of not harming people, protecting the environment, using material and energy efficiently and promoting best practices, thereby earning the confidence of customers, security holders and society at large, being a good neighbor and contributing to sustainable development. Kinder Morgan's policy is to comply with all health, safety, security and environmental laws, rules and regulations, not just because it is legally required but also because we believe it is the responsible way to conduct our business. Kinder Morgan has systems in place that prepare for emergencies and procedures that coordinate our response plans with emergency response organizations in the communities where we operate. Kinder Morgan has a systematic approach to health, safety, security and environmental management designed to ensure compliance with the law, to train employees to be aware of and meet their responsibility for protection of health, safety and the environment, and to achieve continuous performance improvement. In addition to the Kinder Morgan commitment, contractors are required and joint ventures under Kinder Morgan's operational control are expected to apply this policy. Employees, supervisors or operational managers who knowingly engage in or condone environmental health or safety violations are subject to disciplinary action including suspension or termination.

Ian D. Anderson
President
Kinder Morgan Canada
A Member of the Kinder Morgan Group of Companies

KINDER MORGAN CANADA

November 2012

16.0 REGULATORY BACKGROUND

16.1 Federal

This Plan is intended to satisfy the requirements of the Oil Pollution Act of 1990 (OPA 90), and has been prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and applicable Area Contingency Plans (ACP), EPA Region I Regional Contingency Plan. Specifically, this Plan is intended to satisfy:

- PHMSA, U.S. Department of Transportation requirements for a Facility Response Plan (FRP).

16.1.1 Statement of Significant and Substantial Harm

The response zones in this system all contain pipelines greater than 6 5/8 inches and are longer than ten miles. At least one section of pipeline in each response zone crosses a major waterway or comes within five miles of a public drinking water intake. Therefore, in accordance with 49 CFR 194.103(c), each entire response zone described in this Plan will be treated as if expected to cause significant and substantial harm.

16.1.2 DOT/PHMSA Cross Reference

OPA 90 REQUIREMENTS (49 CFR 194)	LOCATION
• Name and address of operator	Section 7.3
• For each Response Area which contains one or more line sections that meet the criteria for determining significant and substantial harm (194.103), listing and description of Response Areas, including county(s) and state(s)	Section 7.9
• Information summary for core plan	Section 7.2
• QI names and telephone numbers, available on 24-hr basis	Section 7.3
• Description of Response Area, including county(s) and state(s) in which a worst case discharge could cause substantial harm to the environment	Section 7.3
• List of line sections contained in Response Area, identified by milepost or survey station or other operator designation	Section 7.5
• Basis for operator's determination of significant and substantial harm	Section 7.3
• The type of oil and volume of the worst case discharge	Section 7.5
• Certification that the operator has obtained, through contract or other approved means, the necessary private personnel and equipment to respond, to the maximum extent practicable, to a worst case discharge or threat of such discharge	Section 19
Notification Procedures	
• Notification requirements that apply in each area of operation of pipelines covered by the plan, including applicable state or local requirements	Section 2.8
• Checklist of notifications the operator or Qualified Individual is required to make under the response plan, listed in the order of priority	Section 2.8.4

• Name of persons (individuals or organizations) to be notified of discharge, indicating whether notification is to be performed by operating personnel or other personnel	Section 2.8.4
• Procedures for notifying Qualified Individuals	Section 2.3
• Primary and secondary communication methods by which notifications can be made	Sections 2.4, 2.6, and 2.7
• Information to be provided in the initial and each follow-up notification, including the following: • name of pipeline • time of discharge • location of discharge • name of oil recovered • reason for discharge (e.g. material failure, excavation damage, corrosion) • estimated volume of oil discharged • weather conditions on scene • actions taken or planned by persons on scene	Section 2.3.1
Spill Detection and On-Scene Spill Mitigation Procedures	
• Methods of initial discharge detection	Section 2.1
• Procedures, listed in order of priority, that personnel are required to follow in responding to a pipeline emergency to mitigate or prevent any discharge from the pipeline	Introduction (Page 1 – Initial Response Actions)
• List of equipment that may be needed in response activities based on land and navigable waters including: ○ portable pumps and ancillary equipment ○ transfer hoses and pumps ○ facilities available to transport and receive oil from a leaking pipeline	Section 9.8
Identification of the availability, location, and contact phone numbers to obtain equipment for response activities on a 24-hour basis	Section 9.4 and 2.0
Identification of personnel and their location, telephone numbers, and responsibilities for use of equipment in response activities on a 24-hour basis	Sections 2.10 and 2.12
Response Activities	
• Responsibilities of, and actions to be taken by, operating personnel to initiate and supervise response actions pending the arrival of the Qualified Individual or other response resources identified in the response plan	Introduction (Page 1 – Initial Response actions)
• Qualified Individual's responsibilities and authority, including notification of the response resources identified in the response plan	Section 8.8
• Procedures for coordinating the actions of the operator or Qualified Individual with the action of the OSC responsible for monitoring or directing those actions	Section 8.8

• Oil spill response organizations (OSRO) available through contract or other approved means, to respond to a worst case discharge to the maximum extent practicable	Section 2.10
• For each organization identified under paragraph (d), a listing of: ○ equipment and supplies available ○ trained personnel necessary to continue operation of the equipment and staff the oil spill removal organization for the first seven days of the response	Section 2.10
List of Contacts	
• List of persons the Plan requires the operator to contact	Sections 2.8, 2.9, 2.10, 2.11, and 2.12
• Qualified individuals for the operator's areas of operation	Section 2.7, and 7.3
• Applicable insurance representatives or surveyors for the operator's areas of operation	
• Persons or organizations to notify for activation of response resources	Section 2.10 and 2.12
Training Procedures	
• Description of training procedures and programs of the operations	Section 17.2.2
Drill Procedures	
• Announced and unannounced drills	Section 17.2
• Types of drills and their frequencies; for example: ○ manned pipeline emergency procedures and qualified individual notification drills conducted quarterly ○ drills involving emergency actions by assigned operating or maintenance personnel and notification of qualified individual on pipeline facilities which are normally unmanned, conducted quarterly ○ shore-based Emergency Response Team (ERT) tabletop drills conducted yearly ○ oil spill removal organization field equipment deployment drills conducted yearly ○ a drill that exercises entire response plan for each Response Area, would be conducted at least once every three years	Section 17.2.2
Response Plan Review and Update Procedures	
• Procedures to meet 194.121	Preface (Plan Maintenance)
• Procedures to review plan after a worst case discharge and to evaluate and record the plan's effectiveness	Preface (Plan Maintenance)

Response Area Appendices	
Each response area appendix would provide the following information:	
• Name and telephone number of the qualified individual	Section 7.3
• Notification procedures	Section 2.0
• Spill detection and mitigation procedures	Section 2.1
• Name, address, and telephone number of oil spill response organization	Section 2.10
• Response activities and response resources including: ○ equipment and supplies necessary to meet 194.115 ○ trained personnel necessary to sustain operation of the equipment and to staff the oil spill response organization and spill management team for the first seven days of the response	Section 2.0
• Names and telephone numbers of federal, state, and local agencies which the operator expects to assume pollution response responsibilities	Sections 2.8, and 2.9
• Worst case discharge volume	Section 18.0
• Method used to determine the worst case discharge volume, with calculations	Section 18.1
• A map that clearly shows: ○ location of worst case discharge ○ distance between each line section in the Response Area: ▪ each potentially affected public drinking water intake, lake, river, and stream within a radius of five miles of the line section ▪ each potentially affected environmentally sensitive area within a radius of one mile of the line section	Section 18.2 and 18.3
• Piping diagram and plan-profile drawing of each line section; may be kept separate from the response plan if the location is identified	Section 18.2
• For every oil transported by each pipeline in the response area, emergency response data that: ○ include name, description, physical and chemical characteristics, health and safety hazards, and initial spill-handling and firefighting methods ○ meet 29 CFR 1910.1200 or 49 CFR 172.602	Sections 14.0 and 7.7

16.2 Washington State Regulations

This Plan is intended to satisfy the requirements of the Washington Administrative Code 173-182. The plan is also intended to work in conjunction with the Northwest Area Contingency Plan and the Washington State Geographic Response Plans. Specifically, this Plan is intended to satisfy the following criteria from WAC 173-182.

Washington Administrative Code	Comments
110 (3)(a)	The ERP is being submitted by KMC as the owner/operator of the Trans Mountain Pipeline (Puget Sound) system.
120 (3)	The ERP is being submitted as part of the five year cycle for review and approval.
130 (1), (2)(a)(b)(c)and (d)	The ERP is being submitted to comply with these sections, and will be addressed individually further in this cross check sheet
130 (2)(e-g),(3), (4) and (5)	Not Applicable
140 (1) and (2)	The ERP covers this in the Preface on page viii under “Plan Maintenance” “Responsibility” in point # 2.
142 (1-6)	This section is described in the Preface on page ix “Changes in Operating Condition” all portions of this chapter are described except 142(2)(f)(ii) as this is not applicable to KMC.
145	The situations for implementation of this ERP is described in the Introduction on page 2 under “Plan Implementation”
150	The post spill and review and documentation commitment is outlined in the Preface on page ix under “Revisions After Release or Exercise”
210	KMC is happy with the format of this ERP it contains checklist, reference materials, has detailed table of contents, is divided into chapters and sections and is formatted to allow for easy replacement of individual pages.
220	The binding agreement is included in the ERP in *Section 19.2 Kinder Morgan Certification – Binding Agreement*
230 (1) and (2)	The ERP has been written to be fully compliant with all applicable sections of WAC 173-182 and in accordance and with reference to the NWACP. The NWACP is referred to in various sections but specifically in *Section 10.6.1* *Planning* Section Resources *Northwest Area Contingency* Plan
230 (3) (a)	The federal and state regulations covered by this plan are outlined in *Section 16* but specifically it has been designed to meet WAC 173-182 and OPA 90 Requirements (49 CFR 194). And is stated in the Introduction in “Regulatory Scope of the Plan” on page 2.
230 (3) (b) (i)	The WCD has been divided up into 5 response zones and is calculated and described in *Section 18.1 Worst Case Discharge Calculations*
230 (3) (b) (ii) and (iii)	Not Applicable, this ERP is not for a vessel nor is it an umbrella plan.
230 (3) (c)	The Control Sheet is located in the Preface on page xi including a description of the information to be included on the sheet during an amendment.
230 (3) (d)	This cross-reference table is required by this chapter. *Section 16.2*

Washington Administrative Code	Comments
	Washington State Regulations
230 (3) (e) (i) and (ii)	The Primary Response Contractors contact information is contained in *Section 2.10 Support Services - Primary Response Contractors (PRC)* the letters of intent or letters of contract are included in *Section 19.5 PRC – Contracts/Letters of Intent.*
230 (3) (e) (iii)	KMC does not rely on mutual aid agreements to meet the planning standards.
230 (3) (e) (iv) and (v)	KMC does not rely on a PRC to staff ICS positions, however an agreement is in place with Witt-O'Brien's to provide ICS staff when required and is specified in the contract letter available in *Section 19.5 PRC – Contracts/Letters of Intent.*
230 (3) (f)	The procedure to track and account for the entire volume of oil recovered and oily waste generated and disposed of during a spill including the commitment to provide to Ecology upon request is in *Section 9.6.2 Waste Management Plan.* Additional procedures are available in *Section 4.9 Credit for Oil Recovery.*
230 (4) (a)	*Section 7.3 Owner/Operator Information*
230 (4) (b)	*Section 7.3 Owner/Operator Information*
230 (4) (c) (i)	*Section 7.2 Puget Sound Area Description*
230 (4) (c) (ii)	*Section 7.6 Puget Sound Tank Data*
230 (4) (c) (iii)	*Section 7.7 Trans Mountain Products Summary*
230 (4) (c) (iv) and (v)	*Section 7.9 Response Zone Descriptions, Maps and Site Plans* or more specifically *Sections 7.9.1 Zone 1 -Border Scraper Trap to Laurel Station, 7.9.2 Zone 2 - Laurel Station to Ferndale Meter Station, 7.9.3 Zone 3 – Laurel Station to Burlington Scraper Trap, 7.9.4 Zone 4 – Burlington Scraper Trap to Anacortes Meter Station, and 7.9.5 Zone 5 – Laurel Station*
230 (5) and (6)	Not Applicable
230 (7)	*Section 0* *Managing Spill Liability* Claims
232	Not Applicable
240	The field document for this ERP contains Sections 1-6 of this document plus more detailed maps and control point locations and information about those locations.
242	Not Applicable
250 (1)	The Initial Response Actions are described in the Introduction on Page 1 in the paragraph titled "Initial Response Actions"
250 (2), (3) and (4)	*Section 1* describes the method for health and safety plans. *Section 3* describes how to conduct spill assessment for all conditions and includes the types of equipment for recording the results. Spill Detection and Verification Procedures are located in *Section 2.1 Incident Verification*
260 (1)	Immediate notification and who is responsible for implementing the notification process is covered in *Section 2.8.4 Initial Notification Requirements – Confirmed Emergency Condition*
260 (2)	The Internal Call-down listing for Emergency Response Line is located in *Section 2.6*. The Internal Call-down listing for Emergency Response Personnel is located in *Section 2.7*. Government Agency Contact Listings

Washington Administrative Code	Comments
	are located in *Section 2.8.4 Initial Notification Requirements – Confirmed Emergency Condition*, and *Section 2.9 Additional Government Contacts*, Primary Response Contractors are located in *Section 2.10 Support Services - Primary Response Contractors (PRC)*, connecting facility contacts are located in *Section 2.11 Oil Company Contacts*, and other resources are located in *Section 2.12 Additional Resources Suppliers.*
260 (3)	Order of priority is established for immediate notification in Section *2.8.4 Initial Notification Requirements – Confirmed Emergency Condition*
262	Not Applicable
264 (1)	The requirement to report spills that may impact waters of the state is outlined in the table located in *Section 2.8.4 Initial Notification Requirements – Confirmed Emergency Condition*
264 (2)	The requirement to report spills that are either unconfirmed or of an unknown size are covered by *Section 2.8.4 Initial Notification Requirements – Confirmed Emergency Condition AND 2.8.2* External Notification – Potential Emergency Condition
270 (1) and (2)	The maintenance and record keeping of response equipment is outlined in *Section 9.9.5 Response Equipment Maintenance*
280 (1) (a)	The organizational diagram for chain of command for the Incident Management Team (Spill Management Team) is depicted in Section 8.4 Response Team Organization The different Incident Management Teams are described in *Sections 8.1 Initial Response Team, 8.2 Local Incident Management Team, and 8.3 Kinder Morgan Incident Management Team.* Further breakdown of the sections in contained in *Sections 9.2 Operations Section Organization Chart, 10.1 Planning Section Organization Chart, 11.1 Logistics Section Organization Chart, and 12.1 Finance Section Organization Chart.*
280 (1) (b)	The personnel expected to fill the ICS roles and their alternates are listed in *Section 2.7*
280 (1) (c-d)	Kinder Morgan uses the ICS structure to manage incidents it is consistent with the NWACP except in the duties related to the Information Officer and Liaison Officer. The duties of the Information Officer (*Section 8.12 Information Officer*) and Liaison officer (*Section 8.13 Liaison Officer*) are outlined and have been altered to match those of the remainder of KMC's operations and the training the staff have received. The major difference is that the Information Office is responsible for public communications and the Liaison Officer is only tasked with agency liaison. The ICS Guide has the Liaison Officer assigning the Community Relations Coordinator to the JIC for consistent messaging; the duties these people preform are consistent with the NWACP, the reporting structure changes slightly. The ICS Sections are outlined in brief in this document (*Section 8.0* describes the Incident Management including the Planning Cycle, *Section 9.0* outlines general duties and function of the Operations Section, and provides additional background information. *Section 10.0* outlines the general duties and functions of the Planning Section and provides additional background information and planning information. *Section 11.0* describes the Logistics Section and *Section 12.0* describes the finance and administration section). Additionally, KMC has developed an ICS Guidebook that is available by request, which gives further checklists for

Washington Administrative Code	Comments
	every position in the ICS structure that KMC expects to utilize with reference to the NWACP and is consistent with the NWACP.
280 (2)	*Section 17.1 Training* outlines the basic training by each group of responders.
280 (3) and (5)	Not Applicable
280 (4)	*Section 8.6 Transfer of Command* outlines clear procedures on transferring command.
310 (1) and (2)	A short description of this section of the WAC has been provided in Section 18.2 Planning Standards for background.
315, 317	Not Applicable
320	*Section 9.4 Air Operations Branch* outlines the air surveillance requirements and how KMC intends to achieve them.
321, 324, 325, 330	Not Applicable
335	*Section 18.2*
345	*Section 18.2*
348	*Section 18.2*
349	Not Applicable
350	*Section 18.2*
355	Not Applicable
365	*Section 18.2*
375	*Section 18.2*
370, 380, 385, 390, 395, 400, 405, 410, 415, 420, 430, and 450	Not Applicable
510	*Section 4.0 Spill Containment and Recovery, and 5.0 Protection of Sensitive Areas, and reference to NWACP and GRP's and Section 7.4* Incident Command Post Location
520	*Section 18.2*
522	Not Applicable
530	*Section 2.1.7 Detection of Spills to Groundwater*
540	KMC relies on NRCES to comply with wildlife rescue standards. Description of equipment and operations is found in *Section 13.0 Wildlife Care*
Section E	Not Applicable - Outlines plan evaluation and is informational for KMC.
700	*Section 17.2 Exercises* outlines the commitments to exercising
710	*Section 17.2.2 Type and Frequency of Exercises*
720	*Sections 17.2.3 Exercise Program Evaluation Criteria and 17.2.5Exercise Component Checklist*
730	*Section 17.2.4 Alternative Drill Credit*
740	Informational, has not been included as an option as it is not the intent of KMC to request waivers for exercises.
Part IV	Not Applicable – specific to Primary Response Contractor Applications
Part V	Not Applicable – outlines record keeping and compliance information

17.0 TRAINING AND EXERCISES

17.1 Training

Training Element	Qualified Individual (QI)	Incident Management Team (IMT)	Initial Response Team
Review of Emergency Response Plan at least annually and includes: • ICS Overview • NWACP policies • Use and location of GRP's • Contents of ERP, Field Guide and ICS Guide	x	x	x
ICS 100 Level Certification	x	x	x
HAZWOPER Certification	x	Command Staff, Operations Section, Planning Section Chief, and Environment Unit	x

17.1.1 Employee Training Records

A training record shall be maintained for each employee that has been trained in accordance with requirements in 29 CFR 1910.120 and 49 CFR 194.117. The Training Department is responsible for maintaining training records for all Company employees, related to safety and emergency related training functions. Training records are maintained as long as the employment with Kinder Morgan continues.

In accordance with 49 CFR 195.403, and at intervals not exceeding 15 months but at least once each calendar year, the Emergency Response and Security Group will;

- Review with personnel their performance in meeting the objectives of the emergency response training program,
- Make appropriate changes to the emergency response training program, and
- Require and verify that supervisors maintain a thorough knowledge of the emergency response procedures for which they are responsible.

17.1.2 Contractors Training Records

The Kinder Morgan emergency response contractors are responsible for maintaining all training records for their employees. Periodic audits shall be conducted of contractor training records to ensure that they comply with the emergency training and exercise requirements. Audit documentation shall be retained in the KM emergency training and exercise files.

17.1.3 Instructors

HAZWOPER instructors and training organizations shall be required to provide a current record of instructor certification to the operator's headquarters prior to undertaking any training. These records shall be maintained at the Kinder Morgan Canada office located in Calgary, AB, as long as the instructor undertakes training, as required by 29 CFR 1910.120.

17.2 Exercises

17.2.1 Company Policy

Kinder Morgan participates in the National Preparedness for Response Exercise Program (PREP). During each triennial cycle, all components of the Plan will be exercised at least once. KMC will provide WDOE and any other stakeholder the opportunity to help design and evaluate all tabletop and deployment drills, which KMC is looking for credit. Objectives not successfully met at an exercise will be tested again within the triennial cycle with the exception of significant failures will be retested within 30 days. WDOE will provide a written evaluation of the exercise to KMC and will outline any objectives successfully met. If changes to the ERP or training program are identified or required KMC will request an informal review with WDOE within 30 days of receipt of a report requiring/suggesting such changes to determine an action plan for making the changes.

17.2.2 Type and Frequency of Exercises

The following drills will be conducted during the triennial cycle. These will be either evaluated by WDOE or self evaluated. In either case of evaluation the WDOE matrix will be used. The following table indicates the type of drill and frequency of the drill along with description and any additional scheduling information.

Drill Type	Frequency in Triennial Cycle	Definition	Scheduling Instruction
Tabletop Drill	2	Is intended to demonstrate the capability to manage a spill using the incident command system. Role playing may be required in the drill and all table top drills will included a master list of equipment and personnel identified to fill both command post and field operations roles. The master resources list will include; WRRL identification umbers for all resources, and personnel names, affiliation home base and command post or field role.	Must be scheduled at least 60 days in advance on the Drill Calendar https://fortress.wa.gov/ecy/naces/
Worst Case Tabletop Drill	1	Once in the triennial cycle the IMT as identified in this plan will be mobilized in state for a drill.	Must be scheduled at least 90 days in advance on the Drill Calendar https://fortress.wa.gov/ecy/naces/
Ecology Unannounced Drills	As Needed	Will be conducted on an as needed basis determined by WDOE. Immediately prior to the start of the drill KMC will be notified in writing of the objectives, expectation and	

		scenario. KMC may request to be excused if conducting the drill poses unreasonable safety or environmental risk, or significant economic hardship. More information around unannounced drills can be found in WAC 173-182-710 (9)	
KMC Unannounced Drills	3		Will not be scheduled, is a test of the ERL notification system. One call to occur annually, in the event a real call takes place, the drill will not be conducted during that calendar year.
Wildlife Deployment Drill	1	Once every three years regional mobile wildlife rehabilitation equipment and personnel necessary to set up the wildlife rehabilitation system found in the plan. This is an additional deployment drill or may be combined with a larger multi objective deployment drill.	Scheduled at least 30 days in advance, and entered on the Drill Calendar https://fortress.wa.gov/ecy/naces/
Deployment Drills	6	Deployment drills will be used to demonstrate the actions KMC would take in a spill including Notifications, safety actions, environmental assessment and response equipment deployment. The drills will include a combination of KMC owned assets, contracted PRC assets and non-dedicated assets, and vessels of opportunity (if appropriate, and applicable). Equipment dedicated in the plan and personnel responsible for operating the equipment will be tested during the triennial cycle, drills will be designed to demonstrate the ability to meet the planning standards, including recovery systems and system compatibility and the suitability of the system for the	Scheduled at least 30 days in advance on the Drill Calendar https://fortress.wa.gov/ecy/naces/

		operating environment. The drills will be conducted in all operating environments that could be impacted by a spill. At least twice in the triennial cycle a GRP will be deployed.	

Notes: KMC may receive credit for a PRC drill and count as one of the above drills if the PRC is listed in this plan KMC operates in the area of the drill, it is scheduled on the drill calendar, and KMC participates in or observes the drill in person.

17.2.3 Exercise Program Evaluation Criteria

The following table outlines the 15 core components of the PREP. These core components also align with the Washington Administrative Code 173-182-720 Evaluation Criteria, which will be used to evaluate all exercises conducted in the triennial cycle.

Core components	Description
Notifications	Test the notifications procedures identified in the Area Contingency Plan (ACP) and the Spill Response Plan.
Staff mobilization	Demonstrate the ability to assemble the spill response organization identified in the ACP and the Spill Response Plan.
Ability to operate within the response management system described in the Plan: • Unified Command • Response management system	Demonstrate the ability of the spill response organization to work within a unified command. Demonstrate the ability of the response organization to operate within the framework of the response management system identified in their respective plans.
Source Control	Demonstrate the ability of the spill response organization to control and stop the discharge at the source.
Assessment	Demonstrate the ability of the spill response organization to provide initial assessment of the discharge and provide continuing assessments of the effectiveness of the tactical operations.
Containment	Demonstrate the ability of the spill response organization to contain the discharge at the source or in various locations for recovery operations.
Recovery	Demonstrate the ability of the spill response organization to recover the discharged product.
Protection	Demonstrate the ability of the spill response organization to protect the environmentally and economically sensitive areas identified in the ACP and the respective industry response plan.
Disposal	Demonstrate the ability of the spill response organization to dispose of the recovered material and contaminated debris.
Communications	Demonstrate the ability to establish an effective communications system for the spill response organization.

Transportation	Demonstrate the ability to establish multi-mode transportation both for execution of the discharge and support functions.
Personnel Support	Demonstrate the ability to provide the necessary support of all personnel associated with response.
Equipment maintenance and support	Demonstrate the ability to maintain and support all equipment associated with the response.
Procurement	Demonstrate the ability to establish an effective procurement system.
Documentation	Demonstrate the ability of the spill response organization to document all operational and support aspects of the response and provide detailed records of decisions and actions taken.

17.2.4 Alternative Drill Credit

KMC may request drill credit for a response to an actual spill, provided that WDOE has an opportunity to participate and evaluate the spill response. Credit form spills will not alleviate the necessity to drill as per WAC 173-182-730. In the event of an actual spill being used for credit KMC will refer to WAC 173-182-730 to understand the criteria and timeline of reporting to be used. Additionally KMC may request drill credit for drills held out of state if all of the requirements are met in WAC 173-182-730 (2).

17.2.5 Exercise Component Checklist

The following checklist is provide by WDOE and will be used for evaluation purposes. Each component must be checked off at least once in a three year period. The active/historical check sheets can be obtained from the Emergency Response and Security Group on request.

Plan Components – Table Top Drills
1. Notifications
1.1 - Internal spill response team notified (initial first responders)
1.2 - Entire spill response organization notified including PRC
1.3 - Timely government notifications made
2. Staff Mobilization
2.1 - Local/internal on site appropriate for scope of drill
2.2 - Away team in state in last 3 years
3. Initial Response Actions
3.1 - Checklist(s) and field document used
3.2 - Initial Site Safety addressed following plan procedures
3.3 - Initial assessment of spill status performed
3.4 - Population Protection
3.5 - Water Intakes Protection
3.6 - Documented early actions on ICS 201 form
3.7 - SMT transition through Initial Incident Briefing
4. Response Management (Cumulative A-J must be checked)
A. Overall Staffing and Coordination:

Plan Components – Table Top Drills
4.A1 - Expanded team plan task assignments followed
4.A2 - Coordination between ICS Sections
B. Unified Command and Command Staff
4.B1 - UC identified and Incident Briefing conducted
4.B2 - UC meet and discuss key issues
4.B3 - Operational Period established
4.B4 - UC established objectives & assessed planned actions
4.B5 - UC prepared and participates in Press Conference
4.B6 - Dedicated historian/scribe assigned to UC
4.B7 - UC approved news releases through Information Officer
C. Information Officer/JIC
4.C1 - Information Officer designated
4.C2 - JIC established
4.C3 - News releases
4.C4 - Preparation for press conference
4.C5 - Ensured appropriate representation at news briefings
4.C6 - Information Officer attended meetings as appropriate
D. Liaison Officer
4.D1 - Liaison Officer designated
4.D2 - Liaison Officer established contact w/stakeholders as appr.
4.D3 - Liaison Officer planned/conducted Local Officials Briefing
4.D4 - Liaison Officer provided information to citizens
4.D5 - Liaison Officer attended meetings as appropriate
E. Safety Officer
4.E1 - Safety Officer Designated
4.E2 - Safety plan developed in a timely manner
4.E3 - Site Safety Plan approved & communicated to field staff
4.E4 - Safety Officer attended meetings as appropriate
F. Operations Section
4.F1 - Operations Section established
4.F2 - Tactical assignments made
4.F3 - Ops section developed plan to provide aircraft support
4.F4 - Coordinated with Planning
4.F5 - Ops Section coordinated on resource orders & tracking
4.F6 - Ops Section worked with Planning on situation status
4.F7 - Ops Section worked with Planning on disposal
4.F8 - Ops Section Chief attended meetings as appropriate
4.F9 - Coordinated with agencies (If applicable)

Plan Components – Table Top Drills
4.F10- Wildlife Branch Leader designated
4.F11- Plan Holder assisted Wildlife Branch Leader w/activities
G. Planning Section
4.G1 - Planning Section established
4.G2 - Planning Section (PS) used appropriate tools
4.G3 - Planning Section Chief (PSC) established meeting schedule
4.G4 - PSC ensured attendance/participation at meetings
4.G5 - PS prepared meeting room displays or handouts
4.G6 - PS prepared and maintained situation displays
4.G7 - Master resource list developed, maintained, & posted
4.G8 - PS documented the spill response effort
H. Environmental Unit
4.H1 - Environmental Unit Leader was designated
4.H2 - Plan holder assisted EUL with unit activities
I. Logistics Section
4.I1 - Logistics Section established
4.I2 - Resource ordering process established
4.I3 - Managed Communication Plan/prepared Radio Plan
4.I4 - Developed Medical Plan for all areas of response
4.I5 - Plan for food/water/sanitary facilities for the response
4.I6 - Plan to provide personnel for response
4.I7 - Established command post
4.I8 - Identified and planned for staging & other areas as needed
4.I9 - Developed ground support/traffic plan
4.I10 - Developed response vessel support plan
4.I11 - Logistics Section Chief attended meetings as appropriate
J. Finance Section
4.J1 - Finance Section established
4.J2 - Finance Section is able to provide a cost estimate
4.J3 - Compensation and claims numbers established

Plan Components - Deployments
1. Notifications
1.1 - Internal spill response team notified (initial first responders)
1.2 - Entire spill response organization notified including PRC
1.3 - Timely government notifications made
5. Response Operations (Cumulative A-C must be checked)

Plan Components - Deployments
A. Initial Response Operations
5.A1 - Initial safety equip deployed & Safety Officer designated
5.A2 - Local/internal response team mobilized and on-site
5.A3 - Number of personnel appropriate
5.A4 - Emergency Shut Down Procedures conducted
5.A5 - Field tested plan holders communication equipment
5.A6 - PH & PRC field tested compatibility of communication equipment
B. Containment and Recovery
5.B1 - Drills conducted in all operating environments per plan
5.B2 - Initial deployment of plan holder owned equipment on-site
5.B3 - Deployed initial mechanical recovery resources
5.B4 - Set up and demonstrated skimmer to storage transfer ability
5.B5 - Demonstrated and described containment of a land spill
5.B6 - Demonstrated and described damage control procedures
C. Protection
5.C1 - Plan holder deployed GRP strategies
D. Wildlife Rehabilitation Equipment
5.D1 - All wildlife equipment deployed in various areas (triennially)

18.0 WORST CASE DISCHARGE

In order to calculate worst case discharge for the Puget Sound Pipeline system and associated breakout tanks the area has been divided up into 5 response zones. The response zones each have a different WCD calculation based on DOT 49 CFR 194.105(b) and Washington Administrative Code 173-182-030 (67)(d). In the event that either calculation results in a differential of WCD volume the higher of the two is used for this emergency response plan and to determine the planning standards applied to each response zone as identified by WAC173-182-365.

The five response zones are as follows:

Zone 1 – Border Scraper Trap to Laurel Station

Zone 2 – Laurel Station to Ferndale Metre Station

Zone 3 – Laurel Station to Burlington Trap

Zone 4 – Burlington Trap to Anacortes Metre Station

Zone 5 – Laurel Station

Zones 1-4 are pipeline response zones, and have been broken down by the ability to be remotely controlled by the Control Centre located in Edmonton, Alberta Canada, which does not rely on a field response to shut down.

Zone 5 is the Laurel Station location which contains two breakout storage tanks. These tanks are in operation for temporary storage of oil awaiting delivery to refineries in Anacortes and Ferndale. These tanks are both available for recovered liquid storage and can receive liquid from vacuum trucks directly.

The worst case discharge (WCD) as defined in 49 CFR 194.105(b), as the largest volume of the following:

- The pipeline's maximum shut-down response time in hours (based on historic discharge data or in the absence of such data, the operators best estimate), multiplied by the maximum flow rate expressed in barrels per hour (based on the maximum daily capacity of the pipeline), plus the largest drainage volume after shutdown of the line section(s) in the response zone expressed in barrels; or
- The largest foreseeable discharge for the line section(s) within a response zone, expressed in barrels (cubic meters), based on the maximum historic discharge, if one exists, adjusted for any subsequent corrective or preventative action taken; or
- If the response zone contains one or more breakout tanks, the capacity of the single largest tank or battery of tanks within a single secondary containment system, adjusted for the capacity or size of the secondary containment system, expressed in barrels.

Under PHMSA's current policy, operators are allowed to reduce the worst case discharge volume derived from 49 CFR 194.105(b)(3) by no more than 75% if an operator is taking certain spill prevention measures for their breakout tanks and presents supporting information in the response plan. An operator can reduce the worst case discharge volume based on breakout tanks in the response zones as follows:

Spill Prevention Measures	Percent Reduction Allowed
Secondary containment capacity greater than 100% capacity of tank and designed according to NFPA 30	50%
Tank built, rebuilt, and repaired according to API Std 620/650/653	10%
Automatic high-level alarms/shutdowns designed according to NFPA/API RP 2350	5%
Testing/cathodic protection designed according to API Std 650/651/653	5%
Tertiary containment/drainage/treatment per NFPA 30	5%*
Maximum allowable credit or reduction	75%

The worst case discharge (WCD) as defined by WDOE in WAC 173-182-030 (67)(d) as; For pipelines, the size of the worst case spill is dependent on the location of pump stations, key block valves, geographic considerations, or volume of the largest breakout tank. The largest volume determined from three different methods, complicated by adverse weather conditions:

- The pipeline's maximum time to detect the release, plus the maximum shutdown response time multiplied by the maximum flow rate per hour, plus the largest line drainage volume after shutdown;
- The maximum historic discharge from the pipeline; and
- The largest single breakout tank or battery of breakout tanks without a single secondary containment system.

Each operator shall determine the worst case discharge and provide the methodology, including calculations used to arrive at the volume. The following section describes each calculation method and the final result for each response zone.

18.1 Worst Case Discharge Calculations

18.1.1 Pipeline Calculation

The worst case discharge volume is calculated based on the highest volume for each response zone using the highest volume for each of the 3 criteria in 49 CFR 194.105(b), and WAC 173-182-030 (67)(d) listed in the previous section.

The worst-case scenario (full mainline rupture with 100% potential rupture volume out) is used for calculating the potential spill volume in the event of rupture. Pipeline total spill volumes are comprised of two components:

- the shutdown volume or initial spill volume
- the drain-down volume or stabilization spill volume

The shutdown volume, also termed the initial spill volume, is the fluid that is pumped out after pipe failure and before the leak detection software detects the release, pumps are shut down and mainline automated valves are closed. At a given point along the pipeline, the initial loss is the amount of product that can be released before the rupture site is isolated, namely:

- Initial spill volume = time to isolate the rupture point × maximum flow rate

The shutdown volume is approximately 2360 bbls (375.21 m3) for the Puget Sound Pipeline assuming a time delay of 15 minutes to recognize a leak and shut down as indicated in the list below

- Release prior to leak detection 4 minutes
- Operator/system reaction time 2 minutes
- System shutdown 4 minutes
- Valve closure time 5 minutes
- Total release time 15 minutes

Note: Time for evaluation and shut-down during bad weather has not been included as it has been determined that the weather will not impact the shut-down time due to the automation in the system.

The drain-down volume, also termed the stabilization spill volume, is the potential amount of product that can be released after isolation of the rupture point. The magnitude of the drain-down volume is related to the following factors,

- the pipeline elevation profile
- the location of mainline valves including automatic valves, check valves and manual valves
- the expected emergency response time to the leak-related manual valves
- Pipeline diameter and wall thickness
- The fluid properties such as viscosity, density and vapor pressure

For a given leaking point in the pipeline, its maximum drain-down volume is calculated using the following steps:

- All mainline automatic block valves are assumed to be closed within the initial shut-down period of 15 minutes, and mainline check valves block the reversal flow automatically.
- The manual valves are left open

- The maximum possible drain-down volume from the isolated leaking point is calculated using a spill volume calculation software.

When emergency crews arrive on site within the emergency response time, they can reduce the cumulative flow by closing the leak-related manual valves. Manual valve closure will reduce the drain-down volume obtained. The maximum drain-down volumes, without the manual valves being automated or closed by emergency crews, is used for evaluation of the spill size potential in WCD calculations.

The liquid pipeline spill volume software was developed by an engineering firm to conservatively quantify liquid spill volume that would be released after a catastrophic failure of the pipeline. The worst case scenario spill volume in the event of a full mainline rupture is calculated. Essentially, the maximum drain-down volume is determined and added to the shutdown volume.

Input data for the software includes distance, elevation and valve type and location data. Both input and output data are in a specific spreadsheet format. Each and every location that has elevation data is considered as an isolated spill or leak location. The elevation profile is then tested both upstream and downstream of the selected spill location. Each segment of the pipeline is tested to determine how much fluid could leak from the line. The volume of leaked fluid is determined by the occurrence of locations at a higher elevation than the leak point within the segment.

The Puget Sound pipeline extends for about 57.46 miles (92.48 km) from the US Border trap to the Anacortes delivery terminal and about 11.64 miles (18.74 km) from Laurel station to Ferndale terminal. The pipeline size is NPS 20 from US Border trap to Burlington station while it is NPS 16 from Burlington station to Anacortes terminal and from Laurel station to Ferndale terminal. The pipeline has a maximum flow rate of about 226,560 bpd (1501 m^3/h). KMC has identified all the HCAs in this pipeline system. Based on the HCAs, the pipeline was divided into 3 sections to simplify the spill volume calculations and analysis, however calculation section 1 will be divided into Response Zone 1 and Response Zone 2 for WCD in the respective response zones. To further simplify the calculations for the response zones, the highest potential spill volume in a given response zone will be used for the WCD for that response zone. The pipeline sections are below:

- Section 1 – US Border to Burlington 48.379 Miles. Zone 1 US Border to Laurel Station, and Zone 3 Laurel Station to Burlington.
- Section 2 – Burlington to Anacortes 9.085 miles. Zone 4
- Section 3 – Laurel to Ferndale 11.644 miles. Zone 2

The results of the spill volume calculations are as follows for the response zones. Each section is further outlined in the following sections.

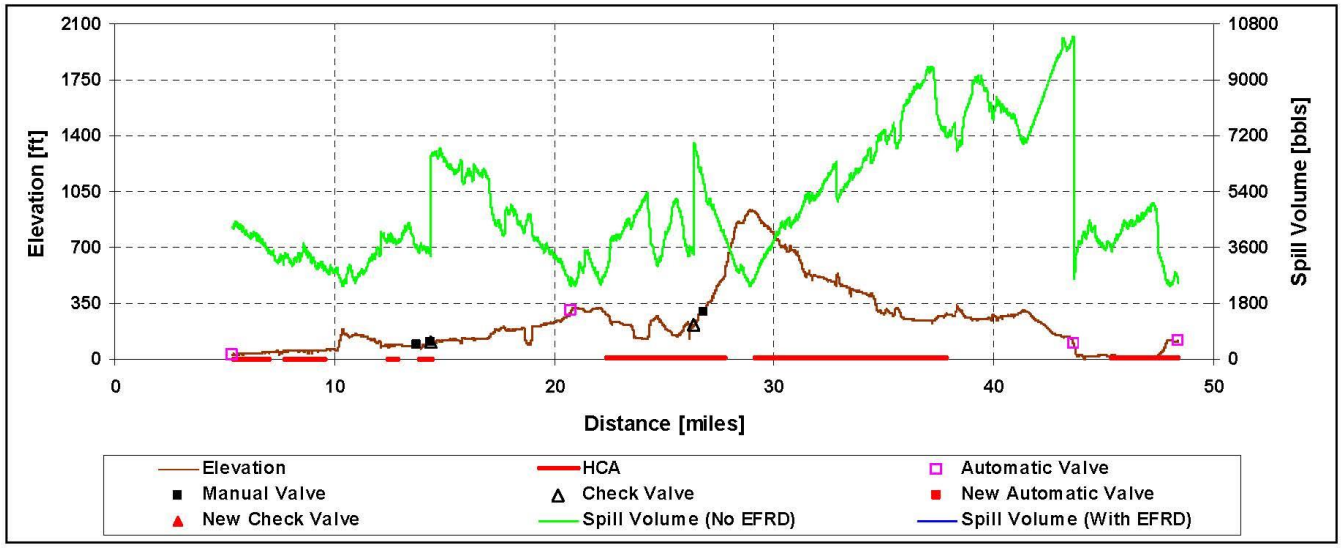
Response Zone	WCD Calculation (bbl)	Mile Post Location
1	6,656	14.45
2	7,186	8.832
3	10,405	43.61
4	4,500	0.887

18.1.1.1 Section 1 – Response Zone 1 and 3

Section one of the NPS 20 Puget Sound pipeline is approximately 48.38 miles (77.86 km) long from the US Border trap to Burlington MU 48 with a minimum wall thickness of 0.25 inch (6.35 mm). The below table presents the locations of existing mainline block valves (automatic and manual), and check valves in this section.

Response Zone	Valve Description	Valve Type	Chainage (miles)
1	US Border Trap	Automatic	5.359
1	MU 14	Manual	13.696
1	MU 15	Manual	14.395
1	Nooksack River	Check Valve	14.396
1	Laurel Station 20Q	Automatic	20.750
3	Whatcom Creek	Check Valve	26.357
3	MU 27	Manual	26.809
3	MU 43	Automatic	43.607
3	MU 48	Automatic	48.379

The spill volume profile for pipeline section one from US Border to Burlington is presented below. In this figure, the green line, labeled “Spill Volume (No EFRD)”, represents the calculated total spill volume profile based on the existing mainline valves assuming that all manual valves are open. An overall peak volume of 10,405 bbls occurs at MP-43.61 in Response Zone 3. The peak volume in Response Zone 1 is 6,656 bbl at MP-14.45.

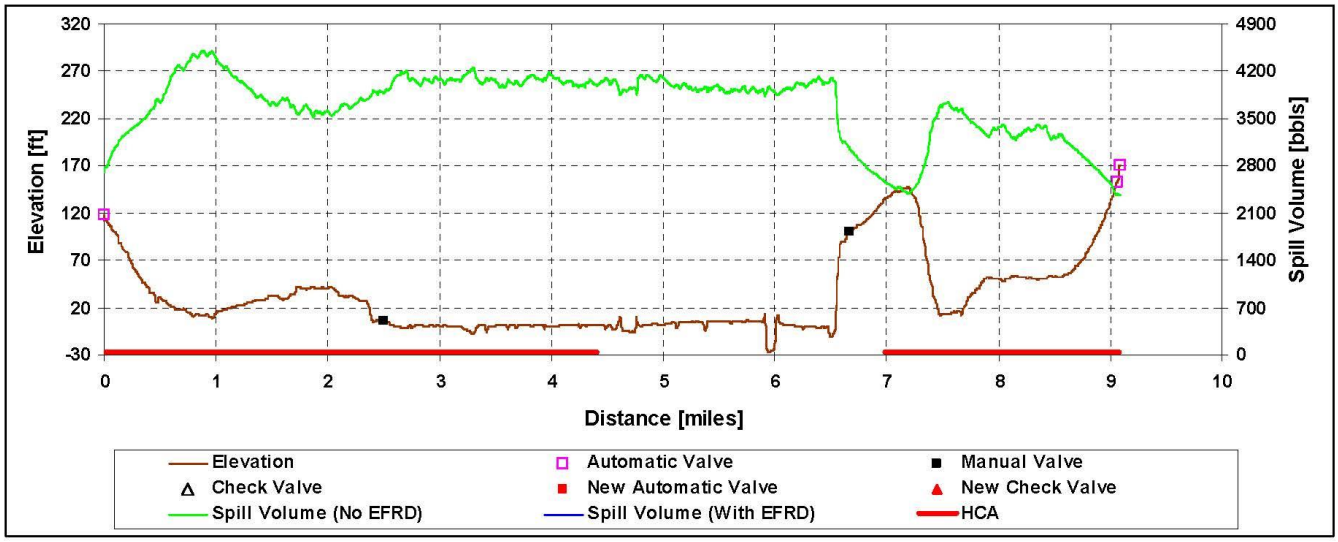


18.1.1.2 Section 2 – Response Zone 4

Section two of the Puget Sound pipeline is approximately 9.085 miles (14.62 km) long from Burlington MU 48 to Anacortes 16G with NPS 16 size and a minimum wall thickness of 0.25 inch (6.35 mm). The table below presents the locations of existing mainline block valves (automatic and manual), and check valves in this section.

Response Zone	Valve Description	Valve Type	Chainage (miles)
4	MU 48	Automatic	0.000
4	MB 3	Manual	2.501
4	MB 7	Manual	6.664
4	MB 9	Automatic	9.060
4	Anacortes 16G	Automatic	9.085

The spill volume profile for pipeline section two from Burlington to Anacortes is presented below. In this figure, the green line, labeled “Spill Volume (No EFRD)”, represents the calculated total spill volume profile based on the existing mainline valves assuming that all manual valves are open. An overall peak volume of 4,500 bbls occurs at MP-0.887 in Response Zone 4.

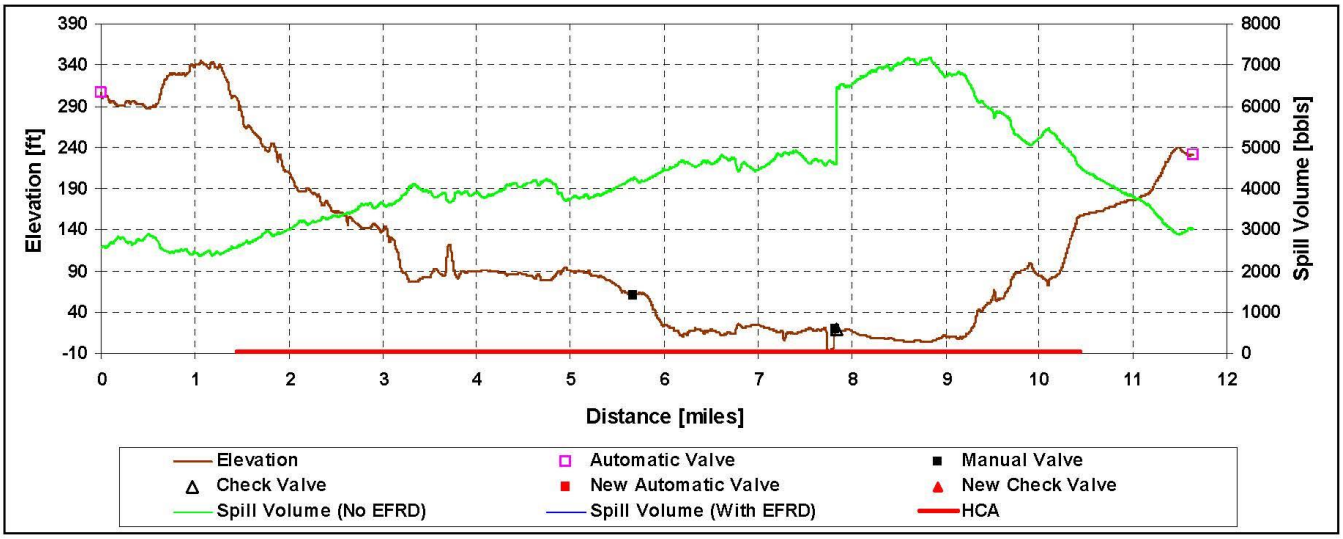


18.1.1.3 Section 3 – Response Zone 2

Section three of the Puget Sound pipeline is approximately 11.644 miles (18.739 km) long from Laurel Station 16N to Ferndale 16G with NPS 16 size and a minimum wall thickness of 0.25 inch (6.35 mm). The table below presents the locations of existing mainline block valves (automatic and manual), and check valves in this section.

Response Zone	Valve Description	Valve Type	Chainage (miles)
2	Laurel Station 16N	Automatic	0.000
2	ML 6	Manual	5.675
2	ML 8	Manual	7.831
2	Nooksak River Check	Check	7.833
2	Ferndale 16G	Automatic	11.644

The spill volume profile for pipeline section two from Laurel to Ferndale is presented below. In this figure, the green line, labeled “Spill Volume (No EFRD)”, represents the calculated total spill volume profile based on the existing mainline valves assuming that all manual valves are open. An overall peak volume of 7,186 bbls occurs at MP-8.832 in Response Zone 2.



18.1.2 Tank Calculation

The worst case discharges for breakout tanks have two sets of criteria under the two legislations. In Washington state under WAC 173-182-030 (67)(d) the WCD is the volume of the largest tank on site which amounts to 89, 455 bbl. The WCD calculation under DOT regulation 49 CFR 194.105(b)(3) accounts for a reduction of 70% of the tank volume equalling 26,837 bbl. The WCD of Zone 5 is 89,455 bbl, because it is the largest worst case discharge volume of the two calculations.

18.1.3 Historic Releases

The WCD calculation under DOT regulation 49 CFR 194.105(b)(2) and WDOE regulation WAC 173-182-030 (67)(d) requires a look at historic spills. A spill in Zone 2 on January 10, 1973 equaled 10,500 bbl, which is larger than the calculated WCD of 7,186 bbl. Zones 1, and 3-5 do not have larger historic spills than the calculated WCD volumes. The following table outlines the historic spills for the Puget Sound Pipeline, and Laurel Station Response Zones:

Date	Response Zone	Material Released	Volume Released (bbl)
30-Jul-12	5	Crude	0.003
12-Apr-09	2	Crude	0.006
4-Jun-08	5	Crude	0.1
26-Oct-00	5	Crude	645
25-Nov-95	5	Crude	0.5
7-Mar-92	5	Crude	50
11-Dec-91	5	Crude	84
15-Jan-91	5	Condensate	75
1-Jun-88	5	Crude	0.1
7-Feb-83	3	Crude	1
1-Feb-79	5	Condensate	1149
3-Dec-75	5	Crude	0.1
23-Apr-74	2	Crude	100
10-Jan-73	2	Crude	10500
11-Aug-72	3	Crude	10
12-Jul-71	5	Crude	6300
15-Oct-56	5	Crude	1
5-Mar-55	2	Crude	10

18.1.4 Response Zone Worst Case Discharge Volumes

The following table outlines the WCD volume for each response zone based on the above calculations, and will be used to determine the planning standards under WAC 173-182-365:

Zone	Description	Worst Case Discharge (bbl)
1	Border Scraper Trap to Laurel Station	6,656
2	Laurel Station to Ferndale Metre Station	10,500
3	Laurel Station to Burlington Trap	10,405
4	Burlington Trap to Anacortes Metre Station	4,500
5	Laurel Station	89,455

18.2 Planning Standards

Washington State applies a planning standard that will be verified during drills. Should an actual spill event occur KMC understands that the initial response to the event is guided by safety considerations, and that KMC is responsible for addressing the entire volume of the spill regardless of the planning standard, also that the planning standards do not constitute cleanup standards that are to be met. In the event of an actual spill the failure to remove the discharge within the time periods set out in the plan will not constitute failure to comply with the ERP for the purposes of the planning standards or for the purpose of imposing administrative, civil, or criminal penalties under any other law. WAC 173-182-310.

18.2.1 Planning Spreadsheets

The following sections outlines the planning spreadsheets provided by WDOE to demonstrate how the planning standards are being met for each of the five response zones. These spreadsheets are also available electronically from the Emergency Response and Security Department.

18.2.1.1 Zone 1 – Bellingham Bay

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 1 Bellingham Bay
Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms
The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014**. This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.
PRC(s): NRCES
Plan Holder owned equipment: YES
Worst Case Spill Volume (bbls): 6,656
Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.
Mutual Aid/Letters Of Intent: This is described in Section 19.5 of the plan.
Analysis point description: Where the Nooksack River enters Bellingham Bay
Marine 50% or Freshwater 65% shore side storage credit: No

Alternative Planning Standard: No.

	On-water Storage (bbls)	Shoreside Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	2,000	2,000	4,000	22
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	2,044	909	2,953	14,821	8,455	17,534	40,810	1,000	38,150	2,000	41,150	137
6 hr required			666				666				7,000	
meets standard			**Yes**				**Yes**				**Yes**	
12 hr available	5,805	5,986	11,791	17,513	18,059	35,597	71,169	9,000	61,650	4,800	75,450	253
12 hr required			1,997				998				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
24 hr available	36,605	14,966	51,571	18,175	18,059	35,597	71,831	9,000	61,650	5,800	76,450	262
24 hr required			3,994				1,331				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
48 hr available	36,605	14,966	51,571	18,175	19,499	35,597	73,271	9,100	61,650	5,800	76,550	265
48 hr required			3,994				1,664				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.2 Zone 1 – Nooksack River

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 1 Nooksack River Crossing

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014**. This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES

Plan Holder owned equipment: YES

Worst Case Spill Volume (bbls): 6656

Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.

Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.

Analysis point description: Zone 1 Nooksack River Crossing (North of Laurel)

Marine 50% or Freshwater 65% shore side storage credit: No

Alternative Planning Standard: No.

	On-water Storage (bbls)	Shore side Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	0	2,000	2,000	18
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	

6 hr available	300	599	899	13,369	823	3,017	17,209	0	10,900	2,000	12,900	59
6 hr required			666				666				7,000	
meets standard			**Yes**				**Yes**				**Yes**	

12 hr available	4,260	5,986	10,246	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
12 hr required			1,997				998				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

24 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
24 hr required			3,994				1,331				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
48 hr required			3,994				1,664				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.3 Zone 2 – Bellingham Bay

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 2 Bellingham Bay

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014**. This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES
Plan Holder owned equipment: YES
Worst Case Spill Volume (bbls): 10,500
Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.
Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan
Analysis point description: Where the Nooksack River enters Bellingham Bay
Marine 50% or Freshwater 65% shore side storage credit: No
Alternative Planning Standard: No

	On-water Storage (bbls)	Shore side Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	2,000	2,000	4,000	22
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	2,044	909	2,953	14,821	8,455	17,534	40,810	1,000	38,150	2,000	41,150	137
6 hr required			1,050				1,050				7,000	
meets standard			**Yes**				**Yes**				**Yes**	
12 hr available	5,805	5,986	11,791	17,513	18,059	35,597	71,169	9,000	61,650	4,800	75,450	253
12 hr required			3,150				1,575				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
24 hr available	36,605	14,966	51,571	18,175	18,059	35,597	71,831	9,000	61,650	5,800	76,450	262
24 hr required			6,300				2,100				27,000	

meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	36,605	14,966	51,571	18,175	19,499	35,597	73,271	9,100	61,650	5,800	76,550	265
48 hr required			6,300				2,625				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.4 Zone 2 – Nooksack River

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 2 Nooksack

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014**. This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES

Plan Holder owned equipment: Yes

Worst Case Spill Volume (bbls): 10,500

Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.

Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.

Analysis point description: Zone 2 Nooksack River Crossing (near Ferndale)

Marine 50% or Freshwater 65% shore side storage credit: YES, Kinder Morgan plans to utilize their break out tanks at Laurel for recovered oil. This is discussed in the plan in Section 18.2.2.

Alternative Planning Standard: No.

	On-water Storage (bbls)	Shoreside Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	0	2,000	2,000	18
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	1,194	909	2,103	14,287	8,095	8,482	30,864	1,000	26,150	2,000	29,150	103
6 hr required			368				1,050				7,000	
meets standard			**Yes**				**Yes**				**Yes**	
12 hr available	4,260	5,986	10,246	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
12 hr required			1,103				1,575				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
24 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
24 hr required			2,205				2,100				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
48 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
48 hr required			2,205				2,625				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.5 Zone 3 – Bellingham Bay

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 3 Bellingham Bay

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014** This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES

Plan Holder owned equipment: YES

Worst Case Spill Volume (bbls): 7000

Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.

Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.

Analysis point description: Zone 3, where Whatcom Creek discharges into Bellingham Bay

Marine 50% or Freshwater 65% shore side storage credit: No

Alternative Planning Standard: No

	On-water Storage (bbls)	Shore side Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	2,000	2,000	4,000	22
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	

6 hr available	2,044	909	2,953	14,821	8,455	17,534	40,810	1,000	38,150	2,000	41,150	137
6 hr required			700				700				7,000	
meets standard			**Yes**				**Yes**				**Yes**	

12 hr available	5,805	5,986	11,791	17,513	18,059	35,597	71,169	9,000	61,650	4,800	75,450	253
12 hr required			2,100				1,050				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

24 hr available	36,605	14,966	51,571	18,175	18,059	35,597	71,831	9,000	61,650	5,800	76,450	262
24 hr required			4,200				1,400				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	36,605	14,966	51,571	18,175	19,499	35,597	73,271	9,100	61,650	5,800	76,550	265
48 hr required			4,200				1,750				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.6 Zone 3 – Samish Bay

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 3 Samish Bay

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014** This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES
Plan Holder owned equipment: Yes
Worst case discharge: 10,405 bbls
Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.
Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.
Analysis point description: Zone 3, where the Samish River discharges into Samish Bay.
Marine 50% or Freshwater 65% shore side storage credit: No
Alternative Planning Standard: No

	On-water Storage (bbls)	Shore side Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	2,000	2,000	4,000	22
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	2,044	909	2,953	14,821	8,455	17,534	40,810	1,000	38,150	2,000	41,150	137
6 hr required			1,041				1,041				7,000	
meets standard			**Yes**				**Yes**				**Yes**	
12 hr available	5,805	5,986	11,791	17,513	18,059	35,597	71,169	9,000	61,650	4,800	75,450	254
12 hr required			3,122				1,561				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
24 hr available	36,605	14,966	51,571	18,175	18,059	35,597	71,831	9,000	61,650	5,800	76,450	262
24 hr required			6,243				2,081				27,000	

meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	36,605	14,966	51,571	18,175	19,499	35,597	73,271	9,100	61,650	5,800	76,550	265
48 hr required			6,243				2,601				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.7 Zone 3 – Samish River

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 3 Samish River

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014** This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES

Plan Holder owned equipment: Yes

Worst Case Spill Volume (bbls): 10,405 bbls

Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.

Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.

Analysis point description: Zone 3 where the pipeline crosses the Samish River.

Marine 50% or Freshwater 65% shore side storage credit: YES, Kinder Morgan plans to utilize their break out tanks at Laurel for recovered oil. This is discussed in the plan in Section 18.2.2.

Alternative Planning Standard: No

	On-water Storage (bbls)	Shoreside Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	0	2,000	2,000	18
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	1,194	909	2,103	14,287	9,141	8,482	31,910	1,000	30,150	2,000	33,150	111
6 hr required			364				1,041				7,000	
meets standard			**Yes**				**Yes**				**Yes**	
12 hr available	4,260	5,986	10,246	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
12 hr required			1,093				1,561				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
24 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
24 hr required			2,185				2,081				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
48 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
48 hr required			2,185				2,601				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.8 Zone 3 – Whatcom Creek

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 3 Whatcom Creek

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014**. This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES

Plan Holder owned equipment: YES

Worst Case Spill Volume (bbls): 7000

Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.

Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.

Analysis point description: Zone 3, where the pipeline crosses Whatcom Creek

Marine 50% or Freshwater 65% shore side storage credit: No

Alternative Planning Standard: No

	On-water Storage (bbls)	Shore side Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	0	2,000	2,000	18
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	

6 hr available	1,194	909	2,103	14,287	8,455	8,482	31,224	1,000	27,150	2,000	30,150	105
6 hr required			700				700				7,000	
meets standard			**Yes**				**Yes**				**Yes**	

12 hr available	4,260	5,986	10,246	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
12 hr required			2,100				1,050				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

24 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
24 hr required			4,200				1,400				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	4,260	14,966	19,226	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
48 hr required			4,200				1,750				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.9 Zone 4 – Padilla Bay

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 4 Padilla Bay

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014** This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES
Plan Holder owned equipment: YES
Worst Case Spill Volume (bbls): 4,200
Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.
Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.
Analysis point description: Zone 4, Padilla Bay
Marine 50% or Freshwater 65% shore side storage credit: No
Alternative Planning Standard: No

	On-water Storage (bbls)	Shore side Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	2,000	2,000	4,000	24
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	2,044	909	2,953	14,821	9,141	17,534	41,496	1,000	41,150	2,000	44,150	143
6 hr required			420				420				7,000	
meets standard			**Yes**				**Yes**				**Yes**	
12 hr available	5,805	5,986	11,791	17,513	18,059	35,597	71,169	9,000	61,650	4,800	75,450	254
12 hr required			1,260				630				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
24 hr available	36,605	14,966	51,571	18,175	18,059	35,597	71,831	9,000	61,650	5,800	76,450	262
24 hr required			2,520				840				27,000	

meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	36,605	14,966	51,571	18,175	19,499	35,597	73,271	9,100	61,650	5,800	76,550	265
48 hr required			2,520				1,050				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.10 Zone 4 – Padilla Bay Standard

Plan Holder:Kinder Morgan Canada (Trans Mountain Pipeline) Zone 4 Padilla Bay

Planning Standard Summary Analysis: WAC 173-182-375 Padilla Bay Planning Standard

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014** This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES

Plan Holder owned equipment: YES

Worst Case Spill Volume (bbls): 4200

Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.

Mutual Aid/Letters Of Intent: PRC Letteres of Intent can be found in Section 19.5 of the plan.

Analysis point description: Zone 4, Padilla Bay

Marine 50% or Freshwater 65% shore side storage credit: No

Alternative Planning Standard: No

	On-water Storage (bbls)	Shoreside Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
1.5 hr available	0	381	381	13,369	137	0	13,506	0	0	2,000	2,000	18
1.5 hr required			0				0				1,000	
meets standard			**Yes**				**Yes**				**Yes**	
2 hr available	0	381	381	13,369	137	0	13,506	0	2,000	2,000	4,000	24
2 hr required			0				0				3,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	2,044	909	2,953	14,821	9,141	17,534	41,496	1,000	41,150	2,000	44,150	143
6 hr required			126	63			126				13,000	
meets standard			**Yes**	**Yes**			**Yes**				**Yes**	
12 hr available	5,805	5,986	11,791	17,513	18,059	35,597	71,169	9,000	61,650	4,800	75,450	254
12 hr required			630	84			420				33,000	
meets standard			**Yes**	**Yes**			**Yes**				**Yes**	
24 hr available	36,605	14,966	51,571	18,175	18,059	35,597	71,831	9,000	61,650	5,800	76,450	262
24 hr required			1,176				588				53,000	
meets standard			**Yes**				**Yes**				**Yes**	
48 hr available	36,605	14,966	51,571	18,175	19,499	35,597	73,271	9,100	61,650	5,800	76,550	265
48 hr required			1,176				1,050				53,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.11 Zone 5 – Bellingham Bay

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 5 Bellingham Bay

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014**. This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES

Plan Holder owned equipment: YES

Worst Case Spill Volume (bbls): 89,455

Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.

Mutual Aid/Letters Of Intent: PRC Letters of Intent are found in Section 19.5 of the plan.

Analysis point description: Zone 5, where the Nooksack River enters Bellingham Bay

Marine 50% or Freshwater 65% shore side storage credit: No

Alternative Planning Standard: No

	On-water Storage (bbls)	Shore side Storage (bbls)	Total Storage (bbls)	Calm Water (EDRC)	Protected Water (EDRC)	Open Water (EDRC)	Total Recovery (EDRC)	B1 Boom (ft)	B2 Boom (ft)	B3 Boom (ft)	Total Boom (ft)	Personnel (12 hour shift)
2 hr available	0	381	381	13,369	137	0	13,506	0	2,000	2,000	4,000	22
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	

6 hr available	29,752	909	30,661	14,821	8,455	17,534	40,810	1,000	38,150	2,000	41,150	137
6 hr required			8,946				8,946				7,000	
meets standard			**Yes**				**Yes**				**Yes**	

12 hr available	33,513	5,986	39,499	17,513	18,059	35,597	71,169	9,000	61,650	4,800	75,450	253
12 hr required			26,837				13,418				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

24 hr available	64,313	14,966	79,279	18,175	18,059	35,597	71,831	9,000	61,650	5,800	76,450	262
24 hr required			53,673				17,891				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	64,313	14,966	79,279	18,175	19,499	35,597	73,271	9,100	61,650	5,800	76,550	265
48 hr required			53,673				22,364				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.1.12 Zone 5 – Laurel Station

Plan Holder: Kinder Morgan Canada (Trans Mountain Pipeline) Zone 5 Laurel Station

Planning Standard Summary Analysis: WAC 173-182-365 Transmission pipelines and pipeline tank farms

The summary analysis spreadsheet is based on a conceptual model of equipment that would be available based on the guidelines set forth in WAC 173-182 for; planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance in spills will depend on the conditions of the day. An electronic version of the equipment detail spreadsheet which lists all equipment can be made available by Ecology upon request. The planning standard summary analysis indicates total access to boom, storage and recovery resources required to meet the planning standard. Equipment access is based on information listed on the WRRL and information provided through the plan holder contingency plan and Primary Response Contractor applications as of **10/30/2014** This information is subject to change as additional equipment is acquired and/or relocated. Substantive changes will result in an update of the spreadsheets.

PRC(s): NRCES
Plan Holder owned equipment: YES
Worst Case Spill Volume (bbls): 89,455
Oil Products Handled by Group (Group 1-5): Groups 2 and 3, crude oil, synthetic crudes, and diluted bitumen. A products summary is located in Section 7.7 of the plan.
Mutual Aid/Letters Of Intent: PRC Letters of Intent can be found in Section 19.5 of the plan.
Analysis point description: Zone 5, Laurel
Marine 50% or Freshwater 65% shore side storage credit: YES, Kinder Morgan plans to utilize their break out tanks at Laurel for recovered oil. This is discussed in the plan in Section 18.2.2.
Alternative Planning Standard: For this operating environment, Kinder Morgan meets the storage planning requirements at hour 6 through the use of shoreside storage devices appropriate to the operating environment. The storage is available via Kinder Morgan owned equipment, Kinder Morgan tanks at Laurel Station, PRC equipment and storage available through LOI.

	On-water Storage (bbls)	**Shore side Storage (bbls)**	**Total Storage (bbls)**	**Calm Water (EDRC)**	**Protected Water (EDRC)**	**Open Water (EDRC)**	**Total Recovery (EDRC)**	**B1 Boom (ft)**	**B2 Boom (ft)**	**B3 Boom (ft)**	**Total Boom (ft)**	**Personnel (12 hour shift)**
2 hr available	0	381	381	13,369	137	0	13,506	0	0	2,000	2,000	18
2 hr required			0				0				2,000	
meets standard			**Yes**				**Yes**				**Yes**	
6 hr available	1,194	1,939	3,133	14,287	8,455	8,482	31,224	1,000	27,150	2,000	30,150	105
6 hr required			3,131				8,946				7,000	
meets standard			**Yes**				**Yes**				**Yes**	
12 hr available	4,260	7,016	11,276	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
12 hr required			9,393				13,418				27,000	
meets standard			**Yes**				**Yes**				**Yes**	
24 hr available	4,260	15,996	20,256	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
24 hr required			18,786				17,891				27,000	

meets standard			**Yes**				**Yes**				**Yes**	

48 hr available	4,260	15,996	20,256	16,979	18,059	24,118	59,156	8,700	50,450	4,800	63,950	211
48 hr required			18,786				22,364				27,000	
meets standard			**Yes**				**Yes**				**Yes**	

18.2.2 Vac Truck to Storage Tank Off-loading of Recovered Oil

- Vac truck driver will enter facility and check in at Control building, and sign in on visitor log sheet.
- Day operator will confirm the driver is current with his year required KMC safety orientation.
- The day operator will fill out , and issue a safe work permit for the unloading of product into tankage.
- Vac truck driver will fill out a KMC "Vacuum and Tank Truck Pre-Job Checklist " and review it with the day operator and obtain his signature.
- Day operator will attach checklist to the daily safe work permit and post prior to work commencing.
- Day operator will accompany the vac truck to the appropriate tank, and will gas check the entire area prior to allowing truck into the tank bay area.
- Day operator will guide vac truck in to tank bay, and act as a spotter while truck backs in to the appropriate location.
- The vac truck will be grounded to tank, and hoses run to the appropriate tank valve.
- The vac truck will build tank pressure prior to discharging into selected tank. Once pressure is reached, the day operator will open the tank valve to facilitate the off-loading.
- Once vac truck has transferred all product to the tank, the day operator will close and secure tank valve , and escort truck out of the tank bay.
- The vac truck driver will work under the same safe work permit for his entire shift, and sign out on the stations visitor log when leaving the site for the last time.
- A new safe work permit and "Vacuum and Tank Truck Pre- Job Checklist " are required to be filled out and posted for each shift.

18.2.3 Oil Recovery Rate

OSCAR Unit	Nameplate Capacity (USGPM)	Efficiency Factor (%)	USGPD	Barrels per Day
Laurel OSCAR				
4' Pedco weir Skimmer with 2x3" pumps	338	20	194,688	4,635
2' Pedco Wier Skimmer with 1x3" pump	338	20	97,344	2,317
Canadyne Multiskimmer	(brush) 88 (drum) 52	20 20	25,344 14,976	603 356
Anacortes OSCAR				
4' Peco Weir Skimmer with 2x3" pumps	338	20	194,688	4,635
2' Pedco Wier Skimmer with 1x2" pump	172	20	49,536	1,179
Morris M1-11/24 Disc Skimmer	20	20	5,760	137
Total 24 Hour Adjusted Rate w/ Brush			**561,600**	**13,369**
Total 24 Hour Adjusted Rate w/ Drum			**551,232**	**13,122**
Total 24 Hour Adjusted Rate w/ Disk			**542,016**	**12,903**

18.2.4 KMC Owned Recovered Liquid Storage

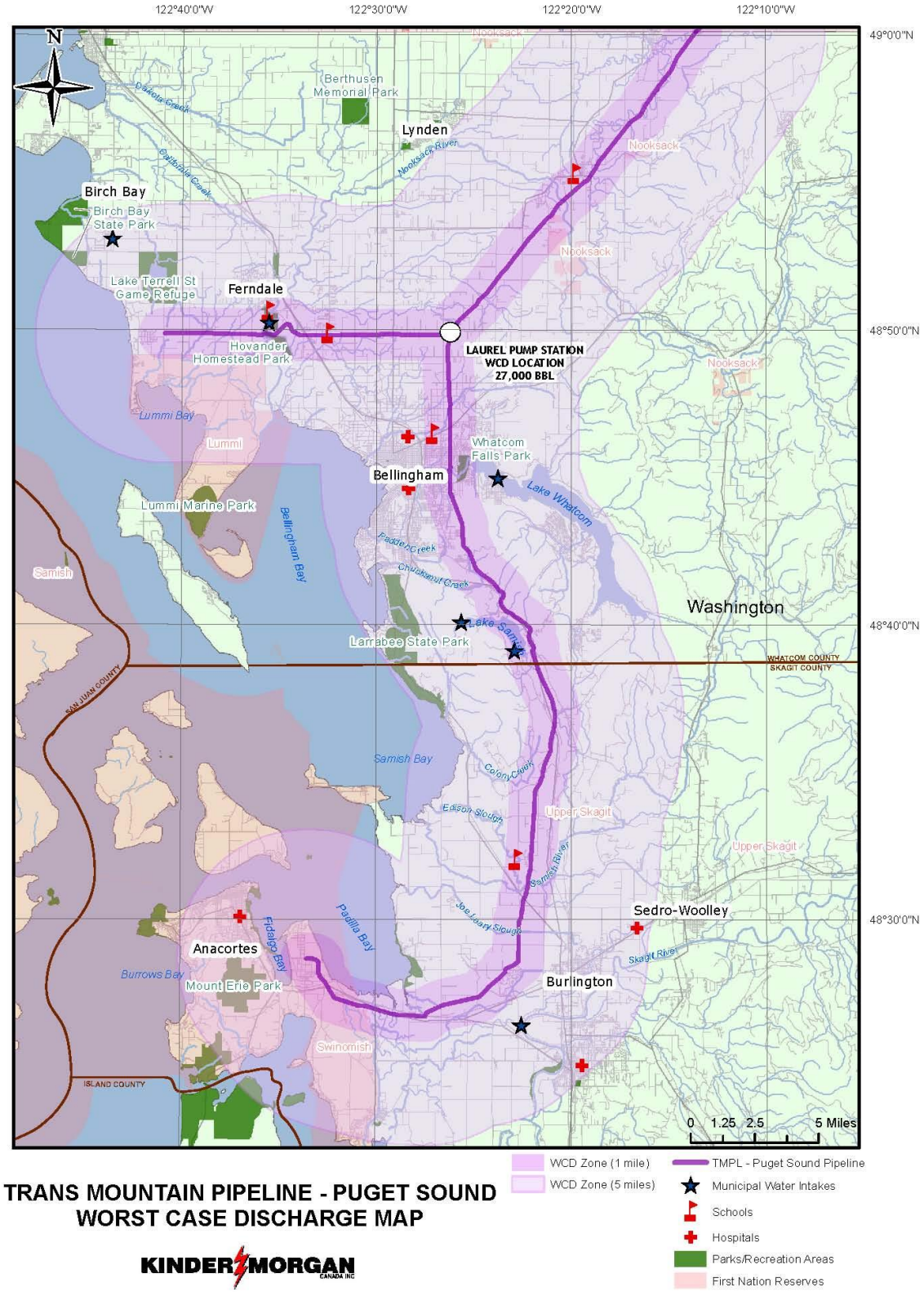
Kinder Morgan has several storage options available for use during an emergency these are listed below:

Location	Description	Capacity (US Gallons)	Capacity (barrels)
Laurel (OSCAR)	1x Portatank 2x Pillow tanks 1x Buoywall	1,000 6,000 1,500	23 142 35
Anacortes (OSCAR)	1x Bouywall 2x Pillow Tanks	1,500 6,000	35 142
Ferndale Relief Tank (130)	1x Relief Tank	126,000	3000
Laurel Relief Tank (120)	1x Relief Tank	126,000	3000
Laurel Tank 170	Breakout Tank	3,757,110	89,455
Laurel Tank 180	Breakout Tank	3,716,244	85,482
Total Permanent Storage		**7,725,354**	**183,937**
Total Temporary Site Storage		**16,000**	**380**

18.2.5 KMC Owned Boom

Under WAC 173-182-365 (2) KMC maintains 2000 ft of boom in Washington State all of which is available anywhere along the pipeline within 2 hours. After the two hour window KMC relies upon our PRC's to provide additional boom capability for the 6, 12, 24, and 48 hour requirements.

18.3 Worst Case Discharge Map



TRANS MOUNTAIN PIPELINE - PUGET SOUND
WORST CASE DISCHARGE MAP

KINDER MORGAN CANADA INC

19.0 CERTIFICATIONS

19.1 Kinder Morgan Certification

Emergency Response Plan Certification

For the Trans Mountain Pipeline (Puget Sound) LLC from the Canada/U.S. Border to Laurel Station (Bellingham, WA), and from Laurel Station to Anacortes Meter Station (Anacortes, WA) and from Laurel Station to Ferndale Meter Station (Ferndale, WA) , Kinder Morgan Canada Inc., as the operator certifies that:

- A spill response plan ("Plan") has been prepared that will be implemented in the event of a worst case discharge of oil
- The Plan is in effect for this pipeline and that Operator personnel are trained in the implementation of this Plan
- The availability of private personnel and equipment necessary to respond, to the maximum extent practicable, to a worst case discharge or a substantial threat of a discharge is ensured by contract or other approved means
- This Plan meets the applicable requirements of Research and Special Programs Administration, U.S. Department of Transportation (49 CFR 194).

***Acceptance Verification*:** This verifies acceptance of this Spill Response Plan for Trans Mountain Pipeline (Puget Sound) LLC. This Plan will be used by facility personnel when responding to an oil spill. This Plan will be used in conjunction with the Emergency Response Field Guide, the Control Point Manual, and the Incident Command System Manual when necessary. The Supervisor, Puget Sound or designee has the authority to make appropriate expenditures in order to execute the provisions of this Plan. The Supervisor, Puget Sound or designee will be considered the "Qualified Individual."



Dan O'Rourke,
Director, Environmental, Health and Safety Department
July 8, 2013

19.2 Kinder Morgan Certification – Binding Agreement

Washington State Department of Ecology
Spill Prevention, Preparedness and Response Program
P.O. Box 47600, Olympia, WA 98504-7600
For information, please contact SPPR Program at 360-407-7455.

Plan Holder/Company Name:

WAC 173-182-220: Binding Agreement
Each plan shall contain a written statement binding the plan holder to its use. The binding agreement shall be signed by the owner or operator, or a designee with authority to bind the owners and operators of the facility or vessel covered by the plan. The agreement is submitted with the plan.

Submitting Party Information

Company Name: Kinder Morgan Canada – Trans Mountain Pipeline (Puget Sound) LLC	
Contact Name: Dan O'Rourke	
Address:2700, 300 -5 Avenue SW, Calgary, AB T2P 5J2	
Phone Number: 403-514-6641	Fax #: 403-514-6401
Email: Dan_O'Rourke@kindermorgan.com	Website: kindermorgan.com

Binding Agreement

I certify that I reviewed and am familiar with the information submitted in this Plan. I verify acceptance of the plan and commit to (a) a safe and immediate response to spills and to substantial threats of spills that occur in, or could impact Washington waters or Washington's natural, cultural and economic resources; (b) having an incident commander in the state within six hours after notification of a spill; (c) the implementation and use of the plan during a spill and substantial threat of a spill, and to the training of personnel to implement the plan; (d) the authority and capability to make the necessary and appropriate expenditures in order to implement plan provisions; (e) working in unified command within the incident command system to ensure that all personnel and equipment resources necessary to the response will be called out to clean up the spill safely and to the maximum extent practicable.



_____ July 8, 2013_____
Authorized Signature Date

___Dan O'Rourke_____
Print Name

___Director, Environmental, Health and Safety Department _____
Title

19.3 United States Department of Transportation

U.S. Department
of Transportation
Pipeline and Hazardous
Materials Safety Administration

1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

November 6, 2013

Ms. Megan Sartore
Kinder Morgan Canada, Inc.
300 5th Ave SW, Suite 2700
Calgary, Alberta T2P 5J2
Canada

RE: LETTER OF APPROVAL: Kinder Morgan Canada, Inc. Trans Mountain Pipeline, LLC, Puget Sound Response Plan, Sequence Number 0587
Dated: July 2013

Dear Ms. Sartore:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) has received and reviewed Kinder Morgan Canada, Inc.'s revised oil spill response plan for Kinder Morgan Canada, Inc. Trans Mountain Pipeline, LLC, Puget Sound Response Plan, dated July 2013. We conclude that the Plan complies with PHMSA's regulations concerning onshore oil pipelines found at 49 Code of Federal Regulations (CFR) Part 194. Your Response Plan has been approved.

This approval is valid for five years from the date of this letter. You must revise and resubmit a Response Plan for approval by **November 6, 2018**. If discrepancies are found during PHMSA inspections, or if new or different operating conditions or information would substantially affect the implementation of this plan, you are required to resubmit the plan before the above-listed date. See 49 CFR § 194.121(b).

Should you have any questions or concerns, please contact me at (202) 366-4595 or by email at PHMSA.OPA90@dot.gov. Please include the sequence number and your PHMSA Operator Identification Number on any future correspondence.

Sincerely,

David K. Lehman, Acting Director
Emergency Support and Security Division
Office of Pipeline Safety

cc: PHMSA Western Region

19.4 Washington State Department of Ecology

Oil Spill Contingency Plan Approval Certificate

WASHINGTON STATE DEPARTMENT OF ECOLOGY

The Oil Spill Contingency Plan for

Kinder Morgan Canada
Trans Mountain Pipeline (Puget Sound) LLC

has been APPROVED pursuant to Chapter 173-182 Washington Administrative Code by the

WASHINGTON STATE
DEPARTMENT OF ECOLOGY
Department of Ecology - Spill Preparedness Section

January 24, 2014
Date of Approval

Linda Pilkey-Jarvis
Preparedness Section Manager

January 24, 2019
Plan Expiration Date

19.5 PRC – Contracts/Letters of Intent

Letters of intent and/or letter of contract for each PRC are included in this section on the next several pages, where available as identified in Section 2.10 Support Services - Primary Response Contractors (PRC). The actual contract, where a contract exists is available to Washington State Department of Ecology for inspection upon request.

December 9, 2014

Kelly Malinoski
Sr. Emergency Response & Security Advisor
Kinder Morgan Canada
2700, 300 – 5 Avenue SW
Calgary, AB T2P 5J2

Via Email: Kelly_malinoski@kindermorgan.com

RE: PRC/OSRO Coverage

RESPONSE CONTRACTOR CERTIFICATION

This letter confirms that NRC Environmental Services Inc. (NRC) has a contract with Kinder Morgan Canada to provide oil spill response coverage for its Puget Sound Operations. NRC confirms that Kinder Morgan Canada is authorized to reference NRC resources and certifications in its state and/or federal contingency and response planning documents pursuant to terms of the contract for coverage commencing January 1, 2015.

NRC is a Washington State approved Primary Response Contractor (PRC) and has been rated by the U.S. Coast Guard as an Oil Spill Response Organization (OSRO) meeting all classification ratings for Rivers/Canals, Inland/Nearshore and Oceans environments, as well as providing Shoreline response capabilities. NRC is capable of beginning mobilization of response efforts within one hour of a spill notification.

If you have any questions, or if I can be of further assistance, please don't hesitate to contact me either by phone at 206-730-3993 or by e-mail at sbarton@nrcc.com.

Sincerely,

Stephanie Barton
Director, Emergency Response Programs
NRC Environmental Services Inc.

Copy: NRC Seattle

October 22, 2014

O'Brien's Response Management
2929 East Imperial Highway
Suite 290
Brea, California 92821

RESPONSE CERTIFICATION

This letter confirms that O'Brien's Response Management has a Response Resources Agreement with Kinder Morgan Canada. Pursuant to the terms of this Agreement, O'Brien's Response Management commits to provide resources to meet requirements the of WAC 173-182-280 spill management teams.

To support Kinder Morgan's spill Management Team regulatory requirement for "one primary and one alternate person to lead each ICS spill management position down to the section chief and command staff level as depicted in the NWACP standard ICS organizational chart," O'Brien's can supply, at a minimum, the following:

- Incident Commander
- Deputy Incident Commander
- Safety Officer
- Public Information Officer/Assistant
- Liaison Officer/Assistant
- Operations Section Chief or Deputy
- Planning Section Chief or Deputy
- Logistics Section Chief or Deputy
- Financial Section Chief or Deputy

O'Brien's Response Management is capable of beginning mobilization of initial response efforts within 30 minutes of spill notification.

If you have any questions, or need further assistance, please contact me either by phone at 206-679-3658 or by e-mail at jmorris@wittobriens.com. In the event of an emergency, please contact the O'Brien's Response Management 24-Hour Command Post at **985-781-0804**.

Signed,

James R. Morris
Manager, Consulting & Response Services

FOCUS wildlife

US Office | PO Box 944/1408 19th St Anacortes WA 98221 • CA Office | 4555 Stonehaven Ave, Vancouver BC V7G 1E7

Ms. Kelly Malinoski
Emergency Response & Security Advisor
Kinder Morgan
2700, 300 – 5 Avenue SW
Calgary, AB T2P 5J2

Re: Focus Wildlife Emergency Response Services

Ms. Malinoski,

Focus Wildlife International is pleased to provide Kinder Morgan with emergency wildlife spill response in the Puget Sound area, and throughout Washington State, the United States and Canada. Focus Wildlife has provided emergency oiled wildlife response for Kinder Morgan since 2007. Focus Wildlife also provides consultation services such as wildlife contingency planning and drill and exercise support for Kinder Morgan.

Focus Wildlife has specific expertise in the area of oiled wildlife response. Incorporated in Washington State, Focus Wildlife maintains an emergency response team and mobile emergency response equipment that can be immediately deployed in the event of an emergency.

In an emergency please contact the following personnel:

Chris Battaglia, Director	800-578-3048 *or* 310-386-5965
Jenny Schlieps, Program Manager	360-391-7777

Best regards,

Chris Battaglia
Director
Focus Wildlife
chris@focuswildlife.org
310-386-5965
www.focuswildlife.net

12525 131st Ct. N.E. Kirkland, Washington 98034 (425) 823-4841 fax (425) 823-3805

Ms. Kelly Malinoski
Emergency Response & Security Advisor
Kinder Morgan
2700, 300 – 5 Avenue SW
Calgary, AB T2P 5J2

Re: Polaris Applied Sciences Scientific Support to Spill Response

Ms. Malinoski.

Polaris Applied Sciences, Inc. (Polaris) is pleased to provide Kinder Morgan Canada with scientific support for spill response in Canada and the United States. As you are aware, we are involved in spill planning with Kinder Morgan for their proposed expansion of their Westridge facility in Burnaby, B.C. and provided Shoreline Cleanup Assessment Technique (SCAT) for the Westridge Delivery Line release in 2007. We also routinely provide drill and exercise support for Kinder Morgan Canada. Our staff is on call 24 hours a day to render assistance. We have been the Shoreline Cleanup Assessment Technique Coordinators for the Deepwater Horizon oil spill in the Gulf of Mexico for nearly 3 years and can handle a worst case scenario for Kinder Morgan in the unlikely event it may occur.

In an emergency please contact any of the following personnel:

Greg Challenger, Principal Marine Scientist	206-369-5686
Gary Mauseth, Principal Marina Scientists	206 954-9648
Elliott Taylor, Prinicpal Marine Scientist	206 660-5753
Andy Graham, Marine Scientist	206-419-1745

Best regards,

Greg E. Challenger, M.S.
Principal Marine Scientist
Polaris Applied Sciences, Inc.
www.polarisappliedsciences.com

CTEH® CENTER FOR TOXICOLOGY AND ENVIRONMENTAL HEALTH, LLC

September 14, 2014

Kelly Malinoski
Kinder Morgan Canada
2700, 300 – 5 Avenue SW
Calgary, AB T2P 5J2

RE: **Commitment to Respond**

Dear Ms. Malinoski,

Center for Toxicology and Environmental Health, L.L.C. (CTEH®) has extended at a level of authority to commit the necessary resources to aid Kinder Morgan Canada (KMC) in the event of an incident necessitating external support. CTEH®'s experienced team of professionals is on call 24/7 to provide air monitoring, air modeling, environmental sampling, data management and toxicology consulting services during incidents. CTEH® maintains a well staffed/equipped office in the greater Seattle area and additionally owns a KingAir 200 airplane availble for emergencies. Our flight time to Seattle from our corporate office in Little Rock, AR using the KingAir is approximately 6 hours, with our goal to be wheels up in 2 hours from the initial phone call for mobilization.

If you have any questions regarding this matter, please don't hesitate to call me at (317) 473-0688.

Regards,

Center for Toxicology and Environmental Health, L.L.C.

James A. McCormack
Member, Senior Environmental Consultant
Center for Toxicology and Environmental Health, L.L.C.

URS

December 11, 2012

Ms. Kelly Malinoski
Kinder Morgan
300 5th Avenue SW, Suite 2700
Calgary, Alberta
Canada, T2P 5JZ

RE: Commitment to Emergency Response

Dear Ms. Malinoski:

As discussed with Mike Droppo over the last several months, URS Corporation (URS) will assist Kinder Morgan Canada as consultant of choice during emergency response incidents related to Kinder Morgan Canada facilities and operations located in Washington State. The core team will be located in our Seattle office with support, as needed, from other URS offices located in the Northwest. We will serve in the Environmental Unit providing consultation and personnel for environmental related issues including:

- Direct assistance to Kinder Morgan environmental unit lead
- Plan development
- Field sampling/support,
- Data management
- Waste management
- Regulatory support
- Tracking/Reporting

We currently are working at the Laurel Station site to complete a Remedial Investigation/Feasibility Study related to historical releases and have been assisting Kinder Morgan with work related to repairs/maintenance of pipeline over water bodies in Washington.

URS has participated in several of the spill drills for the Laurel Station facility located in Bellingham, Washington in the last 10 years. Typically, we provided services associated with waste management. In October 2012, at Mr. Droppo's request to act as primary consultant to Kinder Morgan in the environmental unit, we served in a broader capacity for emergency response during a worst case release scenario at the Laurel Station facility. This followed the

URS Corporation
1501 4th Avenue, Suite 1400
Seattle, WA 98101-1616
Tel: 206.438.2700
Fax: 206.438.2699

ICS training that Kinder Morgan provided to the core URS contact team assembled to serve as our emergency response team. Members of that contact team will also serve as project or task managers in office or in the field and be guiding other URS staff in the event an incident occurs. As work directives are provided by Kinder Morgan Canada referenced to URS' contract with Kinder Morgan effective June 2010, we will continue to augment resources, develop template plans, continue training with Kinder Morgan, and periodically assess that our contacts/resources are up-to-date and in place for use.

If you need additional information, please do not hesitate to contact me (206-438-2234) or Tom Abbott (206-438-2101) in our Seattle office.

Sincerely,
URS CORPORATION

Karen L. Mixon
Project Manager

Katy Chaney
Vice President

cc: Mike Droppo, Kinder Morgan Canada

September 15, 2014

Kinder Morgan Pipelines
1009 East Smith Road
Bellingham, WA 98226

Subject: BAI Environmental Services Letter of Intent

Patrick,
As per your request, please accept the following as BAI Environmental Services' commitment to Kinder Morgan to supply needed equipment and trained and experiences supervision and labor for your routine maintenance projects, and unforeseen emergency response needs.

Projects that BAI Environmental Services performs are as follows:

- Industrial cleaning with wet-mode and dry-mode vacuum trucks
- Vacuum / Excavation work and Line locating with Guzzler trucks
- Hydrocarbon/Pipeline vacuum services
- Hazardous material handling with DOT 412 vacuum trucks
- 10K, 15K and 20K p.s.i. hydroblasting
- Sewer line jetting
- Self-priming diesel pumps for sewer by-pass work or water transfer
- Industrial Maintenance
- Waste handling
- Street sweeping
- Confined space entry
- Spill response
- Steam cleaning and pressure washing
- Fresh air capabilities
- Operating dewatering presses (plate/frame and belt) and centrifuge
- Pond sediment cleaning
- Heavy equipment operation
- Wetland maintenance and mitigation
- Ditch and landscape maintenance
- Vegetation control
- Tree sawing and chipping
- Landfill maintenance
- Hydro seeding
- Straw blowing
- Excavation work

BAI is a member of the ISNetworld and safety on the jobsite is of prime importance to BAI during work performance.

BAI Environmental Services appreciates the opportunity to be of services to Kinder Morgan Canada. Please be assured that all work will be performed in a safe and professional manner and done to your satisfaction.

Thank you again, if you have any questions or concerns on this Letter of Intent or need any further information, please call me at (360) 815-0274.

Sincerely,

Ken Smith

BAI Environmental Services
752 Loomis Trail Road, Lynden, WA 98264
Phone: 360-354-1134, Fax: 360-354-0593
www.bai-environmental.com

September 18, 2014

Mr. Patrick Davis
Kinder Morgan
1009 E. Smith Road
Bellingham, WA 98226

Re: **Non-Binding Intent to Respond**

Dear Mr. Davis:

BakerCorp is pleased to offer our full range of liquid and solid containers for rent to Kinder Morgan in the event of a release of materials both hazardous and non-hazardous, to land or navigational waters.

BakerCorp has a full array of spill response equipment at its Everett, WA branch including over 300 tanks ranging in sizes from 550 gallon stainless steel totes up to 21,000 gallon carbon steel tanks. BakerCorp tank sizes include:

- 550 gallon stainless steel tanks
- 630 gallon poly tanks
- 4000 gallon trailer mounted poly tanks
- 4000 gallon poly tanks
- 6500 gallon poly tanks
- 19600 gallon tanks with epoxy coated lining
- 18000 gallon double wall tanks
- 21000 gallon tanks, some with heating coils
- 20 yard roll off containers for soils or other solids
- 7200 gallon secondary containment for our poly tanks
- 10 x 50 safe guard berms for larger tanks or to use as a deacon station for boom etc.

We also carry a full line of pumps, pipe and hose in various sizes that are capable of moving up to 6,300 GPM and several miles of 4, 6, 8 and 12' quick connect pipe and hose.

BakerCorp is a 24-hour emergency response company with key personnel on call at all times. We will utilize best efforts to respond to the first call within 1 hour. Our 24 hour contact number is 800-BAKER-12.

Baker will strive to deliver ten, 21,000 gallon tanks within 12 hours for a total of 194,000 gallons of capacity. In an extreme emergency situation we have the capability to have tanks delivered from BakerCorp branches in the U.S., utilizing common carriers bringing tanks from

both Seattle, WA and Portland, OR branches. If needed we can reach BakerCorp branches in San Francisco, Canada, Salt Lake City, and Los Angeles for additional manpower as well as more equipment.

With the combination of these branches and the full range of our equipment; BakerCorp can provide 13,599 barrels of storage at hrs 24 and 48. Transportation times will vary but this capacity can be brought to bear quickly and on short notice if inventory is available at the time of request.

This letter is not intended as a binding offer to rent equipment to Kinder Morgan Canada, but rather to provide an overview of BakerCorp ability to provide resources in the event of an incident necessitating external support. All equipment, materials, labor, and transportation rates and costs are offered on an "as available" basis only and are subject to the terms and conditions of BakerCorp standard rental agreement. Unless and until a validly executed rental agreement is entered into between the parties, neither BakerCorp nor Kinder Morgan Canada shall owe any legally binding obligation to the other.

If you have additional questions about BakerCorp or require its services please contact Searl LaChausse or Colin Linn at our Everett, WA office (425-347-8811)

Very truly yours,

BakerCorp Everett, WA

KINDER MORGAN
CANADA









Incident Command System Guide

023228

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Purpose

This Kinder Morgan Incident Command System Guide is a guidance document for implementing an Incident Command System (ICS) response management organization that can be universally adopted by responders for oil spills.

Scope

ICS provides for maximum flexibility in varied situations, which has been adapted by Kinder Morgan Canada (KMC) for use during an operational upset. This manual is a job aid giving general instructions, and checklists, to guide responders in their duties within the ICS process and works in conjunction with Kinder Morgan Area Specific Emergency Response Plans (Contingency Plans), Field Guides and Control Point Manuals. The Area Specific Plans, Guides and Control Points hold specific response tactics, and environmental concerns, forms and procedures relating to specific regulations.

Wherever possible, the IMT will establish, and operate within, a Unified Command structure as warranted by the circumstances of an incident. When a federal or state/provincial agency arrives on-scene to participate in managing a response action, the agencies will utilize a unified command structure to jointly manage the spill incident. In the unified command, decisions with regard to the response will be made by consensus and documented through a single Incident Action Plan (IAP) for each operational period. In the event that the Unified Command is unable to reach consensus, the FOSC/FIC has ultimate decision making authority. The unified command may incorporate additional tribal/first nations or local government on-scene coordinators into the command structure as appropriate.

Incident Commanders for oil discharges and hazardous substance releases will, whenever possible and practical be organized under the Unified Command Structure which includes, but not limited to:

- The pre-designated Federal On Scene Coordinator (FOSC)/Incident Commander (FIC);
- The State/Provincial On Scene Coordinator (SOSC)/Incident Commander (PIC);
- The representative of the Responsible Party (RP); and
- The local and/or tribal/first nations On Scene Coordinators, as appropriate.

To be considered for inclusion as a UC member, the following criteria must be considered:

- The organization must have jurisdictional authority or functional responsibility under a law or ordinance for the incident; and
- The organization must be specifically charged by law or ordinance with commanding, coordinating or managing a major aspect of the incident response; and
- The incident or response operations must have impact on the organization's Area Of Responsibility; and
- The organization should have the resources to support participation in the response organization.

Actual Unified Command makeup for a specific incident will be determined on a case-by-case basis taking into account:

- The specifics of the incident;
- Determinations outlined in the four criteria listed above; and
- Decisions reached during the initial meeting of the Unified Command.

The Unified Command is responsible for the overall management of the incident. The Unified Command directs incident activities including the development and implementation of strategic decisions, approval of the incident action plan, and approves the ordering and releasing of resources. It is expected that each Unified Command member will have the authority to make decisions and commit resources on behalf of their organization.

Typical Response Teams is outlined as a generic response organization for pre-event planning. However, an actual organization will be event-specific. Not all positions need to be filled. The size of the organization is dependent on the magnitude of the incident and can be expanded or contracted as necessary. This modular development is described in Section 2.0 Response Organization Development.

Personnel with specialized skills (technical specialists), not specifically identified within the ICS, may be integrated anywhere within the organization to meet the needs of the Incident Command. This feature allows the greatest compatibility with other existing response management systems.

Guide Maintenance

Single point accountability for the Incident Command System Guide (ICS Guide) development and maintenance rests with the Emergency Response and Security Advisor. This accountability is for:

- ☐ The development of the ICS Guide and managing any future revisions,
- ☐ Ensuring the tools are available and functioning as described in this manual.
- ☐ Ensuring a minimum annual audit of the guide takes place, and the guide is reviewed in full every 5 years.
- ☐ Ensuring the guide is reviewed for effectiveness after an actual response, training or exercises and updated as necessary.

Guide Revisions

All requests for change must be made through the Emergency Response and Security Advisor using the Revision Request Form located on the next page.

Guide Distribution

This guide will be replaced in its entirety as needed. It is not a controlled document, check with the Emergency Response and Security Advisor to ensure you are using the most recent copy of the guide.

Revision Request Form

Requested by:	Date:
Dept/ Agency:	Phone No.:
Revision Type: ___ Addition ___ Deletion ___ Correction	
Manual Section:	Page:
Revision (attach separate sheet if necessary):	
Signature of Requestor:	
Send to: Emergency Response and Security Advisor Kinder Morgan Canada 2700-300 - 5th Avenue S.W. Calgary, AB T2P 5J2 Canada Fax: (403) 514-6401	

To be completed by Emergency Response and Security Advisor	
Date Received:	Comments:
Date Reviewed:	
Issued as Revision: Y/ N	
If No, reason for Rejection:	
Signature Emergency Response and Security Advisor	

1.0 INTRODUCTION

The ICS brings together the functions of the federal government, state/provincial government, local authorities/governments, and the responsible party in order to achieve an effective and efficient response, where the Federal On Scene Commander (FOSC) (USA) or Federal Incident Commander (FIC) (Canada) maintains ultimate authority. The emphasis during oil spill response is on coordination and cooperation.

The FOSC, the state/provincial government (SOSC (USA) or PIC (Canada)), local authorities/ government representatives (LOSC (USA) or LIC (Canada), others including first nations/tribal (OSC (USA) or OIC (Canada)) and the responsible party (RPIC or IC) are all involved with varying degrees of responsibility, regardless of the size and severity of the incident.

Depending on the pipeline/facility regulatory jurisdiction either the FOSC/FIC or SOSC/PIC, retains the authority to direct the spill response, and may direct responses to spills that pose a substantial threat to the public health or welfare. In many situations, however, the FOSC/FIC or SOSC/PIC (depending on jurisdiction) may choose to monitor the response effort and provide support and advice where appropriate. All response actions taken using this ICS Guide are consistent with the federal/state/provincial regulations.

Note: The Trans Mountain Pipeline and Trans Mountain Pipeline (Puget Sound) will always have a FOSC/FIC (or representative as per government mutual aid agreements) as these two pipelines and associated facilities are Federally regulated in their respective country; however, the Jet Fuel Pipeline may not have a FOSC/FIC as part of Unified Command as it is a Provincially regulated pipeline.

Also, more significant incidents will warrant multi-jurisdictional responses. Formation of a Unified Command (UC) using ICS will pull federal, state/provincial, local, first nations/tribal, and private resources together within the framework of the existing response management system established by the first responders. In the USA, state and local responders should note that there are a wide variety of resources available through the EPA or US Coast Guard FOSC. Additionally, in Canada there are a wide variety of resources available provincially and federally through various response groups.

The ICS organizational guidance provided is not regulatory. Recognizing that a response will bring together numerous organizations with varying incident management structures, the Incident Commander or Unified Command for the specific incident will determine how to best set up and staff the incident-specific ICS organization for the most efficient and effective use of the resources involved.

1.1 Using the Incident Command System (ICS)

The ICS provides for maximum flexibility in varied situations. By reading the general instructions, the common unit leader responsibilities, the position descriptions, and checklists, responders will be guided in their duties within the ICS process using this guide.

The diagrams provided in each Section of this guide show the types of positions that may be filled during a response. Not all positions need to be filled, however a position with subordinates on the diagram must also complete the duties not assigned to an individual in their group. The size of the organization is dependent on the magnitude of the incident and can be expanded or contracted as necessary. This modular development is described in Section 2.0 Response Organization Development.

Personnel with specialized skills (technical specialists), not specifically identified within the ICS, may be integrated anywhere within the organization to meet the needs of the Incident Command. This feature allows the greatest compatibility with other existing response management systems.

1.2 Kinder Morgan Response Philosophy

On all emergency incidents, Kinder Morgan will follow the following basic response approach:

1.2.1 Control the Incident Site

- ☐ The incident scene must first be controlled to ensure a safe and effective response to any incident:
- ☐ Don't rush in; hazards must first be fully assessed
- ☐ Establish and announce command at the ICP, either at the incident scene location or, if necessary at a remote location
- ☐ Establish and maintain an isolation perimeter, with hot, warm and cold zones
- ☐ Establish staging area(s)

1.2.2 Size up the Situation

- ☐ A site assessment will identify the scope and nature of the incident, as well as any potential hazards to responders:
- ☐ Recognize and identify any hazardous materials involved
- ☐ Source of any releases
- ☐ Potential exposures

1.2.3 Evaluate the Hazards and Risks

- ☐ An assessment must be conducted to evaluate the level of risk to responders and the public:
- ☐ Assess health, physical and chemical hazards
- ☐ Gather technical data (MSDSs, etc.)
- ☐ Conduct vapour monitoring

1.2.4 Establish Initial Objectives

- ☐ After the potential hazards have been identified, the Incident Commander(s) can establish the initial objectives for the response. Typical initial objectives include:
    - Control the incident Scene
    - Ensure the safety of responders and the public
    - Establish Incident Command Post

1.2.5 Select and Don PPE

- ☐ All incident responders must be protected with the PPE appropriate to the hazards present:
    - Approved Fire-Resistant Coveralls
    - Hard Hats (where overhead hazards are present)
    - Gloves
    - Splash Goggles
    - Rubber Steel-Toed Boots

Also:

- PPE must be worn properly in order to fully protect responders.
- Damaged or heavily-oiled PPE should be replaced as soon as possible.

- All responders leaving the Hot Zone must go through a decontamination zone (Warm Zone) to ensure that contamination is not spread into the Cold Zone.

1.2.6 Manage Information and coordinate Resources

☐ It is essential that information flows quickly and freely to all resources to ensure a safe and coordinated response:
- Expand the ICS as needed, especially if a Unified Command is established
- Ensure that all (internal and external) notifications are made
- Conduct briefings
- Confirm all communications to ensure that they are fully understood and implemented

1.2.7 Implement Response Objectives

☐ Once initial objectives have been established, it will be possible to develop, and implement, strategies and tactics to achieve these objectives. These may be:
- Offensive (i.e., emergency rescue, fire-fighting, spill source control)
- Defensive (i.e., protecting the public, fire control, spill response)
- Non-intervention (protecting the public)

1.2.8 Manage the Incident

☐ On larger incidents, it will be necessary be operate over a number of Operational Periods. In these cases, it will be necessary to fully-staff the Incident Management Team, especially the Planning Section:
- Establish Incident Objectives for each Operational Period
- Conduct Tactics and Planning Meetings
- Develop and approve Incident Action Plans
- Conduct Operations Briefings

1.2.9 Terminate the Incident Response

☐ Once the emergency phase of the incident is over, the Incident Commander will stand down the Incident Management Team and ensure that all post-incident activities are completed:
- Transition to, and conduct the post-emergency phase of the response
- Conduct an incident debrief
- Ensure that all incident documentation is completed
- Ensure that all equipment, PPE and ICP supplies are replenished
- Continue any required project phase activities, i.e., site remediation, repair to terminal assets

1.3 Levels of Emergency

Level	Definition	Examples
1	KMC has the capability to manage and control a Level I emergency using company resources available within the area. The District Supervisor will assume the Incident Commander position.	• Oil spills confined to company property (pipeline station, terminal, or scraper trap) • Public, contractor, or employee safety not endangered • Public property not endangered • Local response handled by District personnel • Notification may not be required to regulatory authorities
2	KMC has the capability to manage and control a Level II emergency using company resources and expertise, with some assistance from local contractors. The Region Director or designate may assume the Incident Commander position.	• Oil has migrated beyond company property (pipeline station, terminal, or scraper trap) but not into a waterway • Emergency services may be required (e.g., fire, police, ambulance) • Public, contractor, or employee safety and/or property may be endangered • Notification required to regulatory authorities • May use a Unified Command organizational structure in the emergency
3	KMC may request assistance from other Industry, Municipal, or State Agency personnel to support the response to the incident. The Region Director will assume the Incident Commander position.	• Major emergency condition such as: • uncontrolled leak • spill on a watercourse • large fire at an operating facility or office building • fatality or serious injury to an employee, contractor, or the public • spill of hazardous substances • Major off-site environmental impact has occurred • Public, contractor, or employee safety and/ or property is endangered • Emergency services are required (e.g., police, fire, ambulance) • Notification required to regulatory authorities • Use of a Unified Command organizational structure in the emergency, as required, to facilitate coordination of company, government and other agency response to the emergency.

Note: For the Jet Fuel Pipeline, please refer to the Emergency Response Plan for levels of emergency, and instructions on how to determine the level of emergency. The Levels in the Jet Fuel Pipeline ERP do align with the levels presented here, however the wording is slightly different.

2.0 RESPONSE ORGANIZATION DEVELOPMENT

An actual response organization typically grows from the "Initial Response Organization" to fit the level of response necessary for a specific incident. The size and focus of the organization is dependent on the magnitude of the incident and should be expanded or contracted as necessary.

Note: Only positions that are required for an adequate response need to be filled, and organizations should be kept as small as possible to accomplish incident objectives, and support the response.

2.1 Initial Response Team

Initial Response resources are managed by the Senior On-Site Individual who assumes the role of Incident Commander until such time as a more senior employee takes over. The Incident Commander will handle all Command and General Staff responsibilities.

2.2 Local Incident Management Team

The Local Incident Management Team (IMT), which is comprised of District personnel in each response area, will respond to incidents beyond the capability of the Initial Responders.

If deployed, the Local IMT's primary tasks are to:

- Ensure the safety of all workers in the area of the spill
- Assess the situation (i.e., incident size, severity, likely impacts)
- Take appropriate action to mitigate the impacts to life safety, the environment, and property

The Local IMT will perform these tasks until relieved or replaced by a higher level of management within the response organization

2.3 Kinder Morgan Incident Management Team

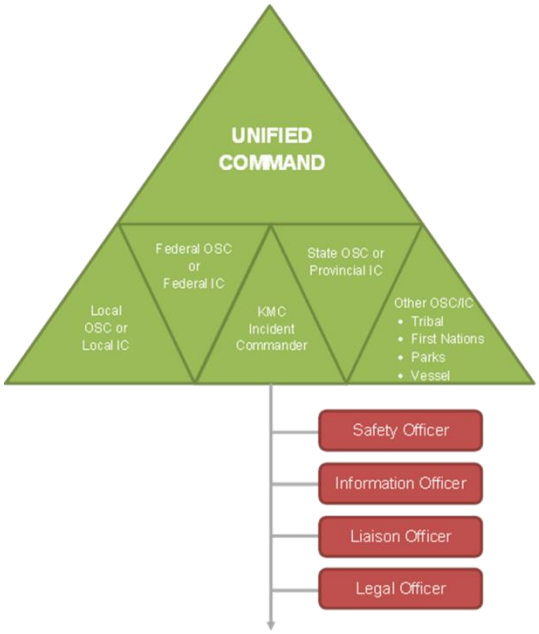
On larger spills, where the local IMT cannot manage a response without assistance, additional IMT personnel will be asked to attend from within Kinder-Morgan's company-wide support system.

The IMT is headed by the Incident Commander who directs and coordinates all response activities and resources. The Deputy Incident Commander provides on-site staff support to the Incident Commander through the Command Staff and relieves the Incident Commander as required.

Each Section is headed by a Section Chief reporting directly to the Incident Commander. The Initial Response Team and initial IMT may be absorbed into the response organization as additional IMT personnel arrive on the scene. The Operations Section Chief is also responsible for directing the activities of outside contractors called in to assist with the response.

2.4 Unified Command

Wherever possible, the IMT will establish, and operate within, a Unified Command structure as warranted by the circumstances of an incident. When a federal or state/provincial agency arrives on-scene to participate in managing a response action, the agencies will utilize a unified command structure to jointly manage the spill incident. In the unified command, decisions with regard to the response will be made by consensus and documented through a single Incident Action Plan (IAP) for each operational period. In the event that the Unified Command is unable to reach consensus, the FOSC/FIC has ultimate decision making authority. The unified command may incorporate additional tribal/first nations or local government on-scene coordinators into the command structure as appropriate.



Incident Commanders for oil discharges and hazardous substance releases will, whenever possible and practical be organized under the Unified Command Structure which includes, but not limited to:

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Actual Unified Command makeup for a specific incident will be determined on a case-by-case basis taking into account:

- The specifics of the incident;
- Determinations outlined in the four criteria listed above; and
- Decisions reached during the initial meeting of the Unified Command.

The Unified Command is responsible for the overall management of the incident. The Unified Command directs incident activities including the development and implementation of strategic decisions, approval of the incident action plan, and approves the ordering and releasing of resources. It is expected that each Unified Command member will have the authority to make decisions and commit resources on behalf of their organization.

2.5 Typical Response Teams

The following diagram depicts a typical response organization to the branch director/unit leader level. If a position below a specific chief, director, supervisor, manager, or unit leader is not filled then the chief, director, supervisor, manager, or unit leader must complete the tasks of reporting position as well. For further information on each position and the supporting roles, please see Sections 6.0 (Incident Command/Command Staff Duties) 7.0 (Operations Section Duties) 8.0 (Planning Section Duties) 9.0 (Logistics Section Duties), and 10.0 (Finance Section Duties).



3.0 RESPONSE OBJECTIVES AND STRATEGIES

Incident objectives and strategies are essential prerequisites to any written or oral Incident Action Plan (IAP), and should be established expeditiously. The following items are a list of common Objective and some helpful strategies for completing the objectives.

3.1 Ensure the Safety of the Public and Response Personnel

- ☐ Identify hazard(s) of spilled material
- ☐ Establish site control (hot zone, warm zone, cold zone, and security)
- ☐ Consider evacuations, as needed
- ☐ Establish vessel and/or aircraft restrictions
- ☐ Monitor air in impacted areas
- ☐ Develop site safety and health plan for personnel
- ☐ Ensure safety briefings are conducted

3.2 Control the Source of the Spill

- ☐ Complete emergency shutdown
- ☐ Conduct firefighting
- ☐ Initiate temporary repairs
- ☐ Transfer and/or lighter product
- ☐ Conduct salvage operations, as necessary

3.3 Maximize Protection of Environmentally-Sensitive Areas

- ☐ Implement pre-designated response strategies
- ☐ Utilize REET to identify and prioritize the environmentally sensitive areas
- ☐ Identify resources at risk in spill vicinity
- ☐ Track oil movement and develop spill trajectories
- ☐ Conduct visual assessments (e.g., overflights)
- ☐ Develop/implement appropriate protection tactics

3.4 Manage a Coordinated Response Effort

- ☐ Complete or confirm notifications
- ☐ Establish a unified command organization and facilities (command post, etc.)
- ☐ Ensure local and tribal officials are included in response organization
- ☐ Initiate spill response Incident Action Plans (IAP)
- ☐ Ensure mobilization and tracking of response resources
- ☐ Account for personnel and equipment
- ☐ Complete documentation
- ☐ Evaluate planned response objectives vs. actual response (debrief)

3.5 Contain and Recover Spilled Material

- ☐ Deploy oil containment boom at the spill source
- ☐ Deploy containment boom at appropriate collection areas
- ☐ Conduct open-water skimming with vessels

- ☐ Evaluate time-sensitive response technologies (e.g., dispersants, in-situ burning)
- ☐ Develop disposal plan

3.6 Recover and Rehabilitate Injured Wildlife

- ☐ Establish oiled wildlife reporting hotline
- ☐ Conduct injured wildlife search and rescue operations
- ☐ Setup primary care unit for injured wildlife
- ☐ Operate wildlife rehabilitation center
- ☐ Initiate citizen volunteer effort for oiled bird rehabilitation

3.7 Remove Oil from Impacted Areas

- ☐ Conduct appropriate shoreline cleanup efforts
- ☐ Clean oiled structures (piers, docks, etc.)
- ☐ Clean oiled vessels

3.8 Minimize Economic Impacts

- ☐ Consider tourism, vessel movements, and local economic impacts throughout response
- ☐ Protect public and private assets, as resources permit
- ☐ Establish damage claims process

3.9 Keep Stakeholders Informed of Response Activities

- ☐ Provide forum to obtain stakeholder input and concerns
- ☐ Provide stakeholders with details of response actions
- ☐ Identify stakeholder concerns and issues, and address as practical
- ☐ Provide elected officials details of response actions

3.10 Keep the Public Informed of Response Activities

- ☐ Provide timely safety announcements
- ☐ Establish a Joint Information Center (JIC) (USA) or Public Information Office (Canada)
- ☐ Conduct regular news briefings
- ☐ Manage news media access to spill response activities
- ☐ Conduct public meetings, as appropriate

4.0 AGENCY/STAKEHOLDER COORDINATION

Agency coordination is critical to an effective and efficient response. Kinder Morgan Canada is committed to working with our partners in response efforts. The Liaison Officer (LO) is responsible for coordination with assisting and cooperating agencies.

The LO is responsible for gathering the concerns of local agencies affected by the incident and communicating that information to the Incident Commander or Unified Command. The LO must promote the best use of available assisting agency support and resources by providing for smooth communication and information exchange. There are two overall coordination strategies that impact KMC operations, one in the USA and one in Canada. In the USA, the Regional Response Team may be established, and in Canada, the Regional Environmental Emergency Team may be established.

4.1 Regional Response Team (USA)

The framework for requesting the Regional Response Team (RRT) can be found in Section 300.115 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Regionally, the National Response System provides for RRT support. The RRT is a group of 16 federal agencies and state representatives charged with providing advice and counsel and other support, when requested, to the Incident Commander or Unified Command. An incident-specific RRT activation will provide federal and state agency coordination for the response.

An incident-specific RRT may be activated by the RRT chair if the discharge:

- ☐ Exceeds the local response capability;
- ☐ Transects state boundaries;
- ☐ Substantially threatens US public health and welfare or regionally significant amounts of property; or
- ☐ Is a worst case discharge as defined in the NCP.

Also per the NCP, an incident-specific RRT, when activated, is responsible to:

- ☐ Monitor and evaluate reports from the response;
- ☐ Provide advice and recommendations to the IC/UC;
- ☐ Request other Federal, state, or local governments or private agencies to provide resources under existing authorities for monitoring or response to a discharge; and
- ☐ Provide additional oversight per the NCP.

Other agency coordination mechanisms are also available. Among these are Area Committees, Local Emergency Planning Committees, locally-designated response teams such as marine firefighting teams, and the multi-agency coordination (MAC) system found in NIIMS. In some areas, coordination and allocation of public resources to support an IC or UC may occur through use of a MAC Group.

4.2 Regional Environmental Emergency Team (REET)

The Regional Environmental Emergencies Team (REET) provides consolidated and coordinated environmental advice, information and assistance in the event of an environmental emergency. REET is most common in Canada, however it may be adapted for use in the USA if the responding agencies are interested in forming this type of team.

REET members represent several federal, provincial and municipal government departments, aboriginal communities, private sector agencies, and local individuals. In British Columbia, REET is co-chaired by Environment Canada and the Province of British Columbia.

In an emergency situation REET operates as a multi-disciplinary and multi-agency team that provides comprehensive and coordinated environmental advice, information and assistance to the Responsible Party Incident Commander, Coast Guard On-Scene Commander (marine spills) or other government Lead Agency (land spills). On behalf of the Responsible Party Incident Commander, Coast Guard On Scene Commander or Lead Agency, REET can address and prioritize the environmental, cultural, economic, property and human issues. REET effectively eliminates agency overlap and utilizes all resources to identify and action the resources at risk.

Technical specialists representing REET agencies may form part of the Environmental Unit, reporting to the Resources at Risk Specialist. A member of the REET may also act as the Leader of the Resources at risk Unit.

REET, when established, is responsible to:

- ☐ Establish the REET team from agencies with jurisdiction or interest in the spill, as well as local resources such as Native Bands, local cultural/historical specialists, and other appropriate private sector groups.
- ☐ As a team identify the environmentally sensitive resources in the area impacted – Resources at risk (ICS 232)
- ☐ Assist with determining pollutant behaviour, fate and effects
- ☐ Identify and prioritize environmental areas to be protected, rehabilitation priorities, economically impacted areas, historical and culturally sensitive areas, and socioeconomic resources impacted.
- ☐ Support the Environmental Unit Leader in both the Tactics and Planning meetings regarding resources at risk and REET recommendations/priorities.
- ☐ Maintain a log of all activities (ICS 214) and forward to Documentation Unit at the end of the shift.

4.3 Addressing Stakeholder Concerns

It is critical that stakeholder concerns be identified and adequately addressed. While this may be planned in advance through contingency plans, the Incident Command organization should aggressively ensure that all concerns unique to the incident are identified and addressed.

To that end, the duties and responsibilities of the Liaison Officer and the Information Officer list a number of functions that must be carried out in order to address stakeholder concerns. In general, these are:

- ☐ Identify stakeholders;
- ☐ Provide stakeholders with information on the status of the response; and
- ☐ Address stakeholder concerns and issues, as practicable.

5.0 GENERAL RESPONSIBLILITIES

5.1 Common Responsibilities

The following checklist is applicable to all personnel in the ICS organization:

- ☐ Receive assignment from your agency, including:
  - Job assignment (e.g. designation, position, etc.).
  - Brief overview of type and magnitude of incident.
  - Travel instructions including reporting location and reporting time.
  - Any special communications instructions (e.g. travel, radio frequency).
  - Monitor incident related information from media, internet, etc., if available.
  - Assess personal equipment readiness for specific incident and climate (e.g. medications, money, computer, medical record, etc.).
  - Maintain a checklist of items and possibly a personal Go-Kit.
  - Inform others as to where you are going and how to contact you.
  - Review appropriate ICS Guide Sections, Planning Cycle Section and Emergency Response (Contingency) Plan for additional applicable duties.
  - Take advantage of available travel to rest prior to arrival.
- ☐ Upon arrival at the incident, check in at the designated check-in location. Check-in may be found at any of the following locations:
  - Incident Command Post (ICP)
  - Base
  - Staging Areas
  - Helibases

Note: If you are instructed to report directly to an on-scene assignment, check in with the Division/Group Supervisor or the Operations Section Chief.

- ☐ Receive briefing from immediate supervisor.
- ☐ Agency representatives from assisting or cooperating agencies report to the Liaison Officer (LNO) at the ICP after check-in.
- ☐ Acquire work materials.
- ☐ Maintain a log of activities (ICS 214a).
- ☐ Participate in IMT meetings and briefings as appropriate.
- ☐ Ensure compliance with all safety practices and procedures. Report unsafe conditions to the Safety Officer.
- ☐ Supervisors shall maintain accountability for their assigned personnel with regard as to exact location(s), personal safety, and welfare at all times, especially when working in or around incident operations.
- ☐ Organize and brief subordinates.
- ☐ Know your assigned communication methods and procedures for your area of responsibility and ensure that communication equipment is operating properly.
- ☐ Use clear text and ICS terminology (no “10 codes”) in all radio communications.
- ☐ Complete forms and reports required of the assigned position and ensure proper disposition of incident documentation as directed by the Documentation Unit.
- ☐ If information needs to be passed to another group/individual use a ICS 213 General Message Form.
- ☐ Follow the document flow procedures as outlined in Section 11.12 ICS Form Distribution/Flow.
- ☐ Ensure all equipment is operational prior to each work period.

- ☐ Report any signs/symptoms of extended incident stress, injury, fatigue or illness for yourself or coworkers to your supervisor.
- ☐ Brief shift replacement on ongoing operations when relieved at operational periods or rotation out.
- ☐ Respond to demobilization orders and brief subordinates regarding demobilization.
- ☐ Prepare personal belongings for demobilization.
- ☐ Return all assigned equipment to appropriate location.
- ☐ Turn in all “original” documentation to the Documentation Unit.
- ☐ Put all “copies” of documentation into the secure recycle bin
- ☐ Complete Demobilization Check-out process before returning to home base.
- ☐ Participate in After-Action activities as directed.
- ☐ Carry out all assignments as directed.
- ☐ Upon demobilization, notify RESL at incident site and home unit of your safe return.

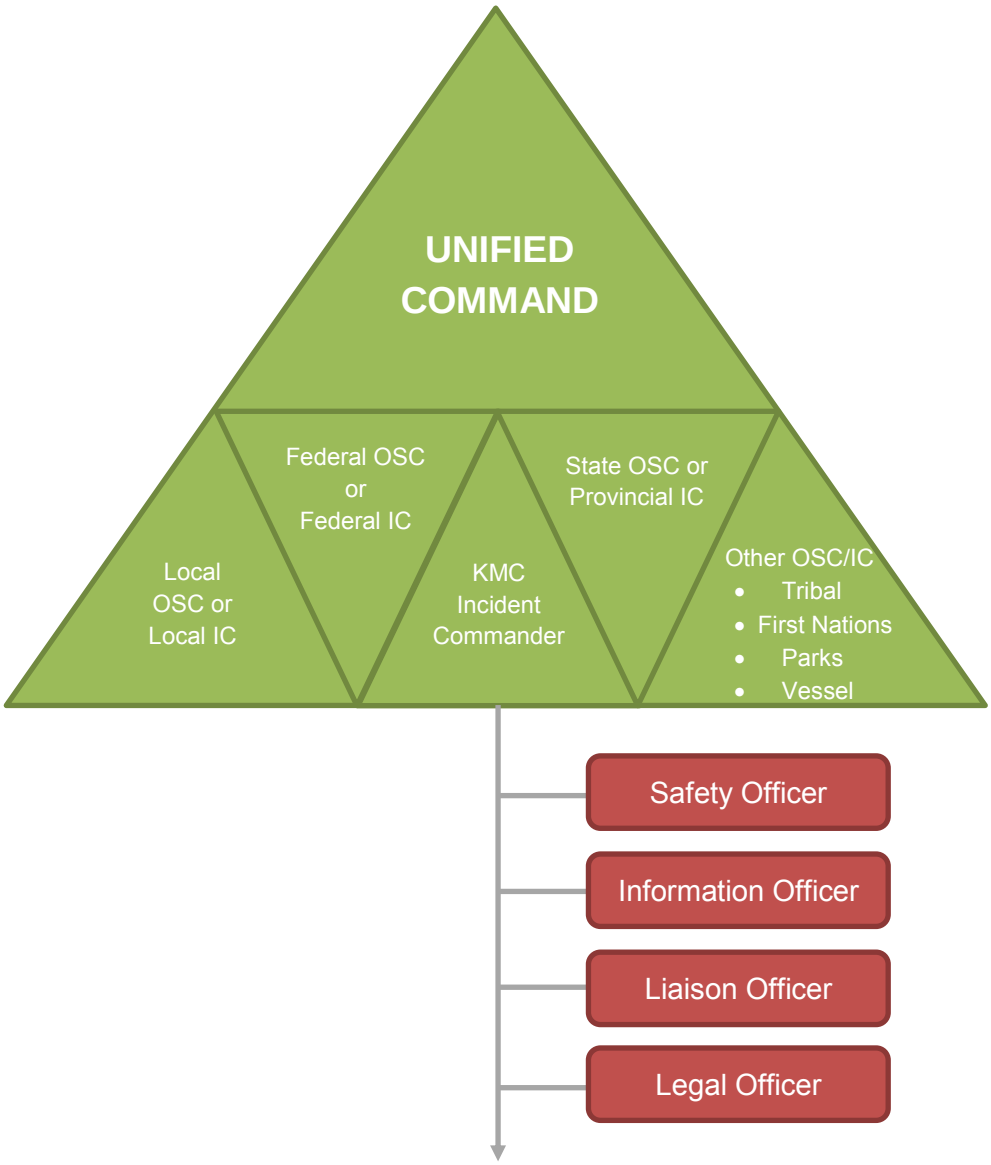
5.2 Unit Leader Responsibilities

A number of the Unit Leader's responsibilities are common to all functions within the ICS organization. Common responsibilities of Unit Leaders are listed below. These will not be repeated in Unit Leader Position Checklists in subsequent chapters.

- ☐ Review Common Responsibilities in Section 5.1 Common Responsibilities.
- ☐ Upon check-in, receive briefing from Incident Commander, Section Chief, Unit Leader or Branch Director as appropriate.
- ☐ Participate in incident meetings and briefings, as required.
- ☐ Determine current status of unit activities.
- ☐ Determine resource needs.
- ☐ Order additional unit staff, as appropriate.
- ☐ Confirm dispatch and estimated time of arrival of staff and supplies.
- ☐ Assign specific duties to staff and supervise staff.
- ☐ Develop and implement accountability, safety and security measures for personnel and resources.
- ☐ Supervise demobilization of unit, including storage of supplies.
- ☐ Provide Supply Unit Leader with a list of supplies to be replenished.
- ☐ Maintain unit records, including Unit Log (ICS 214).
- ☐ Individual responders may want to maintain personal log of actions, decisions and events.
- ☐ Carry out all assignments as directed coworkers to your supervisor.

6.0 INCIDENT COMMAND/COMMAND STAFF DUTIES

6.1 Incident Command Chart



6.2 Incident Commander

On most incidents, a single Incident Commander carries out the Command activity. The Incident Commander is selected through pre-designation, qualifications, or experience.

The Incident Commander may have a deputy, who may be from the same entity or from an assisting entity. Deputies must have the same qualifications as the person for whom they work, as they must be ready to take over that position at any time.

- ☐ Review common responsibilities (Section 5.1 Common Responsibilities).
- ☐ Assess the situation and/or obtain a briefing from the Initial Incident Commander. Obtain a copy of the ICS 201 form or assist with the creation of the ICS 201 form.
- ☐ Confirm/Declare Level of Emergency and ensure all staff are aware.
- ☐ Ensure that notifications have been made.
- ☐ Establish and support Unified Command.
- ☐ Determine incident objectives and strategies. (ICS 202)
- ☐ Establish the immediate priorities.
- ☐ Establish an Incident Command Post.
- ☐ Establish an appropriate organization.
- ☐ Approve and authorize implementation of an Incident Action Plan.
- ☐ Ensure that adequate safety measures are in place.
- ☐ Coordinate activity of all Command and General Staff.
- ☐ Attend appropriate ICS meetings, briefings and press briefings.
- ☐ Review and approve appropriate plans.
- ☐ Coordinate with key stakeholders and officials through the Liaison Officer.
- ☐ Approve requests for additional resources or for the release of resources.
- ☐ Keep lead agency and KM Crisis Management Team informed about incident status.
- ☐ Authorize release of information through the Information Officer.
- ☐ Ensure incident funding is available.
- ☐ Notify Command/General staff of spending limit in one transaction.
- ☐ Notify natural resource trustees(s).
- ☐ Coordinate incident investigation responsibilities.
- ☐ Seek appropriate legal counsel.
- ☐ Order the demobilization of incident resources, when appropriate.
- ☐ Maintain Individual Log (ICS 214a).

6.3 Deputy Incident Commander

The Deputy Incident Commander position (if staffed) is responsible for assisting the Incident Commander by ensuring that the tactical and safety aspects of spill response operations are implemented.

- ☐ Carry out duties as assigned by IC (must be capable of assuming IC duties).
- ☐ Monitor tactical response operations to assess progress and to ensure that sufficient resources are available to the Operations Section.
- ☐ Ensure an effective health and safety program is in place.
- ☐ Attend appropriate ICS meetings and briefings.
- ☐ Maintain Individual Log (ICS 214a).

6.4 Unified Command

While a single Incident Commander normally handles the Command function, an ICS organization may be expanded into a Unified Command (UC) for complex responses which cross jurisdictional boundaries or involve multiple agencies with geographic or functional jurisdiction. The Unified Command brings together the "Incident Commanders" of all major organizations/agencies involved in the response to function as a team with a common set of incident objectives and strategies.

- ☐ Unified Command might include:
  - The Kinder-Morgan (RP) Incident Commander
  - Federal On-Scene Coordinator (FSOC), or Federal Incident Commander (FIC)
  - State On-Scene Coordinator (SOSC) or Provincial Incident Commander (PIC)
  - Local Government Incident Commander or On-Scene Coordinator (LIC or LOSC)
  - Other Incident Commanders or On-Scene Coordinators (OIC/OSC) when appropriate these may include
    - Tribal/First Nations
    - Vessel Operator
    - Parks

Note: The Canadian Coast Guard may not engage in a Unified Command, but may have a representative present in the form of a Federal Monitoring Officer.

Actual Unified Command makeup for a specific incident will be determined on a case-by-case basis taking into account:

- the specifics of the incident;
- determinations outlined in the Area Contingency Plan or existing response plan; or
- decisions reached during the initial meeting of the Unified Command.

The makeup of the Unified Command may change as the incident progresses, in order to account for changes in the situation.

The Unified Command is responsible for overall management of the incident. The Unified Command directs incident activities, including development and implementation of overall objectives and strategies, and approves ordering and releasing of resources. Each Unified Command member may assign Deputy Incident Commander(s) to assist in carrying out Incident Command responsibilities. Unified Command members may also be assigned individual legal and administrative support from their own organizations.

As a component of an ICS, the Unified Command facilitates and coordinates the effective involvement of various agencies and responders. It links the organizations responding to the incident and provides a forum for these agencies to make consensus decisions. Under Unified Command, the various jurisdictions and/or agencies, and non-government responders may blend together throughout the Incident Command System organization to create an integrated response team. Assisting or cooperating agencies that are not part of the Unified Command can also participate through Agency Representatives working with the Liaison Officer. It is important to note that participation in a Unified Command occurs without any agency abdicating authority, responsibility, nor accountability.

6.5 Safety Officer

The Safety Officer is responsible for monitoring and assessing hazardous and unsafe situations and developing measures to assure personnel safety. The Safety Officer will correct unsafe acts or conditions through the regular line of authority, although the Safety Officer may exercise emergency authority to prevent or stop unsafe acts when immediate action is required. The Safety Officer maintains awareness of active and developing situations, ensures the Site Safety and Health Plan is prepared and implemented, and includes safety messages in each Incident Action Plan.

Only one Safety Officer will be assigned for each incident, including incidents operating under Unified Command and multi-jurisdiction incidents. The Safety Officer may have assistants, as necessary, and the assistants may also represent assisting agencies or jurisdictions.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ During initial response, document the hazard analysis process addressing hazard identification, personal protective equipment, control zones, and decontamination area.
- ☐ Participate in planning meetings to identify any health and safety concerns inherent in the operations daily work plan.
- ☐ In Washington State, refer to the NWACP Section 9203 Health and Safety Job Aid for additional information.
- ☐ Review the Incident Action Plan for safety implications (ICS 215a).
- ☐ Exercise emergency authority to prevent or stop unsafe acts.
- ☐ Investigate accidents that have occurred within incident areas.
- ☐ Ensure preparation, UC/IC approval, and implementation of Site Safety and Health Plan (SSHP) in accordance with the existing Response Plans (Contingency Plans) and applicable regulations. The SSHP shall, at a minimum, address, include, or contain the following elements:
    - Health and safety hazard analysis for each site, task or operation.
    - Comprehensive operations work plan.
    - Personnel training requirements.
    - PPE selection criteria.
    - Site-specific occupational medical monitoring requirements.
    - Air monitoring plan: area/personal.
    - Site control measures.
    - Confined space entry procedures, if required.
    - Pre-entry briefings (tailgate meetings): initial and as needed.
    - Pre-operations health and safety conference for all incident participants.
    - Quality assurance of SSHP effectiveness.
- ☐ Assign assistants and operational Safety Watch positions, and manage the incident safety organization.
- ☐ Conduct Safety Briefings as needed in the ICP and/or field, a designate may be used for field briefings
- ☐ Review and approve the Medical Plan (ICS 206).
- ☐ Maintain Unit/Activity Log (ICS 214).

6.6 Information Officer

The Information Officer is responsible for developing and releasing information about the incident to the news media, to incident personnel, members of the public, impacted parties, and to other appropriate agencies and organizations. Only one Information Officer will be assigned for each incident, including incidents operating under Unified Command and multi-jurisdictional incidents. The Information Officer may have assistants, as necessary, and the assistants may also represent assisting agencies or jurisdictions. It is important to connect with the Claims Unit and Land Department to sort out resident and impacted party notifications.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ In Washington State, the Information officer is:
  - Government Representative OR
  - Other individual designated by Unified Command.
- ☐ Establish and staff a Joint Information Center (JIC) or Public Information Office (PIO), as necessary. Note the JIC/PIO will have a separate leader for that unit, that person is not always the same as the Information Officer, but can be in certain circumstances.
- ☐ If the JIC is established in Washington State ensure that JIC manager uses NWACP JIC Manual (Section 9202).
  - Liaison Officer will assign Community Relations Coordinator to the JIC to ensure consistent messaging, and ensure the Community Relations Coordinator is using the NWACP Section 9210 for duties and assignments.
- ☐ Determine from the Incident Commander if there are any limits on information release.
- ☐ Establish contact with the KM Crisis Management Team.
- ☐ Attend appropriate ICS meetings to remain current on operational activities and issues.
- ☐ Develop material for use in media briefings, and ensure that:
  - News releases/briefings are approved and signed off by IC/UC
  - News releases are published as requested by Unified Command
  - New releases are accurate
- ☐ Obtain Incident Commander/Unified Command approval for news media releases.
- ☐ Prepare Incident Commander/Unified Command for any news briefings including:
  - Identify Speakers;
    - Unified Command
    - Scientific Support Coordinator
    - Environmental Unit Leader
    - Wildlife expert
    - Others as needed
  - Predict questions from the media, draft answers, and provide them to speakers.
  - Outline for the press conference discussed.
- ☐ Displays/Maps developed for press conference match command post maps and information.
- ☐ Inform news media and conduct news briefings.
- ☐ Arrange for tours and other interviews or briefings that may be required.
- ☐ Obtain news media information that may be useful for incident planning.
- ☐ Maintain current information summaries and/or displays on the incident within the ICP.
- ☐ Provide information on status of incident to assigned personnel.
- ☐ Work with Liaison Officer on a Public Outreach Media Release, Local Officials Briefing and Open Houses/Public Meetings.
- ☐ Send a representative to any evacuation centre set up to disseminate information about the incident.

- ☐ Work with the Claims Unit Leader (Land Department) to begin the process of field notifications of impacted parties and members of the public.
- ☐ If public evacuations are required, and the Local Authority requires assistance, arrange for additional personnel to assist with all aspects of public evacuation.
- ☐ Ensure Public Inquiries are answered in a timely manner.
- ☐ Maintain Unit/Activity Log (ICS 214).

6.7 Liaison Officer

Incidents that are multi-jurisdictional, or involve several agencies, may require the establishment of the Liaison Officer position on the Command Staff. The Liaison Officer is the point of contact for the assisting and cooperating Agency Representatives and stakeholder groups. Only one Liaison Officer will be assigned for each incident, including incidents operating under Unified Command and multi-jurisdiction incidents. The Liaison Officer may have assistants, as necessary, and the assistants may also represent assisting agencies or jurisdictions.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ In Washington State, the Information officer is:
  - Government Representative OR
  - Other individual designated by Unified Command.
- ☐ In Washington State, refer to the Liaison Manual (Section 9210 of the NWACP) for further duties.
  - Obtain additional resources as required to fulfill the duties outlined in the NWACP.
  - Assign the Community Relations Coordinator to the JIC.
- ☐ In British Columbia, if the Provincial Agencies are not responding to the event, request the Emergency Management Agency to hold an information call with other levels of government to provide updates on the incident. (BC operates a callout system similar to ERL)
- ☐ Provide a point of contact for assisting and cooperating Agency Representatives.
- ☐ Identify Agency Representatives from each agency, including communications link and location.
- ☐ Maintain a list of assisting and cooperating agency and stakeholder group contacts.
- ☐ Assist in establishing and coordinating interagency contacts.
- ☐ Keep agencies supporting incident aware of incident status.
- ☐ Monitor incident operations to identify current or potential inter-organizational issues and advise Incident Command, as appropriate.
- ☐ Participate in planning meetings; provide current resource status information, including limitations and capabilities of assisting agency resources.
- ☐ Provide information and support to local government officials and stakeholder groups.
- ☐ Conduct Local Officials Briefings as needed
- ☐ Conduct a Public Meeting/Open House as needed
- ☐ Assist the Information Officer with a Public outreach focused press releases
- ☐ Maintain Unit/Activity Log (ICS 214).

6.8 Legal Officer

The Legal Officer is responsible for providing advice and direction on all matters that may have a legal impact on KMC or the response operation. This may include matters such as legal matters related to the response, claims, contracts, insurance, information releases, and documentation retention.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Ensure notifications have been made and maintain liaison with regulatory agencies as per existing Emergency Response Plans (Contingency Plans).
- ☐ Provide advice and direction to the Incident Commander/Unified Command on all legal matters related to the response operations.
- ☐ Establish documentation guidelines and provide advice regarding document storage
- ☐ Assist Documentation Unit and Claims Unit with legal issues.
- ☐ Review press releases, contracts, and other matters as requested if they have legal implications to KMC.
- ☐ Participate in appropriate ICS and other meetings as requested.
- ☐ Participate in incident investigations and damage assessments.
- ☐ Maintain a log of all activities (ICS 214).

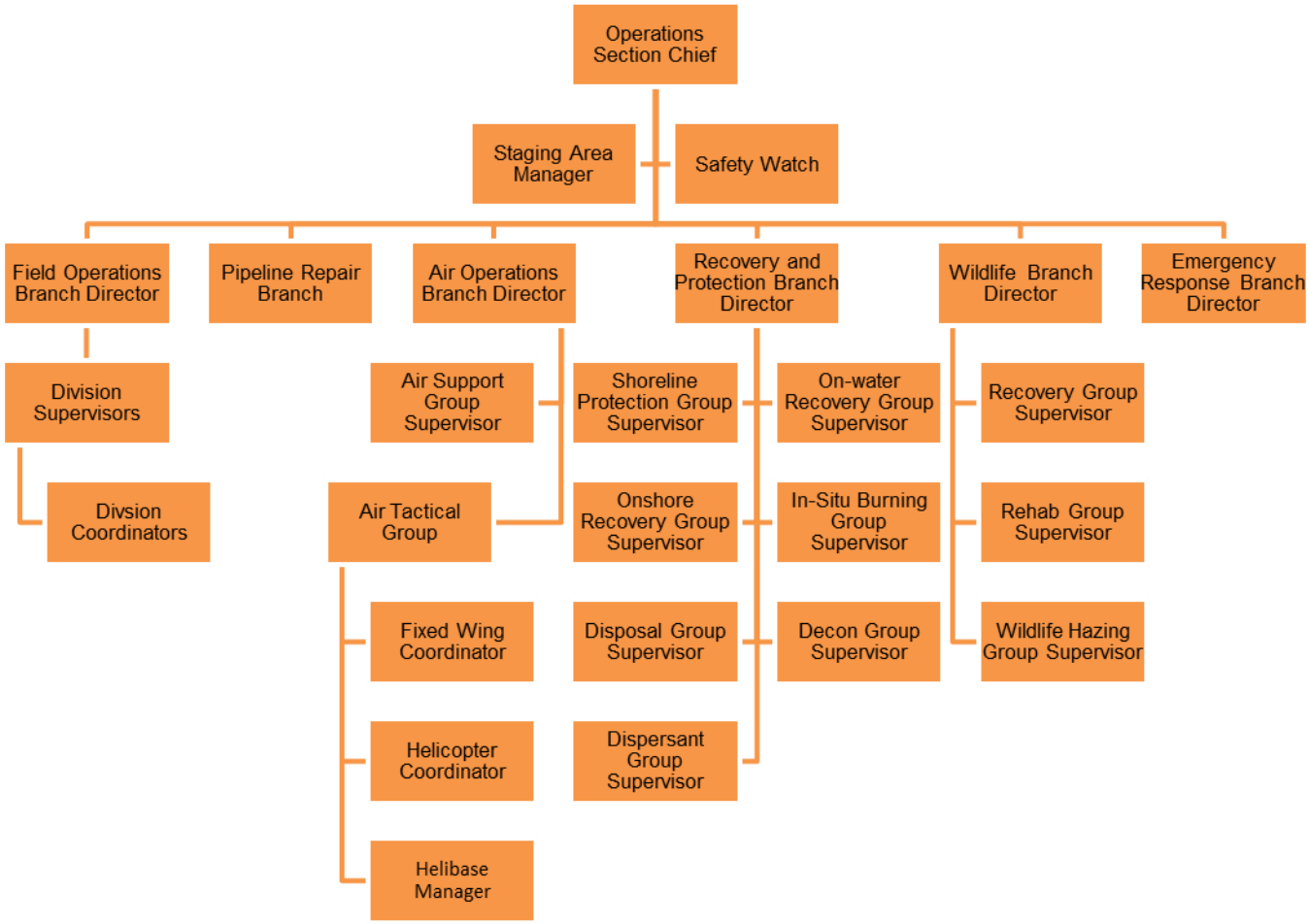
6.9 Agency Representatives

An Agency Representative is an individual assigned to an incident from an assisting or cooperating agency who has been delegated authority to make decisions on matters affecting that agency's participation at the incident. Agency Representatives report to the Liaison Officer or to the Incident Commander in the absence of the Liaison Officer.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Ensure that all agency resources are properly checked-in at the incident.
- ☐ Obtain briefing from the Liaison Officer or Incident Commander.
- ☐ Inform assisting or cooperating agency personnel on the incident that the Agency Representative position for that agency has been filled.
- ☐ Attend briefings and planning meetings, as required.
- ☐ Provide input on the use of agency resources unless resource technical specialists are assigned from the agency.
- ☐ Cooperate fully with the Incident Commander and the General Staff on agency involvement at the incident.
- ☐ Ensure the well-being of agency personnel assigned to the incident.
- ☐ Advise the Liaison Officer of any special agency needs or requirements.
- ☐ Report to home agency or headquarters on a prearranged schedule.
- ☐ Ensure that all agency personnel and equipment are properly accounted for and released prior to departure.
- ☐ Ensure that all required agency forms, reports, and documents are complete prior to departure.
- ☐ Meet with the Liaison Officer or Incident Commander for debriefing prior to departure.
- ☐ Maintain a log of all activities (ICS 214).

7.0 OPERATIONS SECTION DUTIES

7.1 Operations Section Organization Chart



7.2 Operations Section Chief

The Operations Section Chief, a member of the General Staff, is responsible for managing all tactical operations. The Operations Section Chief activates and supervises elements in accordance with the Incident Action Plan and directs its execution; monitors span of control; activates and executes the Site Safety and Health Plan; directs the preparation of unit operational plans; requests or releases resources; makes expedient changes to the Incident Action Plans as necessary; and reports such to the Incident Commander.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain briefing from IC.
- ☐ Evaluate and request sufficient Section supervisory staffing for both operational and planning activities.
- ☐ Supervise Operations Section field personnel.
- ☐ Work with Planning Section Chief to determine the response divisions.

- ☐ Participate in ICS meetings – Initial Incident Briefing, Tactics Meeting, Planning Meeting, Ops. Briefing.
- ☐ Implement the Health and Safety Plan and ensure safe tactical operations.
- ☐ Assist with the preparation and implementation of the Incident Action Plan (IAP) and General Plan.
- ☐ Assemble and disassemble teams/task forces assigned to operations section.
- ☐ Brief Incident Commander, Planning Section Chief and Information Officer about the implementation of the IAP and other operational activities and issues.
- ☐ Implement the IAP for the Operations Section.
- ☐ Evaluate on-scene operations and make adjustments to organization, strategies, tactics, and resources as necessary.
- ☐ Ensure the Resources Unit is advised of changes in the status of resources assigned to the section.
- ☐ Ensure that Operations Section personnel execute work assignments following approved safety practices.
- ☐ Monitor need for and request additional resources to support operations as necessary.
- ☐ Assemble/dissemble task force/strike teams as appropriate.
- ☐ Identify/utilize staging areas.
- ☐ Evaluate and monitor current situation for use in next operational period planning.
- ☐ Convert operational incident objectives into strategic and tactical options.
- ☐ Coordinate and consult with the PSC, technical specialists, modeling scenarios, trajectories, etc., on selection of appropriate strategies and tactics to accomplish objectives.
- ☐ Identify kind and number of resources required to support selected strategies.
- ☐ Develop work assignments and allocate tactical resources based on strategic requirements (i.e. develop the ICS-215).
- ☐ Participate in the planning process and the development of the tactical portions (ICS-204 and ICS-220) of the IAP.
- ☐ Assist with development of long-range strategic, contingency, and demobilization plans.
- ☐ Develop recommended list of Section resources to be demobilized and initiate recommendation for release when appropriate.
- ☐ Receive and implement applicable portions of the incident Demobilization Plan.
- ☐ Participate in operational briefings to IMT members as well as briefings to media, and visiting dignitaries.
- ☐ Maintain Individual Log (ICS 214a).

7.3 Deputy Operations Section Chief

The Deputy Operations Section Chief (if staffed) is responsible for assisting the Operations Section Chief.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Carry out duties as assigned by OSC (must be capable of assuming OSC duties).
- ☐ Attend appropriate ICS meetings and briefings.
- ☐ Maintain Individual Log (ICS 214a).

7.4 Staging Area Manager

Under the Operations Section Chief, the Staging Area Manager is responsible for managing all activities within the designated staging areas.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Implement pertinent sections of the Incident Action Plan (IAP) and determine scope of support services to be provided.
- ☐ Establish and maintain boundaries of staging areas. Post signs for identification and traffic control.
- ☐ Establish check-in function and coordinate forwarding of ICS 211e & ICS 211p to Resources Unit.
- ☐ When moving and/or updating the status of equipment or personnel checking into or out of the staging area, fill in ICS 210 and forward to the Resources Unit.
- ☐ Establish interface with Logistics for info on resource movements, support for resources in the staging areas, and required security.
- ☐ Advise Operations Section Chief of all changing situation/conditions on scene.
- ☐ Attend ICS meetings as required.
- ☐ Respond to requests for resource assignments.
- ☐ Respond to requests for information, as required.
- ☐ Support servicing and preparation of equipment for next operational period as defined in the IAP.
- ☐ Demobilize or reposition staging areas, as needed.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.5 Safety Watch

The Safety Watch operates in the field to ensure that incident response operations at the site level are conducted in a safe manner in keeping with the Site Safety and Health Plan, and KM Health and Safety practices. The Safety Watch works functionally with the Safety Officer to ensure that effective two-way safety communication is established between the field and the Incident Command Post. The Safety Watch may be assigned at the Division, Group, Task Force or Strike Team Level depending on number of workers, geographic spread, and the circumstances of the spill.

Note: If response activities cannot be conducted safely on site, halt operations. The Safety Watch position has the authority of the Incident Commander to halt operations immediately if a serious safety issue arises.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Implement Site Specific Health and Safety Plan, and review site safety requirements with responding field personnel.
- ☐ Ensure that all personnel have appropriate training.
- ☐ Ensure that all personnel have appropriate PPE and training in its use.
- ☐ Develop and conduct safety briefings for helicopters, marine safety, and others as required.
- ☐ Establish safe work areas/zones.
- ☐ Continuously monitor environmental working conditions, including vapour exposures, combustible gasses, O2, and H2S.
- ☐ Monitor physical working conditions, including slippery surfaces, wave exposures, predatory animals, temperature extremes, etc.
- ☐ Relieve injured or sick workers from active duty and advise first aid attendant immediately.

- ☐ Provide an ongoing assessment of site safety hazards.
- ☐ Maintain close contact with site supervisors and leaders, and ensure that safety messages and advisories are passed to all personnel.
- ☐ Advise Operations Section Chief and if staffed, the Safety Officer, of existing or potential hazards.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.6 Field Operations Branch Director

The Branch Director, is under the direction of the Operations Section Chief, and is responsible for implementing the portion of the Incident Action Plan (IAP) appropriate to the Divisions. The Branch Director will work with the Operations Section Chief to establish the geographical Divisions to be numbered alphabetically.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Develop, with subordinates, alternatives for Branch control operations.
- ☐ Attend planning meetings at the request of the Operations Section Chief.
- ☐ Review Division/Group Assignment Lists (ICS 204) for Divisions/Groups within Branch. Modify lists based on effectiveness of current operations.
- ☐ Assign specific work tasks to Division/Group Supervisors.
- ☐ Supervise Branch operations.
- ☐ Resolve logistics problems reported by subordinates.
- ☐ Report to Operations Section Chief when: Incident Action Plan is to be modified; additional resources are needed; surplus resources are available; hazardous situations or significant events occur.
- ☐ Approve accident and medical reports (home agency forms) originating within the Branch.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.6.1 Division Supervisor

The Division Supervisor reports to the Branch Director, and will take the name of the Division he/she is working in (ie. Division A Supervisor, Division B Supervisor etc.). If the number of Divisions exceeds 7, Division Coordinators will be implemented. For example, if there are 14 Divisions there will be 14 Division Coordinators and 2 Division Supervisors, the name of the Supervisor would then reflect the span of control (ie. Division A-F Supervisor, Division G-M Supervisor).

The supervisor is responsible for implementing the assigned portion of the Incident Action Plan (IAP), assigning resources within the division, and reporting progress of control operations and status of resources within the division.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Implement IAP for division.
- ☐ Review division assignments and incident activities with subordinates and assign tasks.
- ☐ Keep Communications Unit and/or Resources Unit advised of all changes in status of resources assigned to the division and/or group.
- ☐ Coordinate activities with other divisions.
- ☐ Determine need for assistance on assigned tasks.
- ☐ Submit situation and resources status information to Branch Director or Operations Section Chief.

- ☐ Report special occurrences or events such as accidents or sickness to the immediate supervisor.
- ☐ Resolve logistics problems within the division.
- ☐ Participate in developing Branch plans for the next operational period.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.6.2 Division Coordinator

The Division Coordinator reports to the Division Supervisor, and will take the name of the Division he/she is working in (ie. Division A Coordinator, Division B Coordinator etc.). When implemented, the Coordinator is responsible for implementing the assigned portion of the Incident Action Plan (IAP), assigning resources within the division, and reporting progress of control operations and status of resources within the division.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Implement IAP for division.
- ☐ Review division assignments and incident activities with subordinates and assign tasks.
- ☐ Coordinate activities with other divisions.
- ☐ Determine need for assistance on assigned tasks.
- ☐ Submit situation and resources status information to Division Supervisor.
- ☐ Report special occurrences or events such as accidents or sickness to the Division Supervisor.
- ☐ Resolve logistics problems within the division.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.7 General Duties for Multi Division/Group resources

7.7.1 Strike Team/Task Force Leader

The Strike Team/Task Force Leader reports to a Division and/or Group Supervisor and is responsible for performing tactical assignments assigned to the Strike Team or Task Force. The leader reports work progress, resources status, and other important information to a Division Supervisor, and maintains work records on assigned personnel.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Monitor work progress and make changes, when necessary.
- ☐ Coordinate activities with other Strike Teams, Task Forces, and Single Resources.
- ☐ Submit situation and resource status information to Division/Group Supervisor.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.7.2 Single Resources

The person in charge of a single tactical resource will carry the unit designation of the resource.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review assignments from IAP (ICS 204s).
- ☐ Obtain necessary equipment/supplies.
- ☐ Review weather/environmental conditions for assignment area.
- ☐ Brief subordinates on safety measures.
- ☐ Monitor work progress.
- ☐ Ensure adequate communications with supervisor and subordinates.
- ☐ Keep supervisor informed of progress and any changes.

- ☐ Inform supervisor of problems with assigned resources.
- ☐ Brief relief personnel, and advise them of any change in conditions.
- ☐ Return equipment and supplies to appropriate unit.
- ☐ Complete and turn in all time and use records on personnel and equipment.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.8 Pipeline Repair Branch Director

The Pipeline Repair Branch Director is responsible to oversee and implement the repair of the pipeline. The Pipeline Repair Branch Director reports to the Operations Section Chief.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Participate in ICS meetings such as Planning Meeting and Operations Briefing, as required.
- ☐ Develop pipeline repair portion of Incident Action Plan (IAP).
- ☐ Brief and assign operations personnel and supervise operations in accordance with IAP.
- ☐ Determine resource needs.
- ☐ Review recommendations and initiate release of resources.
- ☐ Inform Operations Section Chief about status of response operations, resource needs and issues/challenges requiring resolution.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.9 Air Operations Branch Director

The Air Operations Branch Director, who is ground-based, is primarily responsible for preparing the air operations portion of the Incident Action Plan (IAP). The IAP will reflect agency restrictions such as night flying or hours per pilot, that impact the operational capability or use of resources. After, the IAP is approved, Air Operations is responsible for implementing its strategic aspects (those that relate to the overall incident strategy). Additionally, the Air Operations Branch Director is responsible for providing logistical support to helicopters assigned to the incident. Specific tactical activities are normally performed by the Air Tactical Group Supervisor working with ground and air resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine aircraft requirements.
- ☐ Supervise all air operations activities associated with the incident, including aircraft refueling and support.
- ☐ Participate in ICS meetings as required, and participate in preparing the IAP.
- ☐ Perform operational planning for air operations.
- ☐ Prepare and provide Air Operations Summary Worksheet (ICS 220) to the Air Support Group and Fixed-Wing Bases.
- ☐ Determine coordination procedures for use by air organization with ground Branches, Divisions, or Groups.
- ☐ Coordinate with appropriate Operations Section personnel.
- ☐ Establish procedures for emergency reassignment of aircraft.
- ☐ Inform the Air Tactical Group Supervisor of the air traffic situation external to the incident.
- ☐ Coordinate with Federal Aviation Administration and Transport Canada to declare or cancel restricted air space areas, and resolve issues involving non-incident aircraft in the area.
- ☐ Report to the Operations Section Chief on air operations activities.
- ☐ Arrange for an accident investigation team, when warranted.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.9.1 Air Support Group Supervisor

The Air Support Group Supervisor is primarily responsible to support and manage Helibase and Helispot operations, and maintain liaison with Fixed-Wing Air Bases. This includes providing:

- ☐ fuel and other supplies,
- ☐ helicopter maintenance and repair,
- ☐ keeping records of helicopter activity; and
- ☐ enforcing safety regulations.

These major functions are performed at Helibases and Helispots. Helicopters (during landing and takeoff, and while on the ground) are under the control of the air support group's Helibase or Helispot managers. The Air Support Group Supervisor reports to the Air Operations Branch Director.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain copy of the Incident Action Plan (IAP) from the Air Operations Branch Director, including the Air Operations Summary Worksheet (ICS 220).
- ☐ Participate in Air Operations Branch Director planning activities.
- ☐ Inform Air Operations Branch Director of group activities.
- ☐ Identify resources/supplies dispatched for air support group.
- ☐ Request special air support items from appropriate sources through logistics section.
- ☐ Identify Helibase and Helispot locations from the IAP or from the Air Operations Branch Director.
- ☐ Determine need for personnel and equipment assignments at each Helibase or Helispot.
- ☐ Coordinate special requests for air logistics.
- ☐ Maintain coordination with air bases supporting the incident.
- ☐ Coordinate activities with Air Operations Branch Director.
- ☐ Obtain assigned ground to air frequency for Helibase operations from Communication Unit Leader or Communications Plan.
- ☐ Inform Air Operations Branch Director of capability to provide night-flying service.
- ☐ Ensure compliance with each agency's operations checklist for day and night operations.
- ☐ Ensure dust abatement procedures are implemented at Helibase and Helispots.
- ☐ Provide crash-rescue service for Helibases and Helispots.
- ☐ Ensure that Air Traffic Control procedures are established between Helibase and Helispots and the Air Tactical Group Supervisor, Helicopter Coordinator or Fixed-Wing Coordinator.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.9.2 Air Tactical Group Supervisor

The Air Tactical Group Supervisor is primarily responsible for coordinating and scheduling aircraft operations intended to locate, observe, track, survey, support dispersant applications, or other deliverable response application techniques, or report on the incident situation when fixed- and/or rotary-wing aircraft are airborne at an incident. These coordination activities are performed by the Air Tactical Group Supervisor while airborne. The Air Tactical Group Supervisor reports to the Air Operations Branch Director.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine what aircraft (fixed-wing and helicopters) are operating within the area of assignments.
- ☐ Obtain briefing from the Air Operations Branch Director or Operations Section Chief.
- ☐ Manage air tactical activities based upon the Incident Action Plan.

- ☐ Establish and maintain communications with Air Operations, Fixed-Wing Aircraft, Helicopter Coordinators, Air Support Group Supervisor, and Fixed-Wing Bases.
- ☐ Coordinate approved flights of non-incident aircraft or non-tactical flights in restricted air space area.
- ☐ Coordinate dispersant and in-situ burning application through the Air Operations Branch Director and Dispersants and/or In-Situ Burn Operations Group Supervisor.
- ☐ Obtain information about air traffic external to the incident.
- ☐ Receive reports of restricted air space violations.
- ☐ Make tactical recommendations to approved ground contact (Operations Section Chief, Branch Director, or Division/Group Supervisor).
- ☐ Inform the Air Operations Branch Director of tactical recommendations affecting the air operations portion of the Incident Action Plan.
- ☐ Coordinate air surveillance mission scheduling and observer assignments with the Situation Unit Leader.
- ☐ Identify remote sensing technology that may enhance surveillance capabilities.
- ☐ Coordinate air surveillance observations and provide reports by the most direct methods available.
- ☐ Report air surveillance and operations activities to Air Operations Branch Director.
- ☐ Coordinate application monitoring requirements with the Helicopter and Fixed-Wing Coordinators and the Situation Unit.
- ☐ Report on air application activities to the Air Operations Director.
- ☐ Report on incidents/accidents.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.9.3 Fixed-Wing Coordinator

The Fixed-Wing Coordinator is primarily responsible for coordinating assigned airborne fixed-wing aircraft operations at the incident. The Fixed-Wing Coordinator is also responsible for scheduling fixed-wing operations intended to locate, observe, track, survey, or report on the incident situation. The Fixed-Wing Coordinator coordinates the application of dispersants, in-situ burning agents, and bioremediation agents. The Fixed-Wing Coordinator reports to the Air Tactical Group Supervisor.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine type and number of aircraft operating within the incident area.
- ☐ Determine fixed-wing aircraft capabilities and limitations.
- ☐ Survey and report on potential problems within incident assignment area.
- ☐ Coordinate air traffic control procedures with pilots, Air Operations, Air Tactical Group Supervisor,
- ☐ Helicopter Coordinator and Air Support Group.
- ☐ Coordinate the use of radio frequencies for ground-to-air and air-to-air communication with the Air Tactical Group Supervisor and the Communications Unit.
- ☐ Implement and monitor all air safety requirements and procedures.
- ☐ Supervise all fixed-wing aircraft activities; receive assignments, brief pilots, assign missions, and report on mission completion; reassign as directed.
- ☐ Coordinate activities as appropriate, with Air Tactical Group Supervisor, Helicopter Coordinator,
- ☐ and ground operations personnel.
- ☐ Immediately report accidents or incidents to the Air Tactical Group Supervisor and the Air Operations Branch Director.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.9.4 Helicopter Coordinator

The Helicopter Coordinator is primarily responsible for coordinating all tactical or logistical helicopter sorties. The Helicopter Coordinator is also responsible for coordinating and scheduling helicopter operations intended to locate, observe, track, survey, or report on the incident situation. The Helicopter Coordinator coordinates the application of dispersants and in-situ burning agents. The Helicopter Coordinator reports to the Air Tactical Group Supervisor.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine the type and number of aircraft operating within incident assignment area.
- ☐ Determine helicopter capabilities and limitations.
- ☐ Supervise all helicopter activities.
- ☐ Survey and report on potential problems within incident assignment area (other aircraft hazards, ground hazards, etc.).
- ☐ Coordinate air traffic control procedures with pilots, Air Operations Branch Director, Air Tactical Group Supervisor, Fixed-Wing Coordinator, and the Air Support Group.
- ☐ Coordinate the use of radio frequencies for ground-to-air and air-to-air communications with the Air Tactical Group Supervisor and the Communications Unit.
- ☐ Assign and ensure use of appropriate operating frequencies by incident helicopters.
- ☐ Coordinate, and make geographic assignments for, helicopter operations with the Air Tactical Group Supervisor.
- ☐ Implement and monitor all safety requirements and procedures.
- ☐ Ensure that approved night flying procedures are followed.
- ☐ Immediately report accidents or incidents to the Air Tactical Group Supervisor and the Air Operations Branch Director.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.9.5 Helibase Manager

The Helibase Manager has primary responsibility for managing all activities at the assigned Helibase.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain Incident Action Plan (IAP), including Air Operations Summary Worksheet (ICS 220).
- ☐ Participate in Air Support Group planning activities.
- ☐ Inform Air Support Group Supervisor of Helibase activities.
- ☐ Report to assigned Helibase. Brief pilots and assigned personnel.
- ☐ Manage resources/supplies dispatched to Helibase.
- ☐ Ensure Helibase is posted and cordoned.
- ☐ Coordinate Helibase Air Traffic control with pilots, Air Support Group Supervisor, Air Tactical Group Supervisor, Helicopter Coordinator, and the Takeoff and Landing Controller.
- ☐ Manage chemical countermeasure loading operations.
- ☐ Ensure helicopter fuelling, maintenance, and repair services are provided.
- ☐ Supervise manifesting and loading of personnel and cargo.
- ☐ Ensure dust abatement techniques are provided and used at Helibases and Helispots.
- ☐ Ensure security is provided at each Helibase and Helispots.
- ☐ Ensure crash-rescue services are provided for the Helibase.
- ☐ Request special air support items from the Air Support Group Supervisor.
- ☐ Receive, and respond to, special requests for air logistics.
- ☐ Maintain agency records, reports of helicopter activities, and Check-In Lists (ICS 211).
- ☐ Coordinate activities with Air Support Group Supervisor.

- ☐ Display organization and work schedule at each Helibase, including Helispot organization and assigned radio frequencies.
- ☐ Solicit pilot input concerning selection and adequacy of Helispots, communications, Air Traffic Control, operational difficulties, and safety problems.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10 Recovery and Protection Branch Director

The Recovery and Protection Branch Director is responsible to oversee and implement the protection, containment, and cleanup activities established in the Incident Action Plan.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Participate in ICS meetings such as Planning Meeting and Operations Briefing, as required.
- ☐ Develop operations portion of IAP.
- ☐ Brief and assign operations personnel and supervise operations in accordance with IAP.
- ☐ Determine resource needs.
- ☐ Review recommendations and initiate release of resources.
- ☐ Inform Operations Section Chief about status of response operations, resource needs, and issues/challenges requiring resolution.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10.1 Shoreline Protection Group Supervisor

Under the Recovery and Protection Branch Director, the Shoreline Protection Group Supervisor is responsible for deploying containment, diversion, and absorbent boom in designated locations and managing shoreline protection operations in compliance with the Incident Action Plan (IAP). Depending on the size of the incident, the Protection Group may be further divided into Strike Teams, Task Forces, and single resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Implement Protection Strategies identified in the IAP.
- ☐ Help identify shoreline protection equipment and techniques.
- ☐ Determine the feasibility and practicality of shoreline protection operations.
- ☐ Develop a shoreline protection plan.
- ☐ Administer an effective Safety and Health program
- ☐ Conduct shoreline protection activities, coordinating with the On-water Recovery Group and Shoreline Recovery Group, and Mutual Aid/contractors as appropriate.
- ☐ Evaluate the effectiveness of response techniques; adjust techniques and equipment, as necessary, to enhance effectiveness.
- ☐ Provide information for status reports and daily action plans. Approve changes, as necessary.
- ☐ Identify resource needs, and work with the other units to obtain and release manpower, equipment, materials, and supplies.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10.2 On-Water Recovery Group Supervisor

Under the Recovery and Protection Branch Director, the On-Water Recovery Group Supervisor is responsible for managing on-water recovery operations in compliance with the Incident Action Plan. The Group may be divided into Strike Teams, Task Forces, and Single Resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Implement recovery strategies in Incident Action Plan (IAP) and conduct operations on a 24 hour basis – weather and sea state permitting.
- ☐ Administer the Site Safety and Health Plan.
- ☐ Direct, coordinate, and assess effectiveness of on-water recovery actions and modify recovery actions, as needed.
- ☐ Brief the Recovery and Protection Branch Director on activities.
- ☐ Maintain up to date information on slick location, projected trajectories, weather, sea and tidal conditions that may affect operations.
- ☐ Maintain liaison with vessel salvage and lightering operations and provide support when requested.
- ☐ Arrange adequate helicopter support for mechanical recovery to ensure that skimming vessels are in the highest concentrations of oil.
- ☐ Work with Staging Area Manager to establish staging bases to support on-water operations, including support for helicopter flight operations.
- ☐ If alternative countermeasures are to be employed, organize appropriate support resources.
- ☐ Work with Storage and Disposal Group, Planning, and Logistics to address transportation and interim storage for waste.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10.3 On-Shore Recovery Group Supervisor

Under the Recovery and Protection Branch Director, the Shoreline Recovery Group Supervisor is responsible for managing shoreline and onshore cleanup operations including the use of bioremediation and/or chemical treatment, in compliance with the Incident Action Plan (IAP). The group may be further divided into Strike Teams, Task Forces, and Single Resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Implement recovery strategies in the IAP.
- ☐ Identify resource needs, and work with the other Units to obtain and release manpower, equipment, materials, and supplies.
- ☐ Provide daily briefings to field supervisors on IAP assignments (ICS204), Site Safety and Health Plan, and security or access issues.
- ☐ Ensure that all personnel in cleanup areas are trained in basic spill response and safety practices.
- ☐ Ensure the continued function of decon stations, shoreline access, interim storage sites, rest and eating areas, security, etc.
- ☐ Ensure that Field Supervisors establish work and rest shifts, so that workers remain fresh and cleanup activities continue at all times.
- ☐ Ensure that all deceased wildlife found in the cleanup area are recovered, bagged, and correctly tagged to ensure that they are disposed of correctly.
- ☐ Evaluate the effectiveness of recovery techniques; adjust techniques and equipment, as necessary, to enhance effectiveness.
- ☐ Document (written and photo) shoreline cleanup activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10.4 In-Situ Burning Group Supervisor

The In-situ Burning Group Supervisor is responsible for coordinating all aspects of an in-situ burn operation. For aerial ignition, the Group works closely with the Air Tactical Group Supervisor. For marine burn operations, the Group works closely with the On-water Group Supervisor.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Assist the Planning Section in the development of in-situ burn operations and monitoring plans.
- ☐ Implement approved in-situ burn operations and monitoring plans.
- ☐ Manage dedicated in-situ burning resources and coordinate with other operations.
- ☐ Coordinate required monitoring.
- ☐ Brief Recovery and Protection Branch Director on activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10.5 Disposal Group Supervisor

Under the Recovery and Protection Branch Director, the Disposal Group Supervisor is responsible for coordinating the on-site activities of personnel engaged in collecting, storing, transporting, or disposing of waste materials. Depending on the size and location of the spill, the disposal groups may be further divided into Strike Teams, Task Forces, and Single Resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ During the Initial Response Phase, obtain a briefing from the Operations Section Chief, review the ICS 201, and conduct a rapid assessment of the incident to determine:
  - Product spilled,
  - Extent and nature of the oil spill response operations; and
  - Quantities and types of waste to be generated - free liquids, contaminated liquids, contaminated solid debris, sorbents.
- ☐ Obtain the Site Specific Safety and Health Plan and MSDS sheets covering the product spilled.
- ☐ Determine immediate need for interim storage including:
  - Barges, portable tanks, tank trucks, vac trucks for liquids, and
  - Lined bins, drums, bermed holding areas for solid wastes.
- ☐ Establish communications with Group Supervisors.
- ☐ Make immediate arrangements for interim storage, transfer pumps and equipment, and waste handling facilities in the immediate area of operations.
- ☐ Arrange for supervision of the offloading of recovery vessels, barges, bladders and tanks, and the receiving of products at the identified storage areas.
- ☐ Evaluate other commercial options in the immediate area.
- ☐ Work with the Disposal (Waste Management) Technical Specialist in the Planning Section to ensure on-site activities are consistent with the Waste Management Plan under development.
- ☐ Coordinate with the Environmental Unit Leader, Regional Environmental Emergencies Team (REET), and Permits and Approvals Technical Specialist to ensure required approvals and permits are in place.
- ☐ Implement waste handling and storage portion of the Waste Management Plan and Incident Action Plan once developed.
- ☐ Maintain accurate records of recovered material.
- ☐ Brief Recovery and Protection Branch Director on activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10.6 Decontamination Group Supervisor

Under the Recovery and Protection Branch Director, the Decontamination Group Supervisor is responsible for decontamination of personnel and response equipment according to the Decontamination Plan and in compliance with approved statutes.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Develop and implement the Decontamination Plan.
- ☐ Provide input to the development of the Site Specific Health and Safety Plan and the Incident Action Plan.
- ☐ Establish decon sites on a priority basis depending on current activity and anticipated need.
- ☐ Establish contact with Operations Safety Watch and implement Site Specific Safety and Health Plan.
- ☐ Obtain product MSDS to obtain product information and determine the appropriate decon procedures.
- ☐ Work with Storage and Disposal Group Supervisor to ensure that the waste generated by decon operations is identified and processed according to the requirements of the Waste Management Plan.
- ☐ Ensure that shelter and essential decontamination and PPE supplies are always available at the decon sites.
- ☐ Brief Recovery and Protection Branch Director on activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.10.7 Dispersant Group Supervisor

The Dispersants Group Supervisor is responsible for coordinating all aspects of a dispersant operation. For aerial applications, the Group works closely with the Air Tactical Group Supervisor. For marine applications, the Group works closely with the On-water Group Supervisor.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Assist the Planning Section in the development of dispersant application and monitoring plans.
- ☐ Implement approved dispersant operations and monitoring plans.
- ☐ Manage dedicated dispersant resources and coordinate with air operations.
- ☐ Coordinate required monitoring.
- ☐ Brief Recovery and Protection Branch Director on activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.11 Wildlife Branch Director

The Wildlife Branch Director is responsible for minimizing wildlife losses during spill responses; coordinating early aerial and ground reconnaissance of wildlife at the spill site, and reporting results to the Situation Unit Leader; employing wildlife hazing measures as authorized in the Incident Action Plan (IAP) or by the Regional Environmental Emergencies Team (REET); and recovering and rehabilitating impacted wildlife.

A central wildlife processing center should be identified and maintained for: evidence tagging, transportation, veterinary services, treatment and rehabilitation, storage, and other support needs. The activities of private wildlife care groups, including those employed by Kinder Morgan, will be overseen and coordinated by the Wildlife Branch Director.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ In Washington State the Wildlife Branch Director is:
  - a US Fish and Wildlife Service, or
  - WA Department of Fish and Wildlife representative, or
  - Other individual designated by Unified Command.
- ☐ Obtain briefing from Operations Section Chief on spill characteristics and/or from Planning Section on wildlife populations and anticipated impacts.
- ☐ Ensure that adequate hazing, recovery and rehab resources are available to respond to potential impacts.
- ☐ Determine if local resources are adequate to address potential impacts or if external (mutual aid) resources will be required. If mutual aid resources will be required, establish contact immediately.
- ☐ Establish contact with government and NGO wildlife agencies.
- ☐ Provide direction and supervise Wildlife Branch operations.
- ☐ Assemble and disassemble Strike Teams/Task Forces assigned to the Wildlife Branch.
- ☐ Develop Wildlife Branch portion of the Incident Action Plan.
- ☐ Inform Operations Section Chief about status of response operations, resource needs and issues/challenges requiring resolution.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.11.1 Wildlife Recovery Group Supervisor

Under the direction of the Wildlife Branch Director, the Wildlife Recovery Group Supervisor is responsible for coordinating the search, collection, and field tagging of dead and living impacted wildlife and transporting them to processing center(s). This group should coordinate with Planning in conducting aerial and group surveys of wildlife in the vicinity of the spill. They may also deploy acoustic and visual wildlife hazing equipment.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain briefing from Wildlife Branch Director and Planning Section as required, to determine potential for spill impacts on wildlife populations, and obtain requirements for wildlife recovery operations and priorities.
- ☐ Determine resource needs and requisition equipment.
- ☐ Establish contact with Logistics Section to establish logistical support requirements including capture resources, vessels and vehicles for wildlife transportation
- ☐ Work with government experts and wildlife organizations to establish appropriate capture and recovery strategies.

- ☐ Oversee and coordinate search and collection operations.
- ☐ Establish and adhere to strict chain-of-custody procedures including logging and forms
- ☐ Establish and implement protocols for collection of impacted wildlife.
- ☐ Notify Wildlife Branch director and Situation Unit of all recovered wildlife – live and deceased.
- ☐ Coordinate transportation of wildlife to processing centre(s).
- ☐ Brief the Wildlife Branch Director on activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.11.2 Wildlife Rehabilitation Group Supervisor

Under the direction of the Wildlife Branch Director, the Wildlife Rehabilitation Group Supervisor is responsible for receiving oiled wildlife at the processing centers, recording essential information, collecting necessary samples, and conducting triage, stabilization, treatment, transport, and rehabilitation of oiled wildlife. The supervisor is responsible for assuring proper wildlife transportation to appropriate treatment centers for oiled animals requiring extended care and treatment.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine resource needs and establish processing station for impacted wildlife.
- ☐ Ensure proper set-up of facility and functionality of equipment.
- ☐ Oversee rehabilitation supervisors, rehabilitation volunteers, and veterinarians.
- ☐ Coordinate the housing, washing, rinsing, nutrition and general care of recovered animals.
- ☐ Work closely with on-site veterinarians to ensure appropriate care and rehab protocols are established, and follow established contact with local government and rehabilitation organizations.
- ☐ Establish operating hours and staff schedules.
- ☐ Ensure that strict safety and security measures are in place.
- ☐ Establish contact with Logistics Section to establish supply requirements.
- ☐ Collect numbers/types/status of impacted wildlife, and brief the Wildlife Branch director.
- ☐ Coordinate transport of wildlife to other facilities.
- ☐ Coordinate release of recovered wildlife.
- ☐ Brief the Wildlife Branch Director on activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

7.11.3 Wildlife Hazing Group Supervisor

The Hazing Group Supervisor is responsible for deploying acoustical and visual wildlife hazing equipment.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain briefing from Wildlife Branch Director and Planning Section as required, to determine potential for spill impacts on wildlife populations, and obtain requirements for wildlife recovery operations and hazing priorities.
- ☐ Establish contact with government agencies for guidance and required approval.
- ☐ Determine resource needs and requisition hazing equipment.
- ☐ Ensure that strict safety and security measures are in place.
- ☐ Direct Hazing Strike Teams.
- ☐ Brief the Wildlife Branch Director on activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

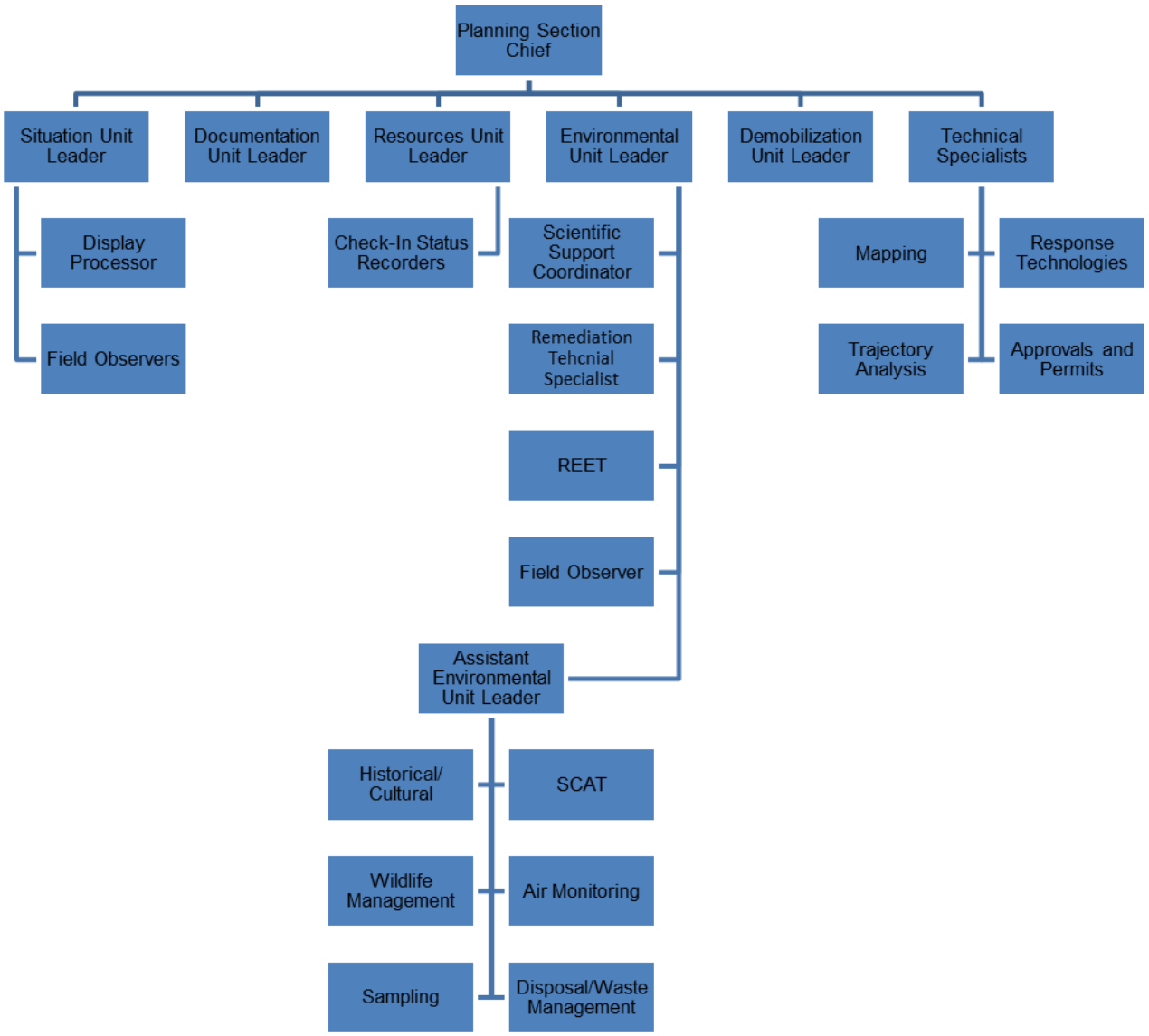
7.12 Emergency Response Branch Director

The Emergency Response Branch Director is primarily responsible for overseeing and implementing emergency measures to protect life, mitigate further damage to the environment, and stabilize the situation.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Participate in planning meetings, as required.
- ☐ Develop operations portion of Incident Action Plan.
- ☐ Determine need for, and request, additional professional resources such as police, ambulance, fire suppression, search and rescue, salvage, HAZMAT.
- ☐ Maintain liaison with additional groups brought into assist with operations.
- ☐ Review suggested list of resources to be released and initiate recommendation for release of resources.
- ☐ Report information about special activities, events, and occurrences to Operations Section Chief.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.0 PLANNING SECTION DUTIES

8.1 Planning Section Organization Chart



8.2 Planning Section Chief

The Planning Section Chief, a member of the General Staff, is responsible for collecting, evaluating, disseminating, and using information about the incident and status of resources. Information is needed to:

- Understand the current situation.
- Predict probable course of incident events.
- Prepare primary and alternative strategies for the incident.

☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
☐ Activate Planning Section Units.
☐ Review Emergency Response (Contingency) Plan for the specific area of response for additional duties/special circumstances
☐ Assign available personnel already on-site to ICS organizational positions, as appropriate.
☐ Identify gaps in the Planning Section and request additional resources as needed.
☐ Collect and process information about the incident and ensure the Incident Status Display is up to date.
☐ Coordinate with IC/UC to develop a Meetings Schedule (ICS 230). Post in the ICP.
☐ Supervise preparation of Incident Action Plan (IAP), Executive Summary (if used) and General Plan.
☐ Provide input to the Incident Command and Operations Sections Chief in preparing the IAP.
☐ Facilitate ICS Planning meetings and participate in other meetings, as required.
☐ Fill in and distribute the ICS 202 form in conjunction with Incident Command.
☐ Determine need for any specialized resources in support of the incident.
☐ Provide Resources Unit with the Planning Section's organizational structure, including names and locations of assigned personnel.
☐ Assign Technical Specialists, where needed.
☐ Assemble information on alternative strategies.
☐ Provide periodic predictions on incident potential.
☐ Provide status reports to appropriate requesters.
☐ Advise General Staff of any significant changes in incident status.
☐ Incorporate the Incident Traffic Plan (from Ground Support Unit), Vessel Routing Plan (from Vessel Support Unit), and other supporting plans in the IAP.
☐ Instruct Planning Section Units in distribution and routing of incident information.
☐ Prepare resource release recommendations for submission to Incident Command.
☐ Maintain Section records.
☐ Maintain Unit/Activity Log (ICS 214).

8.3 Deputy Planning Section Chief

The Deputy Planning Section Chief (if staffed) is responsible for assisting the Planning Section Chief.

☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
☐ Carry out duties as assigned by PSC (must be capable of assuming PSC duties).
☐ Attend appropriate ICS meetings and briefings.
☐ Maintain Individual Log (ICS 214a).

8.4 Situation Unit Leader

The Situation Unit Leader is responsible for collecting and evaluating intelligence about the current and possible future, status of the spill and the spill response operations. This responsibility includes compiling intelligence regarding the type and amount of oil spilled, the amount of oil recovered, the oil's current location and anticipated trajectory, and impacts on natural resources. This also includes providing intelligence to the GIS Specialist(s) for mapping the current and possible future situation, and preparing reports for the Planning Section Chief.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing and special instructions from the Planning Section Chief.
- ☐ Participate in planning meetings, as required.
- ☐ Prepare and maintain Incident Status Display (ISD) and Situation Map (ICS 201).
- ☐ Collect and maintain current incident data.
- ☐ Ensure out of date or obsolete information is removed from the ISD in a timely manner
- ☐ Schedule and conduct spill observations/overflights, as needed.
- ☐ Acquire, distribute, and provide analysis of weather forecasts.
- ☐ Prepare periodic predictions, as requested.
- ☐ Prepare, post, and disseminate resource and situation status intelligence, as required in the PIO/JIC.
- ☐ Prepare the Incident Status Summary (ICS 209).
- ☐ Provide status reports to appropriate requesters.
- ☐ Provide photographic services and maps.
- ☐ Actively solicit field intelligence for use in maintaining the ISD.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.4.1 Display Processor

The Display Processor is responsible for displaying incident status intelligence obtained from Field Observers, resource status reports, aerial and orthographic photographs, infrared data, and other sources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine:
  - Location of work assignments,
  - Number, types, and locations of displays required,
  - Priorities,
  - Map requirements for Incident Action Plan,
  - Time limits for completion; and
  - Field Observer assignments and communications means.
- ☐ Obtain necessary equipment and supplies.
- ☐ Obtain copy of Incident Action Plan for each Operational Period.
- ☐ Assist Situation Unit Leader in analyzing and evaluating field reports.
- ☐ Develop required displays within time limits.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.4.2 Field Observer

The Field Observer is responsible to collect situation intelligence from personal observations at the incident and provide this intelligence to the Situation Unit Leader.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine:
  - Location of assignment,
  - Type of intelligence required,
  - Priorities,
  - Time limits for completion,
  - Method of communication.; and
  - Method of transportation.
- ☐ Obtain copy of Incident Action Plan for the Operational Period.
- ☐ Obtain necessary equipment and supplies.
- ☐ Perform Field Observer responsibilities including, but not limited to, the following:
  - Perimeters of incident,
  - Locations of oil,
  - Rates of spread,
  - Weather conditions; and
  - Hazards.
  - Progress of operation resources.
- ☐ Identify all facility locations (e.g., Helispots, Staging Areas, decon corridors and Division boundaries).
- ☐ Report intelligence to the Situation Unit Leader by established procedure.
- ☐ Report immediately any condition observed which may cause danger or safety hazard to personnel.
- ☐ Gather intelligence that will lead to accurate predictions.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.5 Documentation Unit Leader

The Documentation Unit Leader is responsible for maintaining accurate, up-to-date incident files such as: Incident Action Plan, incident reports, communication logs, injury claims, situation status reports, etc. Thorough documentation is critical to post-incident analysis. Many of these documents will originate in other Sections. This Unit will ensure each Section is maintaining and providing appropriate documents. Incident files will be stored for legal, analytical, and historical purposes. The Documentation Unit also provides duplication and copying services, and provides blank forms to those requiring forms.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing and special instructions from Planning Section Chief.
- ☐ Participate in Planning Meetings, as required.
- ☐ Request additional documentation personnel as needed.
- ☐ Compile a complete library of all necessary ICS forms for use by IMT members.
- ☐ Establish and organize incident files.
- ☐ Establish duplication service and respond to requests.
- ☐ File copies of all official forms and reports.
- ☐ Coordinate with Situation Unit Leader to ensure accuracy and security of intelligence portrayed on Incident Status Display.

- ☐ Review all documentation for accuracy and completeness of records submitted for files and correct errors or omissions by contacting appropriate ICS Units. This includes signatures, operational period, time, date, incident name, etc.
- ☐ Provide incident documentation to appropriate requesters as authorized by IC/UC.
- ☐ Secure all incident documentation prior to demobilization.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.6 Resources Unit Leader

The Resources Unit Leader (RUL) is responsible for maintaining the status of all Resources (primary and support) at an incident, including all non-Kinder-Morgan Resources. The RUL achieves this by developing and maintaining a master list of all Resources, including check-in, status, current location, etc. This Unit is also responsible for preparing parts of the Incident Action Plan (ICS 203, 204 & 207), compiling the entire Plan in conjunction with other members of the IMT, (e.g., Situation Unit, Operations, Logistics) and determining the availability of Resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing and special instructions from the Planning Section Chief.
- ☐ Participate in Planning Meetings, as required.
- ☐ Establish check-in function at incident locations.
- ☐ Using the Incident Briefing (ICS 201), prepare and maintain the Incident Status Display (Organization Chart and resource allocation and deployment sections).
- ☐ Establish contacts with incident facilities to track Resource status and with Logistics to track en-route resources.
- ☐ Gather, post, and maintain incident resource status and provide input to Situation Unit Leader for inclusion in the Incident Status Summary (ICS 209).
- ☐ Prepare Organization Assignment List (ICS 203) and Organization Chart (ICS 207).
- ☐ Develop ICS 215 for use at the Planning Meeting.
- ☐ When informed of equipment or personnel status change, ensure an ICS 210 is filled in and forwarded to appropriate location along with person/equipment.
- ☐ Together with Operations, develop Assignment Lists (ICS 204).
- ☐ Provide status reports to appropriate requesters.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.6.1 Check-In Status Recorder

Check-in/Status recorders are needed at each check-in location to ensure that all Resources assigned to an incident are accounted for.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain briefing from Resource Unit Leader.
- ☐ Obtain work materials, including Check-in Lists (ICS 211), and status display boards.
- ☐ Establish communications with the Communication Center.
- ☐ Post signs so check-in locations can be easily found.
- ☐ Record check-in on Check-in Lists (ICS 211e/p).
- ☐ Transmit check-in intelligence to Resources Unit on regular, arranged schedule, or as needed.
- ☐ Receive, record, and maintain status intelligence on ICS 215 forms, tracking database/spreadsheet or other means of recording.
- ☐ Forward completed Check-in Lists (ICS 211) and Status Change Forms (ICS 210) to the Resources Unit.
- ☐ Maintain files of Check-in Lists (ICS 211).
- ☐ Maintain Unit/Activity Log (ICS 214).

8.7 Environmental Unit Leader

The Environmental Unit Leader is responsible for environmental matters associated with the response, including strategic assessment, modeling, surveillance, and environmental monitoring and permitting. The Environmental Unit prepares environmental data for the Situation Unit. Most Technical Specialists engaged during the response will be assigned to the EUL. The EUL may request documentation/administrative assistance for the unit, this position would follow the general duties and duties assigned by the EUL.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ In Washington State, the Environment Unit Leader is:
    - a government natural resource trustee agency representative OR
    - Other individual designated by Unified Command.
- ☐ Obtain briefing and special instructions from Planning Section Chief.
- ☐ Participate in Planning Section meetings.
- ☐ Identify sensitive areas and recommend response priorities and complete Resources at Risk (ICS 232) as soon as possible. Usually completed with REET (if formed).
- ☐ Determine the extent, fate, and effects of contamination.
- ☐ Monitor the environmental consequences of cleanup actions.
- ☐ Develop shoreline cleanup and assessment plans.
- ☐ Identify the need for, and prepare, any special advisories or orders.
- ☐ Identify the need for and obtain permits, consultations, and other authorizations.
- ☐ Identify and develop plans for protection of affected historical/cultural resources.
- ☐ Evaluate the opportunities to use various response technologies.
- ☐ Develop waste management and disposal plans.
- ☐ Develop plan for collecting, transporting, and analyzing samples.
- ☐ Ensure completed Assignment Lists (ICS 204) for each environmental task are supplied to Planning Section Chief for inclusion in IAP.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.7.1 Scientific Support Coordinator

The Scientific Support Coordinator (SSC) is a technical specialist and is defined in the National Contingency Plan as the principal advisor to the FOSC for scientific issues. The SSC is responsible for providing expertise on chemical hazards, field observations, trajectory analysis, and resources at risk, environmental tradeoffs of countermeasures and cleanup methods, and intelligence management. The SSC is also charged with gaining consensus on scientific issues affecting the response, but ensuring that differing opinions within the scientific community are communicated to the Incident Command.

The SSC is the point of contact for the Scientific Support Team from NOAA's Office of Response and Restoration (OR&R). Additionally, the SSC is responsible for providing data on weather, tides, and currents, and other applicable environmental conditions. The SSC can serve as the Environmental Unit Leader.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Attend planning meetings.
- ☐ Determine resource needs.
- ☐ Provide overflight maps and trajectory analysis to the Situation Unit.
- ☐ Provide weather, tidal, and current intelligence.
- ☐ Obtain consensus on scientific issues affecting the response.
- ☐ Develop a prioritized list of the resources at risk.
- ☐ Provide intelligence on chemical hazards.
- ☐ Evaluate environmental tradeoffs of countermeasures, cleanup methods, and response endpoints.
- ☐ Maintain Unit Activity Log (ICS 214).

8.7.2 Remediation Technical Specialist

- ☐ The Response (Remediation) Technical Specialist works closely with the EUL to provide technical guidance with regard to remediation and response to the incident. The Specialist is responsible for providing expertise on environmental regulations and sampling requirements, environmental behavior of the released product, trajectory analysis, resources at risk, environmental tradeoffs of countermeasures and cleanup methods.
- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ May attend planning meetings with EUL.
- ☐ Helps to determine resource needs (consultant and/or KMC personnel).
- ☐ Helps to identify resources at risk.
- ☐ Works with Sampling Technical Specialist to determine sampling plans for soil, groundwater, surface water and all other affected media.
- ☐ Works with appropriate Technical Specialists, stakeholders and other relevant personnel to determine applicable remediation technologies and develop remediation plans for all affected media.
- ☐ Reviews monitoring and sampling data with the Sampling Technical Specialist daily to identify necessary changes to the sampling or remediation plans.
- ☐ Evaluate environmental tradeoffs of countermeasures, cleanup methods, and response endpoints.
- ☐ Maintain Unit Activity Log (ICS 214).

8.7.3 REET Technical Specialist

The Regional Environmental Emergencies Team (REET) provides consolidated and coordinated environmental advice, intelligence and assistance in the event of an environmental emergency. REET members represent several federal, provincial and municipal government departments, aboriginal communities, private sector agencies, and local individuals. In British Columbia, REET is co-chaired by Environment Canada and the British Columbia Ministry of Environment. In Alberta, REET is established by Environment Canada. Typically, REET is not formed in Washington State, however it may be used as a tool to bring together similar groups as in Canada.

In an emergency situation, REET operates as a multi-disciplinary and multi-agency team that provides comprehensive and coordinated environmental advice, intelligence and assistance to the Responsible Party Incident Commander, Coast Guard On-Scene Commander (marine spills), or other government Lead Agency (land spills). On behalf of the Responsible Party Incident Commander, federal and provincial agency representatives, REET can address and prioritize the environmental, cultural, economic, property and human issues. REET effectively eliminates agency overlap and utilizes all resources to identify and action the resources at risk.

Technical specialists representing REET agencies may form part of the Environmental Unit, reporting to the Environmental Unit Leader. A member of the REET may also act as the Resources at Risk Technical Specialist.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Establish the REET team from agencies with jurisdiction or interest in the spill, as well as local resources such as First Nations, local cultural/ historical specialists, and other appropriate private sector groups.
- ☐ As a team, identify the environmentally sensitive resources in the area impacted – Resources at Risk (ICS 232).
- ☐ Assist with determining pollutant behaviour, fate and effects
- ☐ Identify and prioritize environmental areas to be protected, rehabilitation priorities, economically impacted areas, historical and culturally sensitive areas, and socioeconomic resources impacted.
- ☐ Support the Environmental Unit Leader in both the Tactics and Planning meetings regarding resources at risk and REET recommendations/priorities.
- ☐ Maintain Unit Activity Log (ICS 214).

8.7.4 Field Observer

The Field Observer is responsible to collect situation Intelligence from personal observations at the incident and provide this intelligence to the Environmental Unit Leader. The Field Observer role should be filled by personnel from the Responsible Party in order to provide company environmental knowledge and guidance at the affected areas.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain copy of Incident Action Plan for the Operational Period.
- ☐ Review operational and environmental Assignment Lists (ICS 204) for the Operational Period and identify any environmental issues/concerns.
- ☐ Monitor operational activities to ensure they are completed as documented in all approved plans.
- ☐ Provide environmental knowledge and guidance to operations crews as required.
- ☐ Collect information regarding, but not limited to, the following:

- Perimeters of incident,
- Locations of oil,
- Rates of spread,
- Weather conditions,
- Hazards; and
- Progress of operational resources.

☐ Report immediately any condition observed which may cause danger or safety hazard to personnel or the environment.
☐ Gather intelligence that will lead to accurate predictions.
☐ Participate in daily EU meetings to provide feedback on operational progress and keep up to date with regard to changes in tactics and plans.
☐ Maintain Unit/Activity Log (ICS 214).

8.7.5 Assistant Environmental Unit Leader

The Assistant Environmental Unit Leader is responsible for oversight of the technical specialists in the Environment Unit, and for assisting the Environment Unit Leader as required. The Assistant Environmental Unit Leader may assume the role of Environmental Unit Leader when the Environmental Unit Leader is not available.

☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
☐ Obtain briefing and special instructions from Environmental Unit Leader.
☐ Assume role of Environmental Unit Leader as required to help with overlap situations.
☐ Coordinate Environmental Unit Technical Specialists to ensure all Resources at Risk (ICS 232) are documented and forwarded to Resources at Risk Technical Specialist, and technical plans and Assignment Lists (ICS 204) are completed for inclusion in the IAP.
☐ Ensure Environmental Unit Leader is kept up to date with plan development and any changes to plans and assignment lists. Brief Environmental Unit Leader prior to Planning Meetings.
☐ Maintain Unit Activity Log (ICS 214).

8.7.5.1 Historical/Cultural Resources Technical Specialist

The Historic/Cultural (H/C) Resources Specialist is responsible for identifying and resolving issues related to any historic or cultural sites that are threatened or impacted during an incident. The Specialist shall consult with federal, state, provincial, local/municipal governments, land management agencies, appropriate first nations/tribal groups and other concerned parties. The Specialist must identify H/C sites and develop strategies for protection and cleanup of those sites in order to minimize damage.

☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
☐ In Washington State:
- Implement Programmatic Agreement (PA) for the FOSC.
- If PA is not used, coordinate Section 106 consultations with the SHPO.

☐ Consult and reach consensus with concerned parties on affected H/C sites and response strategies. May require participation in REET meetings with Environmental Unit Leader.
☐ Identify and prioritize threatened or impacted H/C sites. Ensure this information is provided to Resources at Risk Technical Specialist for inclusion in Resources at Risk (ICS 232).
☐ Develop response strategies to protect H/C sites (develop H/C Management Plan, if required).
☐ Participate in the testing and evaluation of cleanup techniques used on H/C sites.
☐ Monitor and provide guidance on the cleanup of H/C sites to reduce or eliminate response-related impacts.

- ☐ Ensure compliance with applicable federal/state/provincial regulations.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.7.5.2 Shoreline Cleanup Assessment (SCAT) Technical Specialist

The Shoreline Cleanup Assessment (SCAT) Specialist is responsible for providing appropriate cleanup recommendations for the shoreline types, and the degree to which they have been impacted. This Specialist will recommend the need for, and the numbers of, Shoreline Cleanup Assessment Teams (SCATs), and will be responsible for making cleanup recommendations to the Environmental Unit Leader. Additionally, this Specialist will recommend cleanup endpoints.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain briefing and special instructions from the Environmental Unit Leader.
- ☐ Participate in Planning Section meetings.
- ☐ Recommend the need for and number of SCATs and ensure Assignment Lists (ICS 204) are completed for each team and provided to Assistant Environmental Unit Leader.
- ☐ Coordinate SCAT operations with affected parties.
- ☐ Describe shoreline types and oiling conditions.
- ☐ Develop SCAT plan and ensure it is updated as required.
- ☐ Identify sensitive resources (ecological, recreational, cultural, etc.) and ensure these are provided to Assistant Resources at Risk Technical Specialist for inclusion on Resources at Risk (ICS 232).
- ☐ Work with appropriate agencies and affected parties to develop end point protocols.
- ☐ Recommend the need for cleanup.
- ☐ Recommend cleanup priorities.
- ☐ Recommend shoreline cleanup methods.
- ☐ Monitor cleanup effectiveness.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.7.5.3 Wildlife Technical Specialist

The Wildlife Technical Specialist's role is to identify and provide management strategies for minimizing/preventing the impacts to wildlife as a result of the release and response activities. This Specialist also acts as a liaison with and provides technical support to the Wildlife Branch within the Operations Section.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine if wildlife impacts are anticipated and/or have been reported.
- ☐ Provide technical intelligence and assistance to the Wildlife Branch to support establishment of wildlife operations.
- ☐ Ensure with Operations that a reporting system is put in place for spill responders and the general public to report affected wildlife.
- ☐ Work with government agencies in identifying species at risk and coordinating wildlife rescue and recovery activities.
- ☐ Develop Wildlife Management Plan including identification of species that are affected or at risk due to release and response activities and management strategies to minimize or prevent impacts to wildlife (hazing, timing windows, etc.) and complete updates as necessary.
- ☐ Work with Wildlife Branch to develop Wildlife Recovery Plan including procedures and process for wildlife recovery, rehabilitation and release and ensure Assignment Lists (ICS 204) are completed for wildlife management field teams.

- ☐ Consult agencies to determine appropriate procedures and any limitations or prohibitions that might exist.
- ☐ Determine and provide intelligence on any overflight restrictions that might affect wildlife operations.
- ☐ Determine and provide intelligence on any environmental restrictions that might be affected by wildlife operations.
- ☐ Identify wildlife hazing requirements and procedures to be employed. Coordinate with Approvals and Permits Technical Specialist and Wildlife Branch.
- ☐ Provide wildlife intelligence to Situation Unit Leader for inclusion in the Incident Status Summary (ICS 209)
- ☐ Maintain Unit/Activity Log (ICS 214).

8.7.5.4 Air Monitoring Technical Specialist

The Air Monitoring Technical Specialist is responsible for providing an air monitoring plan using the parameters in the emergency response plan for an unplanned release or during a fire/in-situ burn.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine resource needs.
- ☐ Participate in planning meetings, as required.
- ☐ Develop Air Quality Monitoring Program including detailed sampling plan, if required.
- ☐ Coordinate air sampling teams and ensure Assignment Lists (ICS 204) completed and provided to Assistant Environmental Unit Leader.
- ☐ Identify and alert appropriate laboratories.
- ☐ Set up site map to monitor location of samples collected and coordinate with GIS staff.
- ☐ Participate in meetings for Public Safety risk assessments.
- ☐ Coordinate sampling activities with Incident Investigators and Legal Specialists.
- ☐ Provide status reports to appropriate requesters.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.7.5.5 Sampling Technical Specialist

The Sampling Technical Specialist is responsible for providing a sampling plan to coordinate collection, documentation, storage, transportation, and submittal of soil and water samples to appropriate laboratories for analysis or storage.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Develop a Sampling Plan for soil, water, and any other affected media as required.
- ☐ Complete updates to Sampling Plan as required (i.e. situational changes, feedback from Field Observers, etc.).
- ☐ Determine resource needs.
- ☐ Participate in planning meetings, as required.
- ☐ Coordinate sampling teams and ensure Assignment Lists (ICS 204) completed and provided to Assistant Environmental Unit Leader.
- ☐ Identify and alert appropriate laboratories.
- ☐ Set up site map to monitor location of samples collected and coordinate with GIS staff.
- ☐ Coordinate sampling activities with Incident Investigators and Legal Specialists.
- ☐ Provide status reports daily to Assistant Environmental Unit Leader and to appropriate requesters as required.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.7.5.6 Disposal (Waste Management) Technical Specialist

The Disposal/Waste Management Technical Specialist is responsible for developing a Waste Management Plan that details the minimization, collection, sampling, monitoring, transportation, manifesting, permitting, recycling, and disposal of all liquid and solid wastes generated during the response. The Disposal (Waste Management) Technical Specialist coordinates activities closely with the Storage and Disposal Group Supervisor (Operations) and the Approvals and Permits Technical Specialist.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Develop a Waste Management Plan to address all waste streams related to the release and response activities including waste recycling, disposal and temporary storage locations. Waste Management Plan must be developed for inclusion in IAP for the first operational period.
- ☐ Complete updates and revisions to the Waste Management Plan as required.
- ☐ Coordinate implementation of the Waste Management Plan and work with Field Observer to evaluate the effectiveness of the plan.
- ☐ Determine resource needs.
- ☐ Coordinate acquisition of any waste related approvals including sample collection and waste manifests from waste disposal or recycling facilities.
- ☐ Coordinate acquisition of any federal/provincial/state waste generator permits.
- ☐ Coordinate with Approvals and Permits Technical Specialist regarding required permits, as necessary.
- ☐ Track the types and quantities of waste generated and all relevant documentation (i.e. shipping documents such as waste manifests and bills of lading, etc.).
- ☐ Calculate and verify the volume of oil recovered, including product collected with sediment/sand, etc. and provide required intelligence to Situation Unit Leader for inclusion on (ICS 209?).
- ☐ Provide status reports to appropriate requesters.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.8 Demobilization Unit Leader

The Demobilization Unit Leader is responsible for developing the Incident Demobilization Plan, and assisting Sections/Units in ensuring that orderly, safe, and cost-effective demobilization of personnel and equipment is accomplished.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing and special instructions from Planning Section Chief.
- ☐ Review incident resource records to determine probable size of demobilization effort.
- ☐ Participate in planning meetings, as required.
- ☐ Evaluate logistics and transportation capabilities required to support demobilization.
- ☐ Prepare and obtain approval of Demobilization Plan, including required decontamination.
- ☐ Distribute Demobilization Plan to each processing point.
- ☐ Ensure that all Sections/Units understand their responsibilities within the Demobilization Plan.
- ☐ Monitor implementation and assist in coordinating the Demobilization Plan.
- ☐ Brief Planning Section Chief on progress of demobilization.
- ☐ Provide status reports to appropriate requesters.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.9 Technical Specialists

Technical Specialists are advisors with special skills needed to support the incident. Although Technical Specialists are usually initially assigned to the Planning Section, they may be reassigned elsewhere. If necessary (due to span-of-control limitations), Technical Specialists may be formed into a separate Unit. The Planning Section will maintain a list of available specialists and will assign them where needed.

The following are example position descriptions for Technical Specialists that might be used during an oil spill response.

- Response Technologies
- Mapping/GIS Technical Specialist
- Trajectory Analysis (Modeling) Technical Specialist
- Resources At Risk (RAR) Technical Specialist
- Approvals and Permits Technical Specialist

8.9.1 Response Technologies Technical Specialist

The Response Technologies Specialist is responsible for evaluating the opportunities to use various Response Technologies (RT), including mechanical containment and recovery, dispersant or other chemical countermeasures, in-situ burning, and bioremediation. The specialist will conduct the consultation and planning required deploying a specific response technology, and articulating the environmental tradeoffs of using, or not using, a specific response technology.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Participate in planning meetings, as required.
- ☐ Determine resource needs.
- ☐ Gather data pertaining to the spill, including spill location, type and amount of petroleum spilled, physical and chemical properties, weather and sea conditions, and resources at risk.
- ☐ Identify available RT that may be effective on the specific spilled petroleum.
- ☐ Make initial notification to all agencies that have authority over the use of RT.
- ☐ Keep Planning Section Chief advised of RT issues.
- ☐ Provide status reports to appropriate requesters.
- ☐ Establish communications with Regional Response Team to coordinate RT activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.9.2 Mapping/GIS Technical Specialist

The Mapping/GIS Technical Specialist is responsible for gathering and compiling updated spill intelligence and providing various map products regarding the incident. The GIS team will work with the Situation Unit and the Information Officer to ensure accurate and rapid dissemination of oil spill information to the IMT.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine resource needs.
- ☐ Participate in planning meetings, as required.
- ☐ Gather and compile data from the different incident sections.
- ☐ Provide maps for various components of the incident.
- ☐ Provide status reports to appropriate requesters.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.9.3 Trajectory Modeling Technical Specialist

The Trajectory Modeling Specialist is responsible for providing projections and estimates of the movement and behaviour of the spill. The specialist will combine visual observations, remote sensing intelligence, and computer modeling, as well as observed and predicted tidal, current, and weather data to form these analyses. Additionally, the specialist is responsible for coordinating with local experts (fishermen, First Nations, Tribal, weather service, academia, researchers, etc.) in formulating these analyses. Trajectory maps, overflight maps, and tides and current data will be supplied by the Specialist to the Situation Unit for posting on the Incident Status Display and dissemination throughout the Command Post.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Gather pertinent intelligence on tides and currents from all available sources.
- ☐ Provide trajectory and overflight maps, and tidal and current intelligence.
- ☐ Participate in Tactics and Planning Meetings as needed.
- ☐ Provide briefing on observations and analyses to the proper personnel.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.9.4 Resources at Risk (RAR) Technical Specialist

The Resources at Risk Specialist is responsible for identifying resources thought to be at risk from exposure to the spilled oil by analyzing known and anticipated oil movement and the location of natural, cultural, and economic resources. The Resources at Risk Specialist considers the relative importance of the resources and the relative risk to develop a priority list for protection.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Coordinate activities with federal/state resource trustees and/or Regional Environmental Emergencies Team (REET) for the identification and prioritization of natural and cultural resources at risk.
- ☐ Complete Resources at Risk Summary (ICS 232) before the Unified Command Objectives Meeting.
- ☐ Participate in planning meetings, as required.
- ☐ Determine resource needs.
- ☐ Obtain current and forecasted status intelligence from Situation Unit.
- ☐ Identify natural resources at risk.
- ☐ Identify archaeo-cultural resources at risk.
- ☐ Identify socioeconomic resources at risk.
- ☐ Develop a prioritized list of the resources at risk for use by the Planning Section.
- ☐ Provide status reports to appropriate requesters.
- ☐ Maintain Unit/Activity Log (ICS 214).

8.9.5 Approvals and Permits Technical Specialist

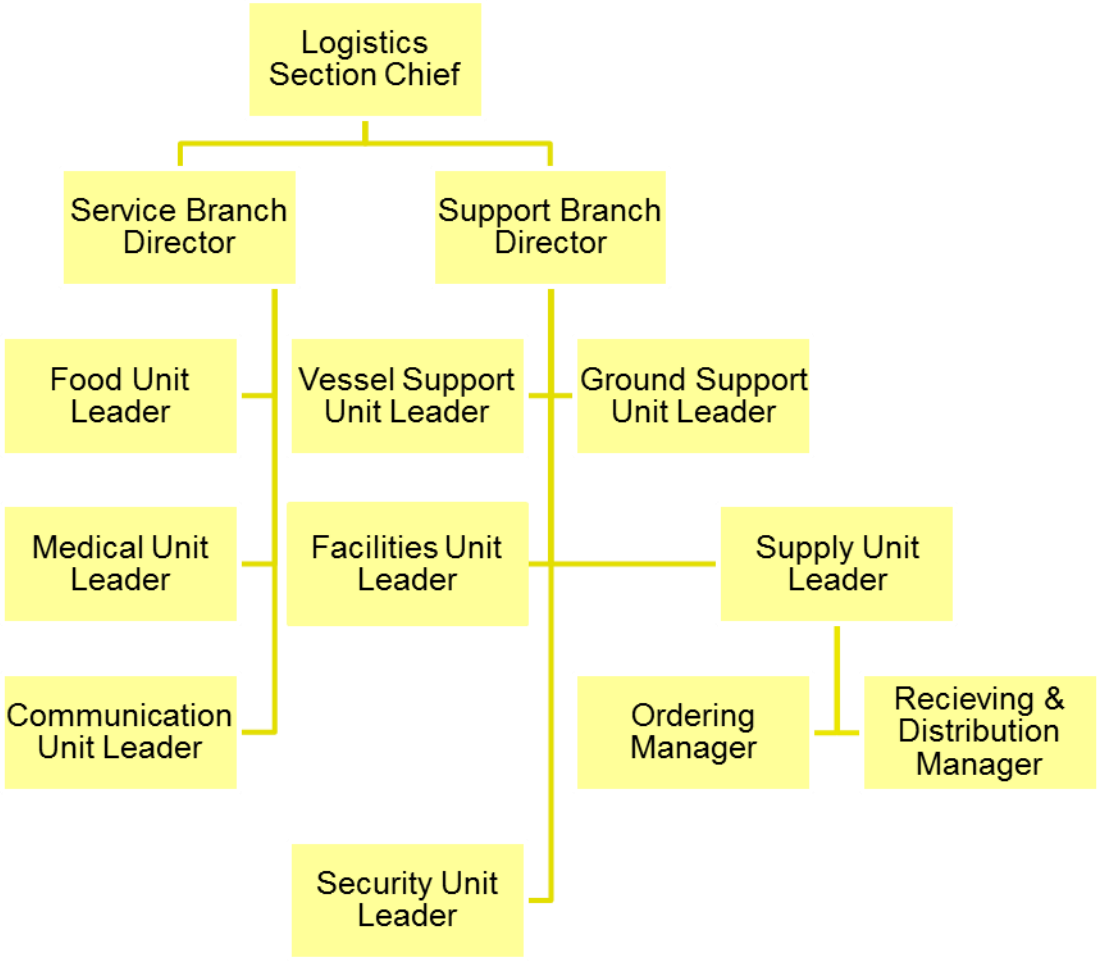
The Approval and Permits Specialist is responsible for providing guidance and establishing permits and special approvals required for environmental response activities and /or waste management. This may include, but is not limited to, items such as decanting approvals, in-situ burning, the use of dispersants, waste manifesting, waste permitting, and/or special operating permits.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Establish an organization to support permitting, as required.

- ☐ Develop a list of potential permits/approvals, and identify what area of the organization may require them.
- ☐ Provide guidance to the Operations Section Chief and the Disposal/Waste Management Technical Specialist on permit requirements.
- ☐ Evaluate the need for decanting approvals with the Operations and Planning Section Chiefs.
- ☐ At the request of the Operations Section, evaluate the need for special approvals / permits for alternative countermeasures, such in-situ burning and/or the use of dispersants in the affected areas.
- ☐ Evaluate and obtain any environmental permits or approvals required for the response operations.
- ☐ Monitor ongoing operations to ensure compliance with all permits and approvals that have been issued.
- ☐ Work closely with the Disposal (Waste Management) Technical Specialist and Disposal Group Supervisor to ensure proper permits are in place for all aspects of waste management.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.0 LOGISTICS SECTION DUTIES

9.1 Logistics Section Organization Chart



9.2 Logistics Section Chief

The Logistics Section Chief, a member of the General Staff, is responsible for providing facilities, services, and material in support of the incident response. The Logistics Section Chief participates in developing and implementing the Incident Action Plan (IAP), and activates and supervises Branches and Units within the Logistics Section.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Emergency Response (Contingency) Plan for the specific area of response for additional duties/special circumstances.
- ☐ Plan organization of Logistics Section.
- ☐ Coordinate travel arrangements for initial response team members if required.
- ☐ Establish and equip an Incident Command Post (ICP) and communicate location to response team.
- ☐ Assign work locations and preliminary work tasks to Section personnel.

- ☐ Notify Resources Unit of Logistics Section units activated, including names and locations of assigned personnel.
- ☐ Assemble and brief Branch Directors and Unit Leaders.
- ☐ Participate in appropriate ICS meetings and Incident Action Plan (IAP) preparation.
- ☐ Assist with the development of the Operational Planning Worksheet (ICS 215).
- ☐ Identify service and support requirements for planned and expected operations.
- ☐ Provide input to, and review, Communications Plan, Medical Plan, Traffic Plan, and Vessel Routing Plan.
- ☐ Coordinate and process requests for additional resources.
- ☐ Review IAP and estimate section needs for the next operational period.
- ☐ Advise on current service and support capabilities.
- ☐ Estimate future service and support requirements.
- ☐ Provide input to Demobilization Plan as required by Planning Section.
- ☐ Recommend release of unit resources in conformance with Demobilization Plan.
- ☐ Ensure general welfare and safety of Logistics Section personnel.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.3 Deputy Logistics Section Chief

The Deputy Logistics Section Chief (if staffed) is responsible for assisting the Logistics Section Chief.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Carry out duties as assigned by LSC (must be capable of assuming LSC duties).
- ☐ Attend appropriate ICS meetings and briefings.
- ☐ Maintain Individual Log (ICS 214a).

9.4 Service Branch Director

The Service Branch Director, when activated, is under the supervision of the Logistics Section Chief, and is responsible for managing all service activities at the incident. The Branch Director supervises the operations of the Communications, Medical, and Food Units.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain working materials from Logistics kit.
- ☐ Determine level of service required to support operations.
- ☐ Confirm dispatch of Branch personnel.
- ☐ Participate in planning meetings of Logistics Section personnel.
- ☐ Review Incident Action Plan.
- ☐ Coordinate activities of Service Branch Units.
- ☐ Inform Logistics Section Chief of activities.
- ☐ Resolve Service Branch problems.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.4.1 Food Unit Leader

The Food Unit Leader, under the direction of the Service Branch Director or Logistics Section Chief, is responsible for determining feeding requirements at all incident facilities, including menu planning, determining cooking facilities required, food preparation, serving, providing potable water, and general maintenance of the food service areas.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from Service Branch Director or Logistics Section Chief.
- ☐ Determine location of working assignment, and number and location of personnel to be fed.
- ☐ Prepare a food plan for the Incident Action Plan that includes all information on the food resources.
- ☐ Determine method of feeding to best fit each situation.
- ☐ Obtain necessary equipment and supplies to operate food service facilities.
- ☐ Set up Food Unit equipment.
- ☐ Prepare menus to ensure incident personnel receive well-balanced meals.
- ☐ Ensure that sufficient potable water is available to meet all incident needs.
- ☐ Ensure that all appropriate health and safety measures are taken.
- ☐ Supervise cooks and other Food Unit personnel.
- ☐ Keep inventory of food on hand and receive food orders.
- ☐ Provide Supply Unit Leader food supply orders.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.4.2 Communications Unit Leader

The Communications Unit Leader, under the direction of the Service Branch Director or Logistics Section Chief, is responsible for developing plans for the effective use of:

- Incident communications equipment and facilities.
- Installing and testing communications equipment.
- Supervising the Incident Communications Center.
- Distributing communications equipment to incident personnel.
- Communications equipment maintenance and repair.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from Service Branch Director or Logistics Section Chief.
- ☐ Determine unit personnel needs. (IT, Radio, Telecom Specialists etc.).
- ☐ Advise on communications capabilities/limitations including but not limited to:
    - radio/telephone communications,
    - wireless and wired internet communications,
    - printing/copying and other IT needs,
    - teleconferencing, video conferencing and video link,
    - local television accessibility,
    - file share location, and
    - emergency response email for internal tracking
- ☐ Prepare and implement the incident Radio Communications Plan (ICS 205).
- ☐ Ensure the Incident Communications Center and Message Center is established.
- ☐ Set up telephone and public address systems.
- ☐ Establish appropriate communications distribution/maintenance locations.

- ☐ Ensure communications systems are installed and tested.
- ☐ Ensure an equipment accountability system is established.
- ☐ Ensure personal portable radio equipment from cache is distributed per radio plan.
- ☐ Provide technical information, as required on:
  - Adequacy of communications systems currently in operation.
  - Geographic limitation on communications systems.
  - Equipment capabilities.
  - Amount and types of equipment available.
  - Anticipated problems in the use of communications equipment.
- ☐ Supervise Communications Unit activities.
- ☐ Maintain records on all communications equipment, as appropriate.
- ☐ Ensure equipment is tested and repaired.
- ☐ Recover equipment from relieved or released units.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.4.3 Medical Unit Leader

The Medical Unit Leader, under the direction of the Service Branch Director or Logistics Section Chief, is primarily responsible for developing the Medical Emergency Plan, obtaining medical aid and transportation for injured and ill incident personnel, and preparing reports and records. The Medical Unit may also assist Operations in supplying medical care and assistance to civilian casualties at the incident, but is not intended to provide medical services to the public.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from Service Branch Director or Logistics Section Chief.
- ☐ Participate in Logistics Section/Service Branch planning activities.
- ☐ Determine level of emergency medical activities performed prior to activation of Medical Unit.
- ☐ Activate Medical Unit.
- ☐ Prepare the Medical Plan (ICS 206) and have it approved by the Safety Officer.
- ☐ Prepare procedures for major medical emergency.
- ☐ Declare major medical emergency, as appropriate.
- ☐ Respond to requests for medical aid.
- ☐ Respond to requests for medical transportation.
- ☐ Respond to requests for medical supplies.
- ☐ Prepare medical reports and submit, as directed.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.5 Support Branch Director

The Support Branch Director, when activated, is under the direction of the Logistics Section Chief, and is responsible for developing and implementing logistics plans in support of the Incident Action Plan, including providing personnel, equipment, facilities, and supplies to support incident operations. The Support Branch Director supervises the operation of the Supply, Facilities, Ground Support, and Vessel Support Units.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain work materials from Logistics kit.
- ☐ Identify Support Branch personnel dispatched to the incident.

- ☐ Determine initial support operations in coordination with Logistics Section Chief and Service Branch Director.
- ☐ Prepare initial organization and assignments for support operations.
- ☐ Determine resource needs.
- ☐ Maintain surveillance of assigned unit work progress and inform Logistics Section Chief of activities.
- ☐ Resolve problems associated with requests from Operations Section.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.5.1 Vessel Support Unit Leader

The Vessel Support Unit Leader is primarily responsible for:

- Coordinating transportation of personnel, supplies, food, and equipment for waterborne resources;
- Fuelling, servicing, maintaining, and repairing vessels and other vessel support equipment; and
- Implementing the Vessel Routing Plan; and
- Supporting out-of-service waterborne resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain a briefing from the Support Branch Director or Logistics Chief.
- ☐ Participate in Support Branch/Logistics Section planning activities.
- ☐ Coordinate Vessel Routing Plan development.
- ☐ Coordinate vessel transportation assignments with the Protection and Recovery Branch or other sources of vessel transportation.
- ☐ Coordinate water-to-land transportation with Ground Support Unit, as necessary.
- ☐ Maintain a prioritized list of transportation requirements to be scheduled with the transportation source.
- ☐ Support out-of-service vessel resources, as requested.
- ☐ Arrange for fuelling, maintenance, and repair of vessel resources, as requested.
- ☐ Maintain inventory of support and transportation vessels.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.5.2 Ground Support Unit Leader

The Ground Support Unit Leader is primarily responsible for:

- Coordinating transportation of personnel, supplies, food, and equipment on land;
- Fuelling, servicing, maintaining and repairing vehicles and other ground support equipment;
- Implementing the Incident Traffic Plan; and
- Supporting out-of-service shoreside resources.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from Support Branch Director or Logistic Section Chief.
- ☐ Participate in Support Branch/Logistics Section planning activities.
- ☐ Coordinate development of the Traffic Plan with the Planning Section.
- ☐ Support out-of-service shoreside resources.
- ☐ Notify Resources Unit of all status changes on support and transportation vehicles.

- ☐ Plan, document and activate, fuelling, maintenance, and repair of ground transportation resources needs.
- ☐ Maintain inventory of support and transportation vehicles (ICS 218).
- ☐ Coordinate transportation services.
- ☐ Maintain usage information on rented equipment.
- ☐ Requisition maintenance and repair supplies (e.g., fuel, spare parts).
- ☐ Coordinate incident road maintenance.
- ☐ Submit reports to Support Branch Director, as directed.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.5.3 Facilities Unit Leader

The Facilities Unit Leader is primarily responsible for the layout and activation of incident facilities (e.g., Base, Camp(s), and Incident Command Post (ICP)). The Facilities Unit provides sleeping and sanitation facilities for incident personnel and manages base and camp operations. Each facility (base or camp) is assigned a manager who reports to the Facilities Unit Leader and is responsible for managing the operation of the facility. The basic functions or activities of the Base and Camp Manager are to provide security service and general maintenance. The Facility Unit Leader reports to the Support Branch Director.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from the Support Branch Director or Logistics Section Chief.
- ☐ Review Incident Action Plan.
- ☐ Participate in Logistics Section/Support Branch planning activities.
- ☐ Determine requirements for each facility to be established.
- ☐ Determine requirements for the ICP.
- ☐ Prepare layouts of incident facilities.
- ☐ Notify Unit Leaders of facility layout.
- ☐ Activate incident facilities.
- ☐ Provide Base and Camp Managers, and support staff to operate facilities.
- ☐ Provide sleeping facilities.
- ☐ Provide security services.
- ☐ Provide facility maintenance services - sanitation, lighting, and cleanup.
- ☐ Demobilize base and camp facilities.
- ☐ Maintain Facilities Unit records.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.5.4 Supply Unit Leader

The Supply Unit Leader is primarily responsible for ordering personnel, equipment and supplies; receiving and storing all supplies for the incident; maintaining an inventory of supplies; and servicing non-expendable supplies and equipment.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain a briefing from the Support Branch Director or Logistics Section Chief.
- ☐ Participate in Logistics Section/Support Branch planning activities.
- ☐ Provide Kits/Go Boxes to Planning, Logistics and Finance Sections.
- ☐ Determine the type and amount of supplies/ resources en route, and communicate details to Staging Area Managers and Resource Unit.

- ☐ Arrange for receiving ordered supplies.
- ☐ Review Incident Action Plan for information on operations of the Supply Unit.
- ☐ Order, receive, distribute, and store supplies and equipment, and coordinate contracts and resource orders with the Finance Section.
- ☐ Receive, and respond to, requests for personnel, supplies, and equipment.
- ☐ Maintain inventory of supplies and equipment.
- ☐ Coordinate service of reusable equipment.
- ☐ Submit reports to the Support Branch Director.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.5.5 Ordering Manager

The Ordering Manager is responsible for placing all orders for supplies and equipment for the incident. The Ordering Manager reports to the Supply Unit Leader.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Obtain necessary agency(s) order forms.
- ☐ Establish ordering procedures.
- ☐ Establish name and telephone numbers of agency personnel receiving orders.
- ☐ Set up filing system.
- ☐ Get names of incident personnel who have ordering authority.
- ☐ Check on what has already been ordered.
- ☐ Ensure order forms are filled out correctly.
- ☐ Place orders expeditiously.
- ☐ Consolidate orders when possible.
- ☐ Identify times and locations for delivery of supplies and equipment.
- ☐ Keep Receiving and Distribution Manager informed of orders placed.
- ☐ Submit all ordering documents to Documentation Unit through Supply Unit Leader before demobilization.
- ☐ Maintain Unit/Activity Log (ICS 214).

9.5.6 Receiving and Distribution Manager

The Receiving and Distribution Manager is responsible for receiving and distributing all supplies and equipment (other than primary resources), and the servicing and repairing of tools and equipment. The Receiving and Distribution Manager reports to the Supply Unit Leader.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Order required personnel to operate supply area.
- ☐ Organize physical layout of the supply area.
- ☐ Establish procedures for operating supply area.
- ☐ Set up filing system for receiving and distributing supplies and equipment.
- ☐ Maintain inventory of supplies and equipment.
- ☐ Develop security requirement for supply area.
- ☐ Establish procedures for operating supply area.
- ☐ Submit reports to Supply Unit Leader.
- ☐ Notify Ordering Manager of supplies and equipment received.
- ☐ Provide necessary supply records to Supply Unit Leader.
- ☐ Maintain Unit/Activity Log (ICS 214).

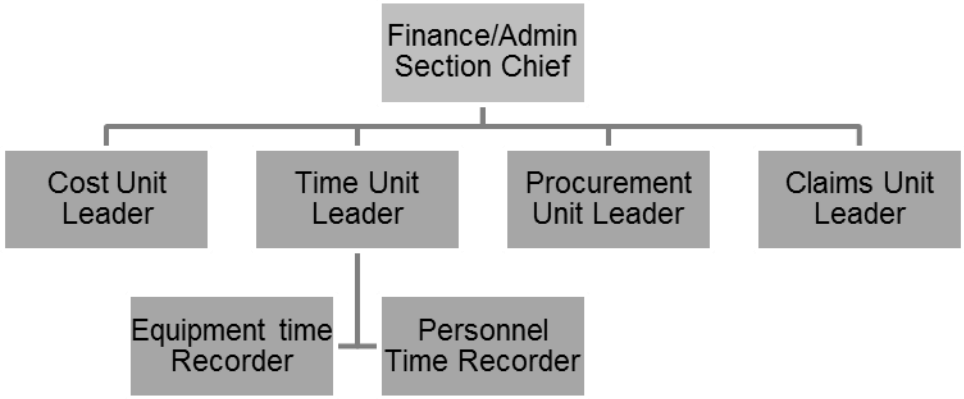
9.5.7 Security Unit Leader

The Security Unit Leader is responsible to provide safeguards for protecting personnel and property from loss or damage.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Establish security for the Incident Command Post, and implement an identification program for incident facilities.
- ☐ Using the Check-in List (Personnel) (ICS 211p), check in/out all incident personnel entering/leaving the ICP, and other incident facilities and forward to the Resource Unit.
- ☐ Establish contacts with local law enforcement agencies, as required.
- ☐ Contact agency representatives to discuss any special custodial requirements which may affect operations.
- ☐ Request required personnel support to accomplish work assignments.
- ☐ Ensure that support personnel are qualified to manage security problems.
- ☐ Develop Security Plan for the incident site and facilities, including staging area, ICP, and any location where personnel are housed.
- ☐ Adjust Security Plan for personnel and equipment changes and releases.
- ☐ Coordinate security activities with appropriate incident personnel.
- ☐ Keep the peace, prevent assaults, settle disputes by coordinating with agency representatives.
- ☐ Prevent theft of company and personal property.
- ☐ Document all complaints and suspicious occurrences.
- ☐ Maintain Unit/Activity Log (ICS 214).

10.0 FINANCE SECTION DUTIES

10.1 Finance Section Organizational Chart



10.2 Finance/Administration Section Chief

The Finance/Administration Section Chief, a member of the General Staff, is responsible for all financial and cost analysis aspects of the incident and for supervising members of the Finance/Administration Section.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Determine Section resource needs.
- ☐ Develop an operating plan for Finance/Administration function on incident.
- ☐ Prepare work objectives for subordinates, brief staff, make assignments, and evaluate performance.
- ☐ Attend briefings/meetings as appropriate to gather information on activities and overall strategy.
- ☐ Utilize information posted on the Incident Status Display for resource and cost monitoring.
- ☐ Participate in appropriate ICS meetings and assist as required with the preparation of the Incident Action Plan.
- ☐ Meet with assisting and cooperating company/ agency representatives, as required.

- ☐ Provide input in all planning sessions on financial and cost analysis matters.
- ☐ Maintain daily contact with company administrative headquarters on finance matters.
- ☐ Ensure that all personnel time records are transmitted to home company according to policy.
- ☐ Participate in all demobilization planning.
- ☐ Ensure that all obligation documents initiated at the incident are properly prepared and completed.
- ☐ Provide cost estimate (burn rate) to Incident Commander/Unified Command as requested
- ☐ Ensure Compensation and Claims numbers are established and the information is distributed via ICS 213 (General Message).
- ☐ Brief company personnel on all incident related business management issues needing attention and follow-up prior to leaving incident.
- ☐ Maintain Unit/Activity Log (ICS 214).

10.3 Deputy Finance/Administration Section Chief

The Deputy Finance Section Chief (if staffed) is responsible for assisting the Finance Section Chief.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Carry out duties as assigned by FSC (must be capable of assuming FSC duties).
- ☐ Attend appropriate ICS meetings and briefings.
- ☐ Maintain Individual Log (ICS 214a).

10.4 Cost Unit Leader

The Cost Unit Leader is responsible for collecting all cost data, performing cost-effectiveness analyses, and providing cost estimates and cost-saving recommendations for the incident.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from Finance/Administration Section Chief.
- ☐ Coordinate with company/agency headquarters on cost-reporting procedures.
- ☐ Obtain and record all cost data.
- ☐ Prepare incident cost summaries.
- ☐ Prepare resource-use cost estimates for Planning.
- ☐ Make recommendations for cost-savings to Finance/Administration Section Chief.
- ☐ Maintain cumulative incident cost records.
- ☐ Ensure that all cost documents are accurately prepared.
- ☐ Complete all records prior to demobilization.
- ☐ Provide reports to Finance/Administration Section Chief.
- ☐ Maintain Unit/Activity Log (ICS 214).

10.5 Time Unit Leader

The Time Unit Leader is responsible for equipment and personnel time records.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from Finance/Administration Section Chief.
- ☐ Determine resource needs.
- ☐ Establish contact with appropriate company/agency personnel/representatives.

- ☐ Organize and establish Time Unit.
- ☐ Establish Time Unit objectives.
- ☐ Ensure that daily personnel and equipment time recording documents are prepared in compliance with time policies.
- ☐ Submit cost estimate data forms to Cost Unit, as required.
- ☐ Provide for records security.
- ☐ Ensure that all records are current or complete prior to demobilization.
- ☐ Release time reports from assisting organizational entities to the respective Representatives prior to demobilization.
- ☐ Brief Finance/Administration Section Chief on current problems, recommendations, outstanding issues, and follow-up requirements.
- ☐ Maintain Unit/Activity Log (ICS 214).

10.5.1 Equipment Time Recorder

Under Supervision of the Time Unit Leader, Equipment Time Recorder is responsible for overseeing the recording of time for all equipment assigned to an incident.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Set up Equipment Time Recorder function in location designated by Time Unit Leader.
- ☐ Advise Ground Support Unit, Vessel Support Unit, Facilities Unit, and Air Support Group of the requirement to establish and maintain a daily record of equipment time reports.
- ☐ Assist units in establishing a system for collecting equipment time reports.
- ☐ Post all equipment time tickets within four hours after the end of each operational period.
- ☐ Prepare a use and summary invoice for equipment (as required) within 12 hours after equipment arrival at incident.
- ☐ Submit data to Time Unit Leader for cost-effectiveness analysis.
- ☐ Maintain current posting on all charges or credits for fuel, parts, services, and commissary.
- ☐ Verify all time data and deductions with equipment owners/operators.
- ☐ Complete all forms according to company/agency specifications.
- ☐ Close out forms prior to demobilization.
- ☐ Distribute copies per company/agency and incident policy.
- ☐ Maintain Unit/Activity Log (ICS 214).

10.5.2 Personnel Time Recorder

The Personnel Time Recorder reports to the Time Unit Leader and records personnel information.

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Establish and maintain a file for personnel time reports within the first operational period.
- ☐ For each operational period, initiate, gather, or update a time report from all applicable personnel assigned to the incident.
- ☐ Verify that all personnel identification information is correct on the time report.
- ☐ Post personnel travel and work hours, transfers, promotions, specific pay provisions, and terminations to personnel time documents.
- ☐ Ensure that time reports are signed.
- ☐ Close out time documents prior to personnel leaving the incident.
- ☐ Distribute all time documents according to company/agency policy.
- ☐ Maintain a log of overtime hours worked and give to Time Unit Leader daily.
- ☐ Maintain Unit/Activity Log (ICS 214).

10.6 Procurement Unit Leader

The Procurement Unit Leader is responsible for administering all financial matters pertaining to vendor contracts, leases, and fiscal agreements. The major responsibilities of the Procurement Unit are:

- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Review incident needs and any special procedures with Unit Leaders, as needed.
- ☐ Coordinate with local agencies on plans/suppliers.
- ☐ Obtain the Incident Procurement Plan.
- ☐ Prepare and authorize contracts and land-use agreements.
- ☐ Draft memoranda of understanding as necessary.
- ☐ Establish contracts and agreements with supply vendors.
- ☐ Provide for coordination between the Ordering Manager, agency dispatch, and all other procurement organizations supporting the incident.
- ☐ Ensure that a system is in place that meets agency property management requirements.
- ☐ Ensure proper accounting for all new property.
- ☐ Interpret contracts and agreements; resolve disputes within delegated authority.
- ☐ Coordinate with the Claims Unit for processing claims.
- ☐ Coordinate use of impress funds, as required.
- ☐ Complete final processing of contracts and send documents for payment.
- ☐ Coordinate cost data in contracts with the Cost Unit Leader.
- ☐ Brief the Finance/Administration Section Chief on current problems and recommendations, outstanding issues, and follow-up requirements.
- ☐ Maintain Unit/Activity Log (ICS Form 214).

10.7 Claims Unit Leader

The Claims Unit Leader is responsible for the overall management and direction of all administrative matters pertaining to Compensation-For-Injury and claims-related activity for an incident.

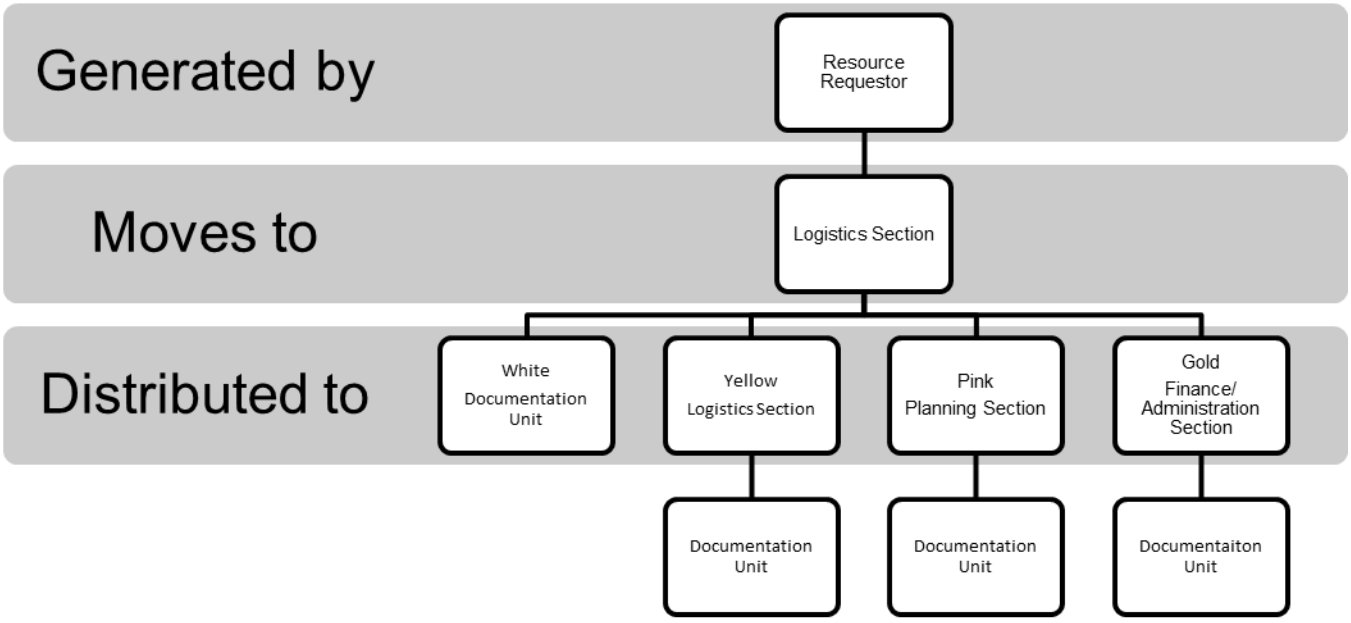
- ☐ Review Common Responsibilities (Section 5.1 Common Responsibilities).
- ☐ Review Unit Leader Responsibilities (Section 5.2 Unit Leader Responsibilities).
- ☐ Obtain briefing from Finance/Administration Section Chief.
- ☐ Establish contact with Safety Officer, Information Officer Liaison Officer and Company/Agency Representatives.
- ☐ Determine the need for Compensation for Injury and Claims Specialists and order personnel, as needed.
- ☐ If possible, collocate Compensation-for-Injury work area with the Medical Unit.
- ☐ Obtain a copy of the Incident Medical Plan.
- ☐ Coordinate with Procurement Unit on procedures for handling claims.
- ☐ Periodically review documents produced by subordinates.
- ☐ Obtain Demobilization Plan and ensure that Compensation-for-Injury and Claims Specialists are adequately briefed on Demobilization Plan.
- ☐ Ensure that all Compensation-for-Injury and Claims documents are up to date and routed to the proper company/agency.
- ☐ Establish procedures for handling claims and coordinate with Legal Officer and Finance Section Chief.

- ☐ Establish a phone number for the receipt of third party claims. Provide this number to the Situation Unit Leader for display in the Incident Command Post (ICP) and Joint Information Centre (JIC)/Public Information Office (PIO) for release to the public.
- ☐ Keep Legal Officer and Incident Commander informed of the nature and numbers of claims received, and status of negotiations with claimants.
- ☐ Keep Finance Section Chief briefed on level of expenditures.
- ☐ Negotiate settlements with claimants.
- ☐ Establish contact periodically with Safety Officer, Information Officer, and Liaison Officer.
- ☐ Brief Unit personnel on incident activities.
- ☐ Maintain Unit/Activity Log (ICS 214).

11.0 PROCEDURES AND TOOLS

11.1 Resource Request Process

- ☐ All Resource Requests will be complete using a 4 part Purchase Order Form. Ensure you are pressing hard enough that all 4 copies are readable.
- ☐ A Section Chief (or Deputy) MUST sign off on the form before it is submitted.
- ☐ Any single order over the spending limit imposed by the Incident Commander will be signed off by the Kinder Morgan Incident Commander.
- ☐ All 4 parts of the form are to be given to the Logistics Section who will then order and track the items. Logistics will then distribute the forms as follows;
    - White – Documentation Section
    - Yellow – Planning Section (Resource Unit)
    - Gold – Finance/Administration Section
    - Pink – Logistics Section
- ☐ If using the electronic version of the form 4 copies must be printed and highlighted for the destination of each form in the lower right box of the form.
- ☐ When each section is done with the form, the form will be given to Documentation to be attached to the original document.



11.2 Incident Facilities

Only those facilities needed for any given incident will be activated.

11.2.1 Incident Command Post (ICP)

The Incident Command Post, or ICP, is the location from which the Incident Commander(s) oversees all incident operations. There is only one ICP for each incident or event. Every incident or event must have some form of an Incident Command Post. The area specific Emergency Response (Contingency) Plans list potential locations for the ICP for each area Kinder Morgan operates. Some common requirements for an effective ICP are:

- The ICP should be large enough to provide adequate working room for assigned personnel.
- The ICP should contain situation and resource status displays necessary for the incident, and other information necessary for planning purposes and be marked by a banner, sign or green light.
- Agency Reps are normally located at the ICP.
- Position outside of the present and potential hazard zone.
- Have the ability to expand as the incident grows.
- Have the ability to provide security and to control access to the ICP as necessary.
- Announce ICP activation and location via radio or other communication so all appropriate personnel are notified.

11.2.2 Staging Areas

Staging Areas are temporary locations at an incident where personnel and equipment are kept while waiting for tactical assignments. Staging Areas should be located close enough to the incident for a timely response, but far enough away to be out of the immediate impact zone. There may be more than one Staging Area at an incident. Each Staging Area will have a Staging Area Manager who reports to the Operations Section Chief. Kinder Morgan maintains Control Point manuals for all operations, the Control Points manuals outline locations for access and potential staging areas.

11.2.3 Base

A Base is the location from which primary service and support activities, such as feeding and resupply, are performed. Not all incidents will have a Base. There will be only one Base per incident.

11.2.4 Camp

A Camp is a temporary location within the general incident area which is equipped and staffed to provide sleeping, food, water and sanitary services to incident personnel. There may be one or more camps, and different types of camps, depending on the needs of the incident.

11.2.5 Helibase

A Helibase is the location from which helicopter-centered air operations are conducted. Helibases are generally used on a more long-term basis and include such services as fuelling and maintenance.

11.2.6 Helispots

Helispots are more temporary facilities used for loading and unloading personnel and cargo. Large incidents may require more than one Helibase and several Helispots.

11.3 Incident Resources

ICS resources can be factored into two categories:

- **Tactical Resources** are personnel and major items of response equipment available or assigned to the Operations Section. They are the primary concern to the Resources Unit
- **Support Resources** include all other resources required to support the incident.

Resources are described by two terms; **kind** and **type**.

- The **kind of resource** describes what the resource is. For example helicopter, shoreline crew, tank truck and bulldozer, are all kinds of resources.
- The **type of resource** describes a capability for that kind of resource. Many tactical resources, such as helicopters, will have a wide variety of capabilities and uses. The various kinds of resources used for ICS applications should be “typed” whenever possible.

11.4 Resource Status Conditions

All tactical resources at an incident will be assigned to one of the three following status conditions:

- **Assigned:** Assigned resources are working on an assignment under the direction of a Supervisor.
- **Available:** Available resources are assembled, have been issued their equipment, and are ready for deployment. Available resources are located at one of the staging areas.
- **Out-of-Service:** Out-of-service resources are not ready for available or assigned status.

When a resource status changes, or changes location an ICS 210 Status Change form should be completed to record the change.

11.5 Utilizing/Organizing Resources

There are three ways of organizing resources at an incident:

11.5.1 Single Resources

Single Resources are individual personnel, single pieces of equipment (with or without operator), or a crew of individuals with an identified work supervisor. A single resource is often the most common way of using initial resources on an incident.

11.5.2 Task Forces

Task Forces are any combination and number of single resources (within span-of-control limits) assembled for a particular tactical need. Task Forces may be:

- A mix of different kinds of resources.
- The same kind but different types of resources.

11.5.3 Strike Teams

Strike Teams consist of resources that are of the same type and kind. They are a good way to organize multiple Single Resources that share the same characteristics.

11.6 Incident Status Display

The collection and display of information about an incident and the nature and status of response operations is a critical aspect of establishing and maintaining a command and control environment and it should promote effective and efficient communications. Ideally, pre-designed status boards should be used for display to ensure that critical information is captured and presented in a clear and logical fashion.

Status boards that depict information that is of use to two or more Sections in an Incident Command Post should be grouped together in an area called the Incident Situation Display. The Incident Situation Display should be the one place in an Incident Command Post where anyone can go, at any time, to learn about the nature and status of an incident and response operations. It should include the most complete and current information available.

Status boards in the Incident Situation Display should be limited in number and should be displayed in an ordered fashion to ensure that they impart an integrated and coherent message concerning: (1) the incident (e.g., nature and location of source, status of source, type and quantity of material spilled or emitted, and the environmental conditions affecting the response); and (2) the nature and status of response operations to address the incident.

An Incident Situation Display should be established and maintained by the Situation and Resources Unit Leaders. It should be situated in a highly visible and easily accessible location, in close proximity to both the Planning and Operations Sections.

Since it is an active work area, it should be located away from areas subject to heavy foot traffic.

Although an Incident Situation Display is established and maintained by personnel in the Planning Section, it belongs to everyone in the ICS. To the extent the Incident Situation Display contains information about activities underway in other Sections, it is the obligation of appropriate personnel in those Sections to work with Planning to ensure information posted in the Incident Situation Display is accurate and up-to-date. It is likewise the responsibility of the status board monitors within the Situation Unit to seek out sources and establish paths and schedules for needed information.

As time allows, black-and-white versions of the status board information should be prepared. These documents should be time-stamped and distributed within the ICP and/or remotely, and copies may be made available at Incident Situation Display.

11.6.1 Incident Status Display Contents

The Incident Status Display (ISD) may be a combination of poster size documents on a wall/easel and/or display board, and should contain the following:

- ☐ **Weather, Tides & Currents**
  - Source: Weather Observer or Internet
  - Frequency: ASAP, at least every 3 hours thereafter, or as required.
  - Distribution: Documentation Unit, ISD, Operations Planning Section Chief, copy for Tactics and Planning meetings
- ☐ **Initial Incident Information Sheet/ Incident Report**
  - Source: Control Room, KM Duty Person, Initial Incident Commander
  - Frequency: Once initially, copies ongoing
  - Distribution: Documentation Unit, ISD, Legal, Incident Commander

☐ **Incident Briefing Form - ICS 201**

Description	Provides the Command and General Staff positions with the initial response information, including an incident name and description, objectives, a situation map, active resources, actions underway, current organization in place, and resources needed.
Source	Prepared by the Initial Incident Commander.
Frequency	Prepared once in the initial stages of activation and can be used as an operations plan until the first Incident Action Plan is in place.
Distribution	Documentation Unit, ISD, Command Staff, and General Staff and their organizations as they choose.

☐ **Incident Objectives/Strategies - ICS 202**

Description	Prepared by the Planning Section Chief outlining the initial objectives from the Unified/Incident Commander, and revised after each Planning Meeting. Provides the basic strategy, objectives and safety considerations for the next Operational Period.
Source	Planning Section Chief
Frequency	Initially with Unified/Incident Commander and then by Planning Section Chief after each Planning Meeting.
Distribution	Documentation Unit, Section Chiefs, and all section supervisory personnel.

☐ **Organization Chart - ICS 207**

Description	Prepared by the Resources Unit with the assistance of the Planning Section Chief. Describes active ICS elements and personnel staffing the positions.
Source	Resources Unit Leader. ICS 207 is usually developed from ICS 203 - Organization Assignment List.
Frequency	Initial activation phase and as organizational changes take place.
Distribution	Documentation Unit, ISD, and latest version with IAP.

☐ **Incident Radio Communications Plan - ICS 205 and Communications List – ICS205a**

Description	Prepared by Communications Unit Leader. ▪ 205 – Provides the radio frequency/channel allocations down to the Division/Group level. ▪ 205a – Provides telephone and other contact information for all personnel active in the incident.
Source	Communications Unit Leader
Frequency	ASAP in initial response phase, at the beginning of every Operational Period and as required by an organizational change.
Distribution	Documentation Unit, Complete distribution within Incident Command, ISD, attached to each IAP.

☐ **Site Specific Safety and Health Plan**

Description	Prepared by the Safety Officer as soon as possible to ensure the safety of all personnel associated with the incident.
Source	Safety Officer
Frequency	ASAP after initial response. Updated and re-issued with each IAP.
Distribution	Documentation Unit, Command and General Staff, ISD,
Note	Ensure distribution of copies to all supervisory personnel at the Section, Branch, Division, group, and Unit Leader levels.

☐ **Incident Status Summary (ICS 209)**

Description	Prepared by Situation Unit and provides the basic information to Command and General Staff for planning the next Operational Period. Acts as a common summary of the incident for all parties.
Source	Resource Unit, Operations Section, Planning Section and others.
Frequency	Prepared prior to each Planning Meeting or on request by Planning Section Chief or Incident Commander.
Distribution	Documentation Unit Leader, Incident Commander, General Staff, Information Officers, ISD, attached to each IAP, as requested.
Note	It is critical that the ICS 209 be commenced as soon as possible and be maintained accurately throughout.

☐ **Daily Meetings Schedule (ICS 230)**

Description	Prepared by Situation Unit Leader in conjunction with Planning Section Chief. Outlines planned meetings, purpose, suggested attendees and scheduled times.
Source	Situation Unit Leader and Planning Unit Leader
Frequency	Initially and as schedule changes.
Distribution	Documentation Unit, Command and General Staff, ISD, all suggested attendees listed.

☐ **Meeting Summary (ICS 231)**

Description	Prepared by the administrative assistant to the facilitator of each meeting.
Source	Administrator and/or facilitator of each meeting.
Frequency	Following each meeting. Situation Leader should contact meeting facilitator if not supplied.
Distribution	Documentation Unit, meeting attendees, ISD

☐ **Trajectory Model**

Description	Prepared by the Modeling Technical Specialist. Develops computer model that forecasts the location, fate and effects of the spill, based on currents, winds, tides, and oil properties.
Source	Modeling Specialist running OilMapTM or other suitable trajectory software.
Frequency	ASAP in the initial response phase and before every tactics and/or planning meeting.
Distribution	Documentation Unit, ISD, Planning and Operations Section Chief.

☐ **Resources at Risk Summary (ICS 232)**

Description	The Resources at Risk Summary provides information about sites in the incident area which are sensitive due to environmental, archaeo-cultural, or socio-economic resources at risk, and identifies incident-specific priorities and issues.
Source	The Environmental Unit Leader, with input from REET, will complete this form for each Operational Period. It should be updated prior to the Planning Meeting.
Frequency	ASAP during the initial response, and before each planning meeting for the next Operational Period.
Distribution	Documentation Unit, Planning Section Chief, OPC, Information Officer, ISD, may be attached to IAP.

☐ **Media Releases**

Description	Prepared by Information Officer in conjunction with the Incident Commander, Unified Command or Joint Information Centre (JIC).
Source	Information Officer
Frequency	Determined by Information Officer in consultation with Incident Command.
Distribution	Documentation Unit, ISD, Command Staff and General Staff

☐ **Overflight Map**

Description	Prepared by the field observer reporting to Situation Unit Leader. Relates latest visual status of incident to Situation Unit Leader for analysis and display.
Source	Field Observer or Operations Section Chief
Frequency	ASAP in initial response phase, and scheduled updates to meet the planning meeting and IAP development.
Distribution	Documentation Unit, ISD, Situation Unit leader, Planning Section Chief, IAP attachment.

☐ **Situation Map**

Description	Prepared by Situation Unit Leader and Planning Section Chief to display the latest information on the incident and resources locations.
Source	Situation Unit Leader, with input from Section Chiefs, Resource Unit Leader, observers, and mapping specialists.
Frequency	ASAP in initial response phase and before each tactics & planning meeting.
Distribution	Documentation Unit, ISD, Section Chiefs, attached to IAP.

☐ **Division Map**

Description	Prepared by Situation Unit Leader/Mapping/GIS Technical Specialist to display the latest information on the geographical breakdown of operational divisions and groups.
Source	Situation Unit Leader, with input from Operations Section Chief
Frequency	Commenced ASAP in initial response phase by Operations Section Chief. Updated before each tactics & planning meeting.
Distribution	Documentation Unit, Command, ISD, Section Chiefs, attached to IAP.

☐ **General Information**

Description	Prepared by Situation Unit Leader to display general information not otherwise captured on the Incident Status Display. At the very least, it will show the current level of emergency.
Source	As required
Frequency	As required
Distribution	ISD

☐ **Fate and Effects Models**

Description	Prepared by the Modeling Technical Specialist to display the latest mass balance information and predictions.
Source	Modeling Technical Specialist running NOAA's ADIOS program and/or other models.
Frequency	ASAP in initial phase and as new information becomes available.
Distribution	Documentation Unit, ISD, and Section Chiefs.

☐ **Incident Action Plan (IAP)**

Description — The Incident Action Plan (IAP) contains general control objectives reflecting the overall incident strategy and specific action plans for the next Operational Period. When all attachments are included, the plan:

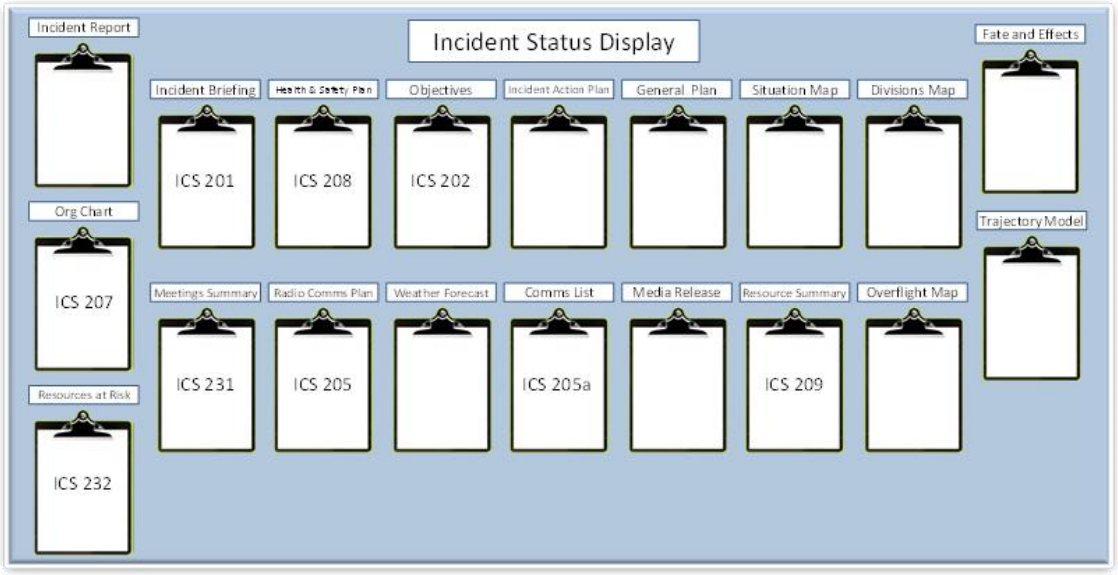
- Specifies objectives for the next Operational Period.
- Defines the work assignments (ICS204s) for the next Operational Period, including extracts of site-specific safety messages (Note: the Site Safety Plan is generally a stand-alone document and is not included in the IAP).
- Defines resources needed to accomplish the plan.
- Depicts how response personnel will be organized.
- Lists radio and telephone communications for all incident personnel.
- Specifies a medical plan to follow in case of a responder emergency.
- Identifies resources at risk.

Source — The Planning Section compiles the IAP, with input and assistance from the Operations Section. The Plan is to be completed following each Planning Meeting. The Plan should be approved and signed by each member of the Unified Command.

Frequency — ASAP following the initial response phase and once every Operational Period thereafter.

Distribution — Sufficient copies of the IAP will be reproduced and distributed to all supervisory personnel at the Section, Branch, Division/Group, and Unit Leader levels. The original IAP MUST be given to the Documentation Unit.

11.6.2 Incident Status Display Layout



11.7 Situation Map Contents

Depending on the incident specifics, listed here are types of information/sites that may need to be displayed on the situation map.

- ☐ Response Resources:
  - Boom
  - Oil Spill Response Vessels
  - Skimmers
  - Storage Tanks/Barges
  - Task Forces/Strike Teams
  - Division/Group Assignments
- ☐ Facilities:
  - Incident Command Post
  - Incident Base
  - Staging Areas
  - Camps (Lodging)
  - Transport Center
  - Medical Facilities
  - Decon Stations
  - Helibase/Helispot
- ☐ Response Sites:
  - Environmental Sites
  - Socio-Economic Sites
  - Historical/Cultural Areas
  - Hazardous Areas
  - Intakes/Outfalls
- ☐ Public Facilities:
  - Marinas
  - Schools
  - Hospitals/Nursing Homes
  - Boat Ramps
  - Parks
  - Roadblocks/Detours
- ☐ Consistent symbology between maps
- ☐ Accurate Legend that includes all items on the map
- ☐ Arial Photography/Satellite Imagery, if available
- ☐ Data returned from the field including GPS data

11.8 Emergency Response (Contingency) Plans

Kinder Morgan Canada had a number of Emergency Response (Contingency) Plans for its pipelines and facilities. The area specific plans describe the types of emergencies, response strategies, tactics, health and safety, local response organizations, regulatory requirements and additional duties for each responder that may be required specific to the operating area. It is important for each responder to check the plan for any detailed information that may be required during an emergency, or information that could be useful during an emergency, such as environmentally sensitive areas, routing, facility layout, regulatory contacts, etc. The plans that Kinder Morgan Canada currently maintains are:

- Trans Mountain Pipeline Emergency Response Plan
- Terminals and Tank Farms Emergency Response Plan
    - Including Edmonton Terminal, Kamloops Station, Burnaby Terminal, Sumas Tank Farm
- Westridge Marine Terminal Emergency Response Plan
- Trans Mountain Pipeline (Puget Sound) Emergency Response Plan
- Jet Fuel Pipeline Emergency Response Plan

11.9 Field Guides/Control Point Manuals

In addition to the Emergency Response (Contingency) Plans KMC maintains Field Guides which shows the pipeline routing information, along with Control Point Locations. Control Points are predetermined access locations for either staging, access to specific sites for response, or both. The Trans Mountain Pipeline Field Guide does not contain the Control Point information; this is found in a Control Point Manual. The Field Guide for Puget Sound Pipeline does contain the Control Point information. Westridge Terminal does not require a Field Guide/Control Point Manual; this information can be found within the Emergency Response Plan. The Jet Fuel Pipeline does not have a Field Guide or a Control Point Manual; the information is found within the Emergency Response Plan.

11.10 Media Briefing Tips

- ☐ Prepare. Know the facts. Develop 2-3 key messages and deliver them. Anticipate tough questions. If possible, try to get an idea of subjects and direction of the interview.
- ☐ Be concise. Give 10-20 second, simple answers, and when you're done, be quiet.
- ☐ Be honest, personable, professional, presentable (remove sunglasses and hats).
- ☐ Look at the reporter, not the camera.
- ☐ Ensure media are escorted and wearing PPE when going to hazardous sites.
- ☐ Ensure local Public Affairs office is aware of media visits.
- ☐ NEVER talk "off the record," exaggerate, or try to be cute or funny.
- ☐ DON'T guess or speculate or say "no comment." Either explain why you can't answer the question or offer to track down the answer.
- ☐ DON'T disagree with the reporter. Tactfully and immediately clarify and correct the information.
- ☐ DON'T speak for other agencies or offices; or use jargon or acronyms.

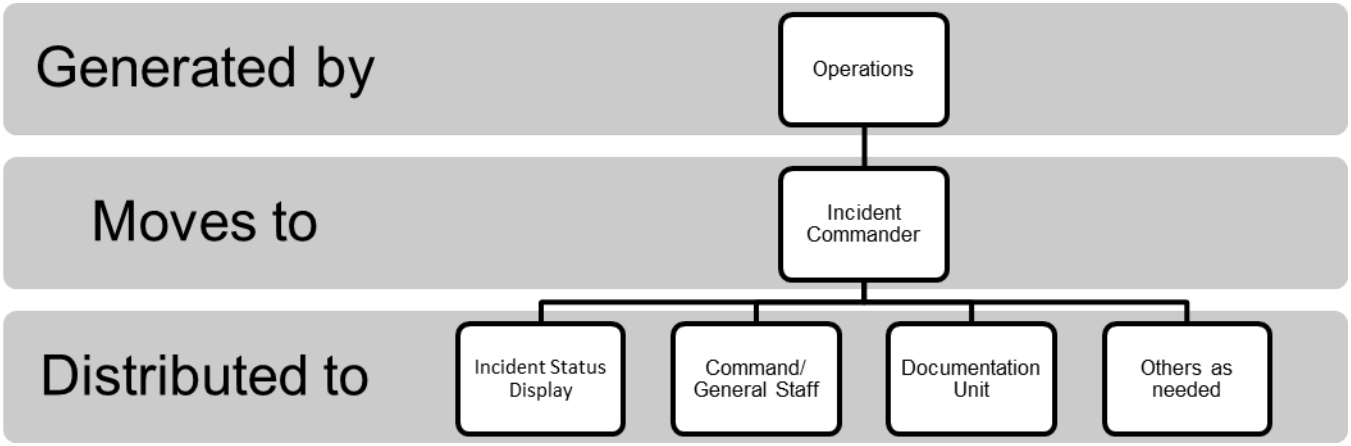
Note: only authorized individuals may speak to the media, and must be media trained.

11.11 ICS Forms

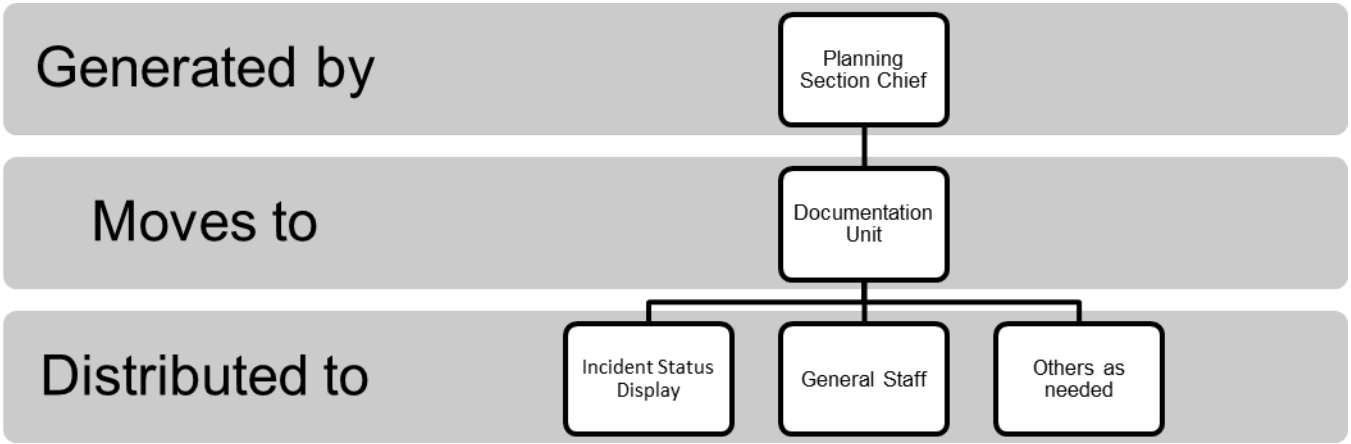
There are a number of ICS forms and KMC specific incident forms. These forms can be located in hardcopy inside the Documentation Go-box or in digital format at: http://kmonline/business_units/KMC/Pages/EHS_Emergency_Response.aspx or in E:\Manuals\EHS\Emergency Response\ICS Forms. They will also be available in the Go-box in digital form on a USB key.

11.12 ICS Form Distribution/Flow

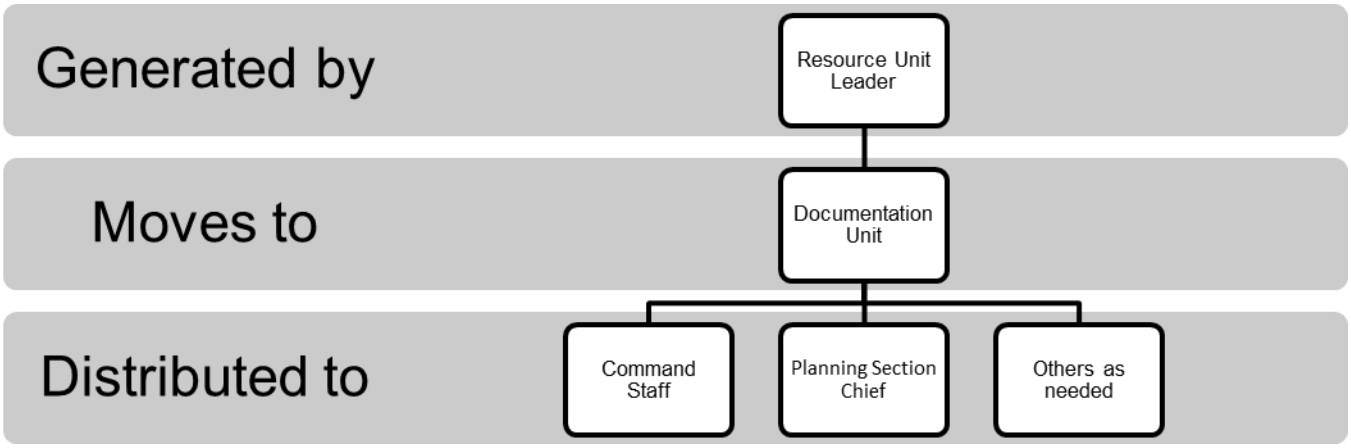
11.12.1 ICS 201 – Incident Briefing



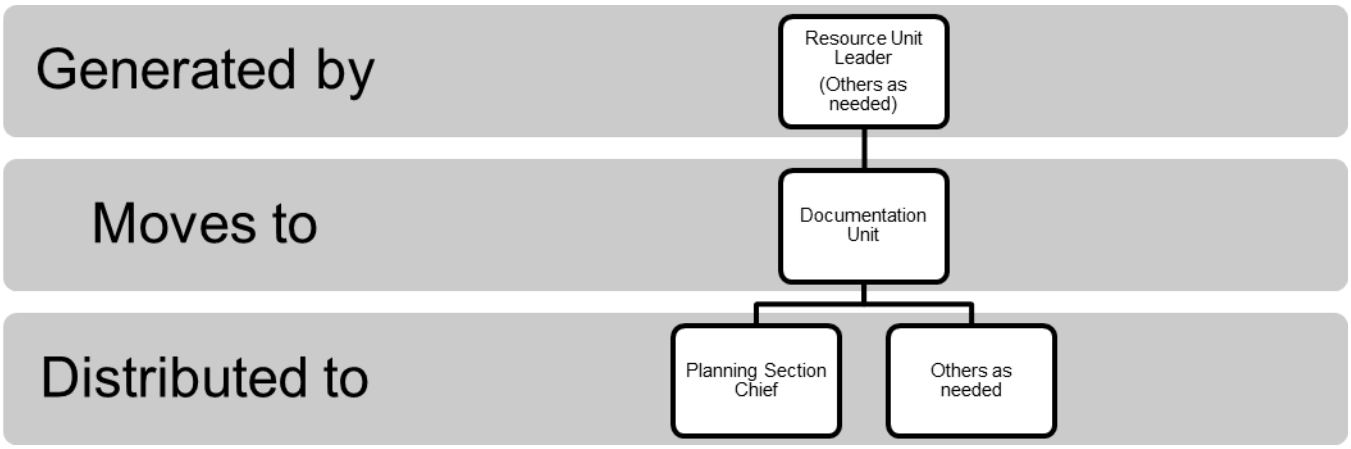
11.12.2 ICS 202 – Incident Objectives



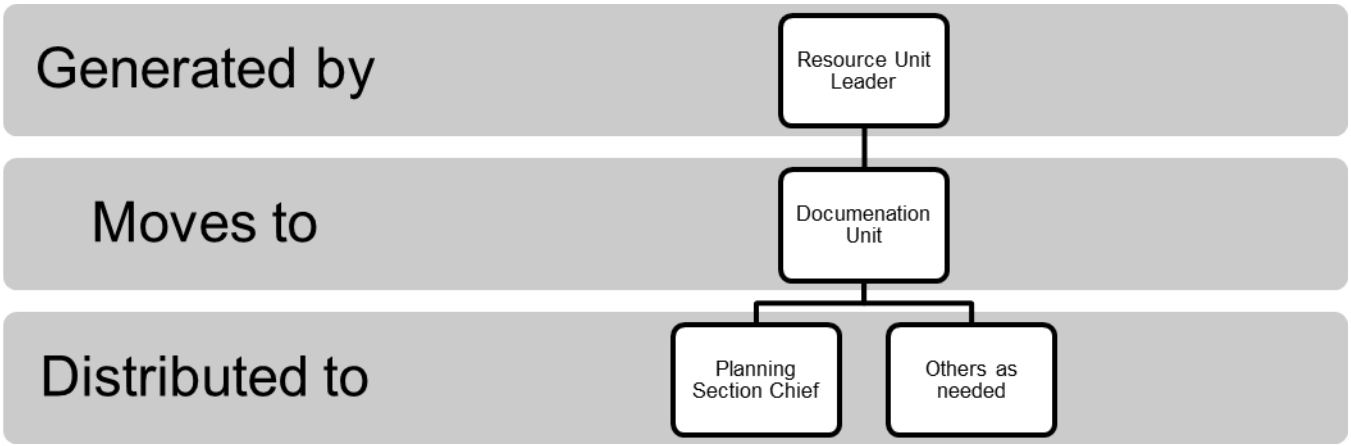
11.12.3 ICS 203 – Organization Assignment List



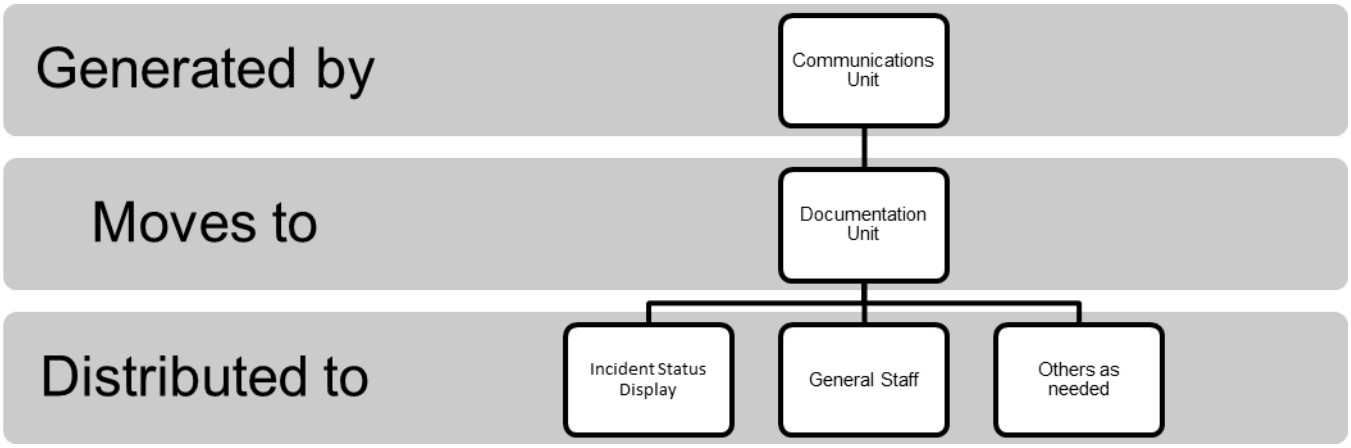
11.12.4 ICS 204 – Assignment List



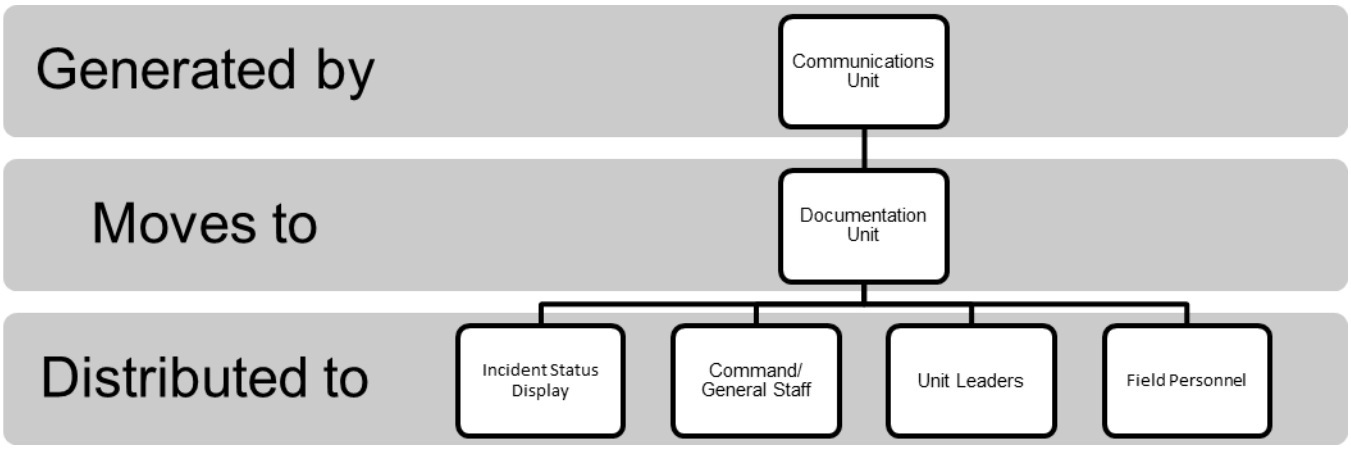
11.12.5 ICS 204a – Assignment List Attachment



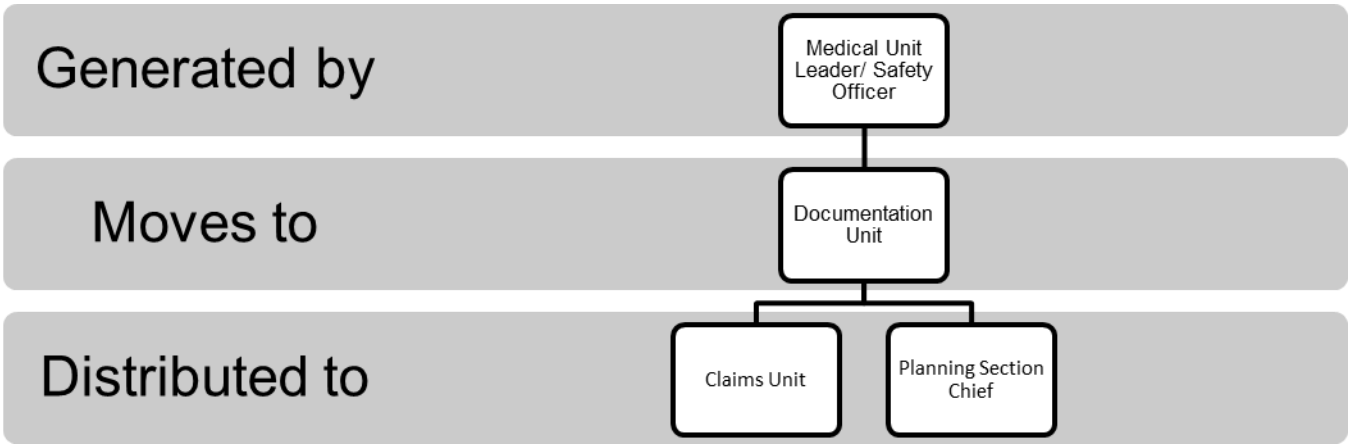
11.12.6 ICS 205 – Incident Radio Communication Plan



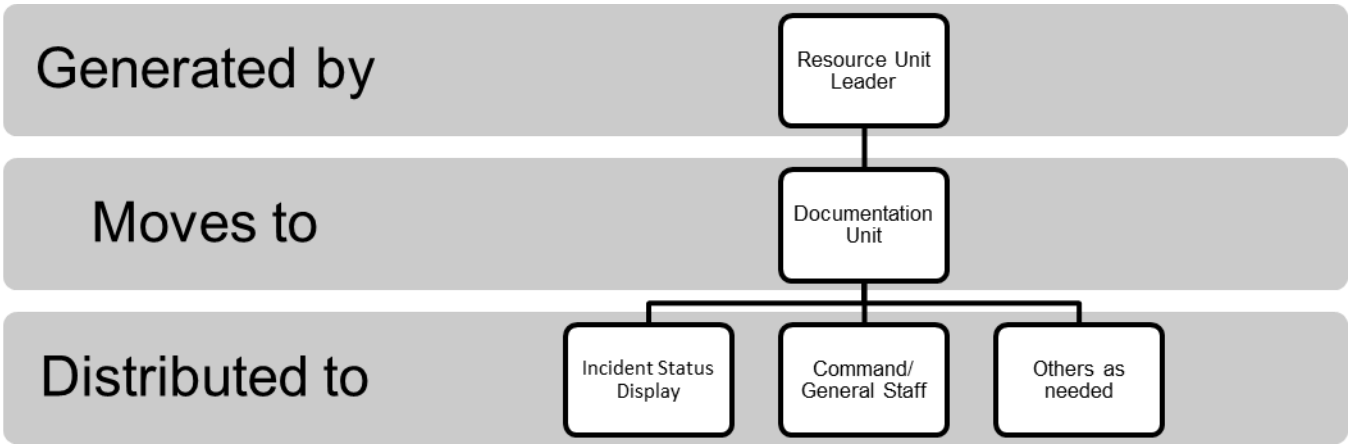
11.12.7 ICS 205a – Communications List



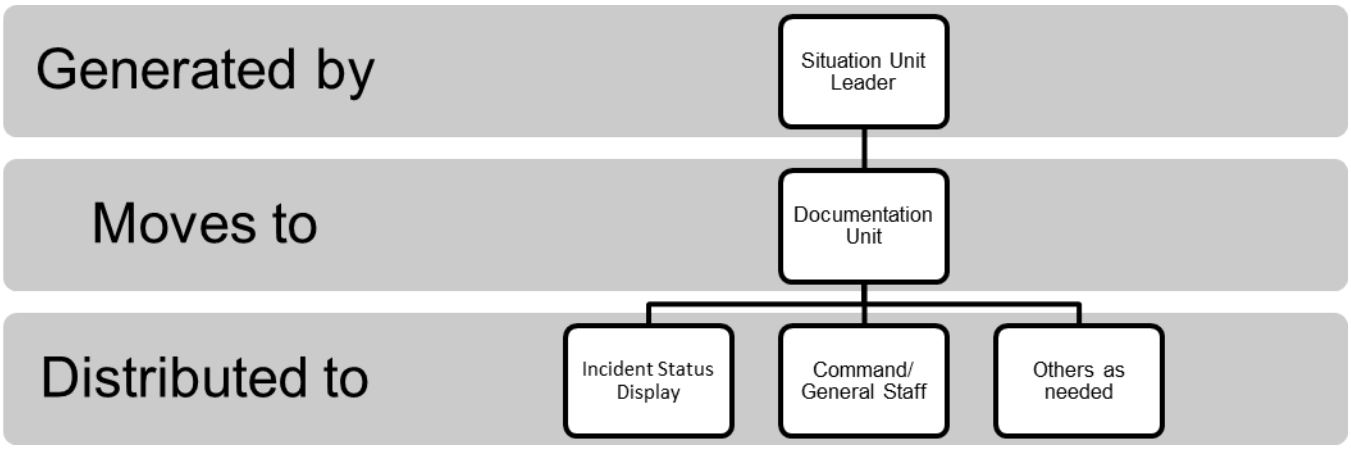
11.12.8 ICS 206 – Medical Plan



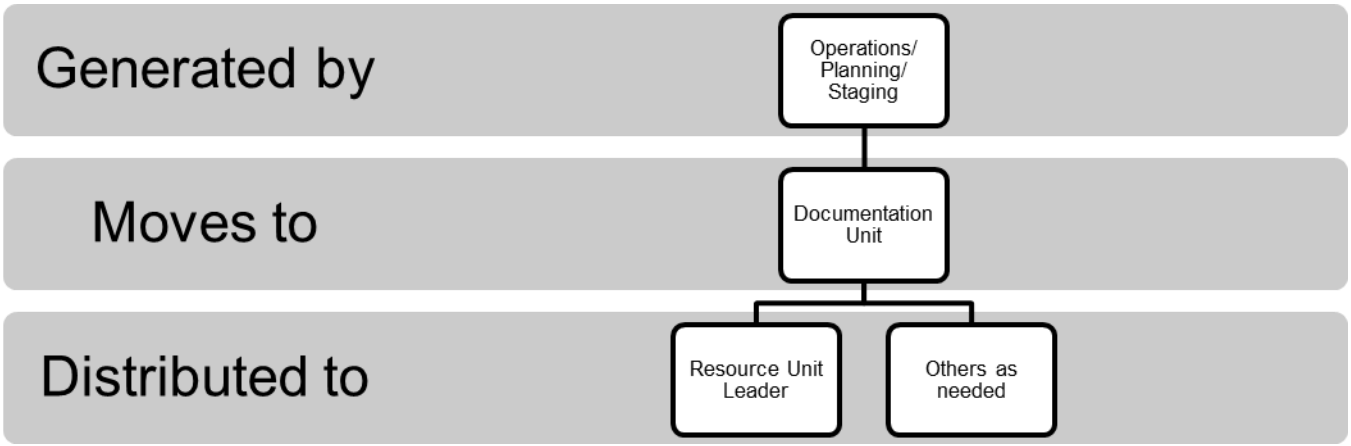
11.12.9 ICS 207 – Incident Organization Chart



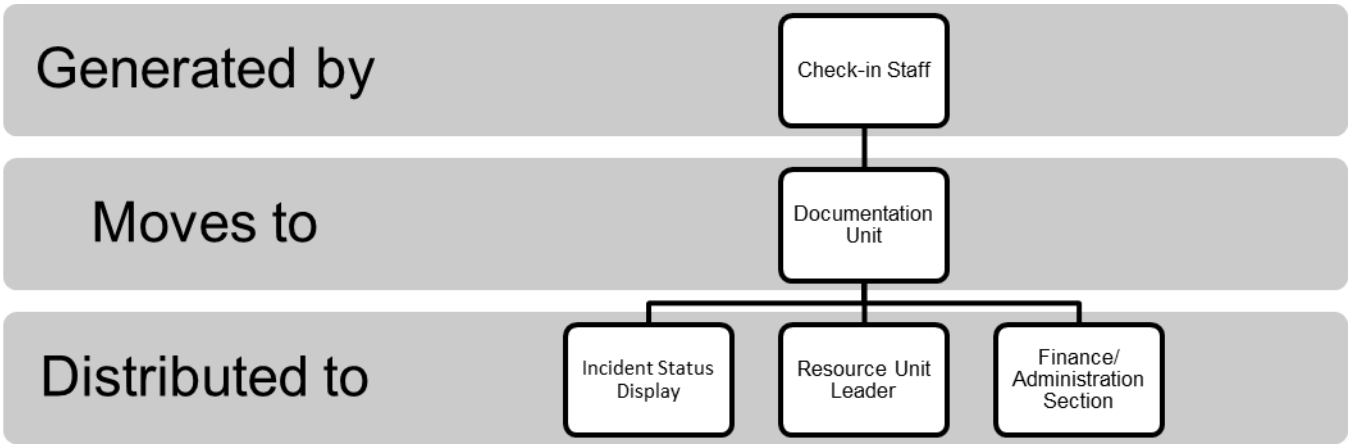
11.12.10 ICS 209 – Incident Status Summary



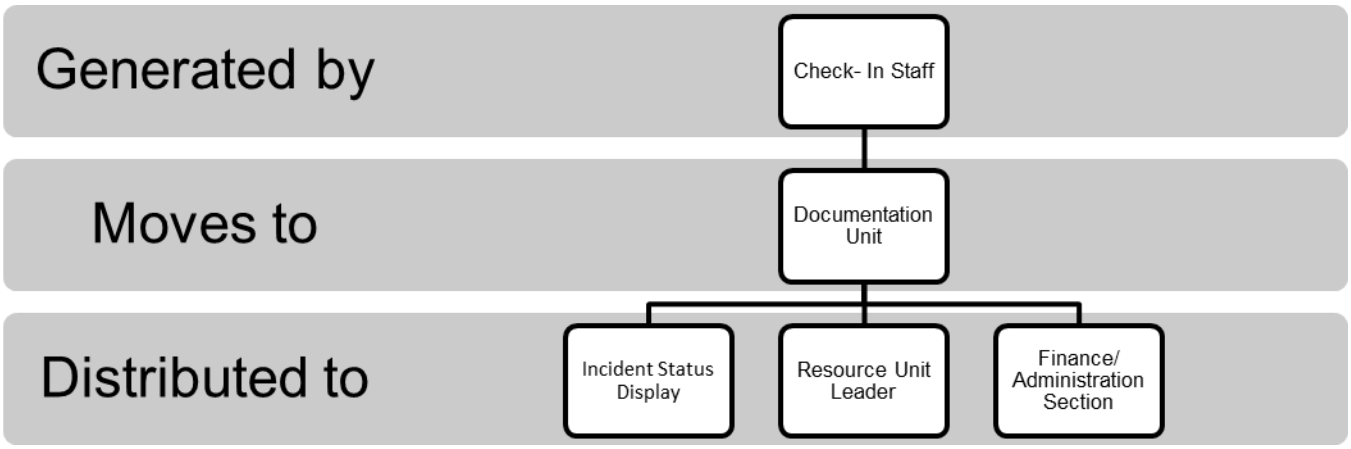
11.12.11 ICS 210 – Status Change



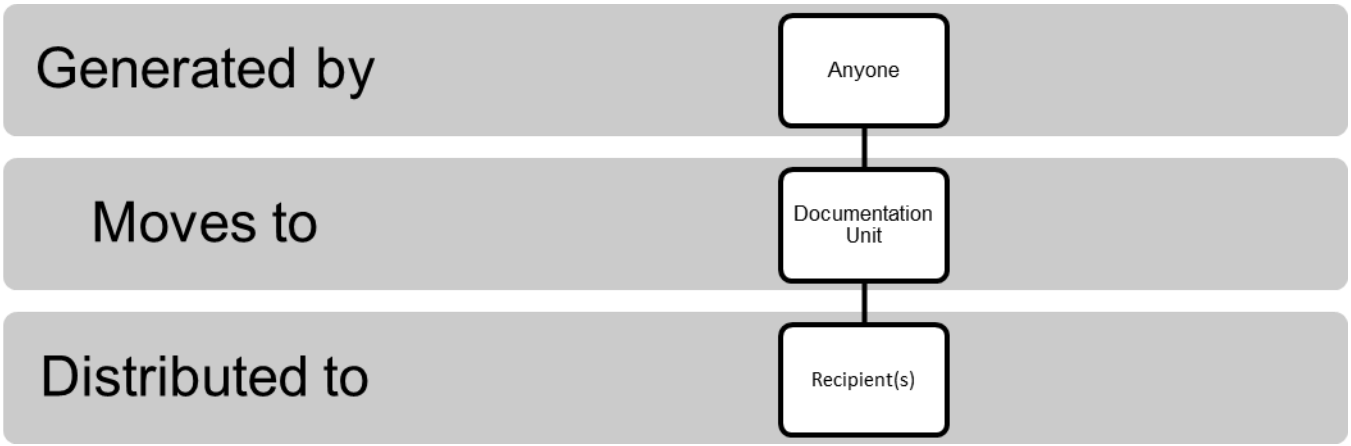
11.12.12 ICS 211e – Check-in List (Equipment)



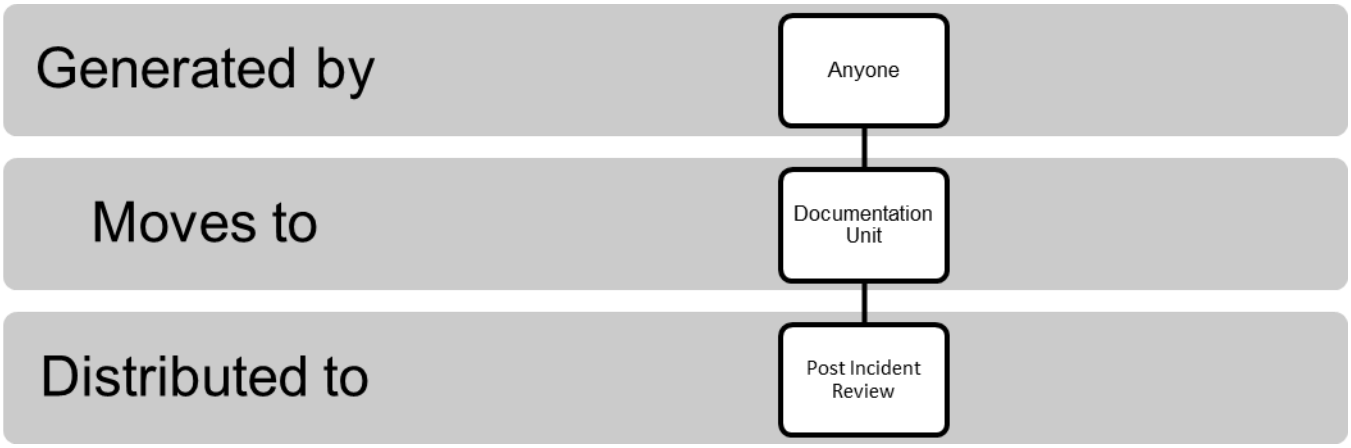
11.12.13 ICS 211p – Check-in List (Personnel)



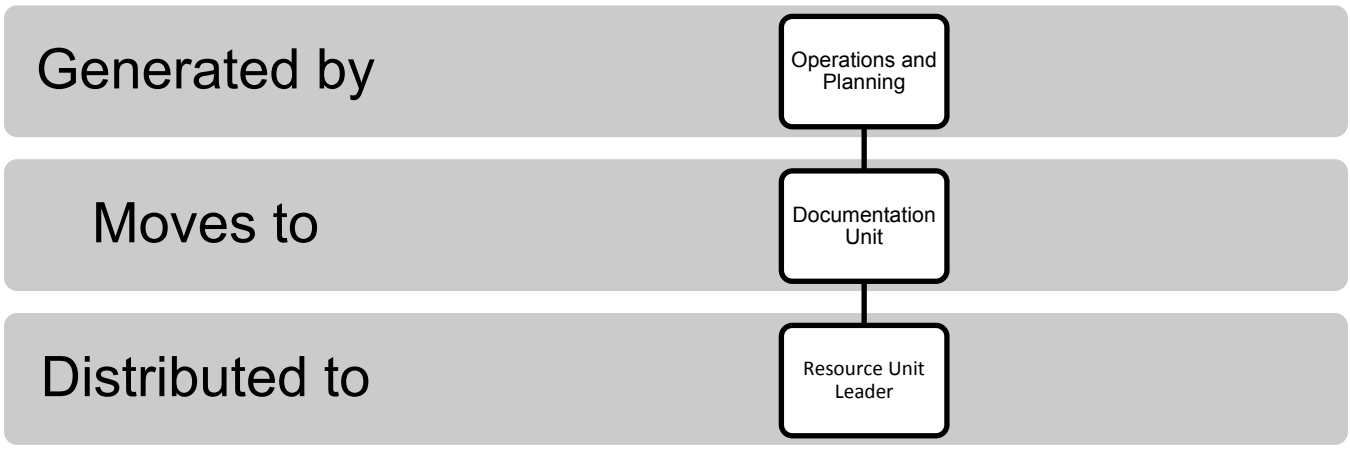
11.12.14 ICS 213 – General Message



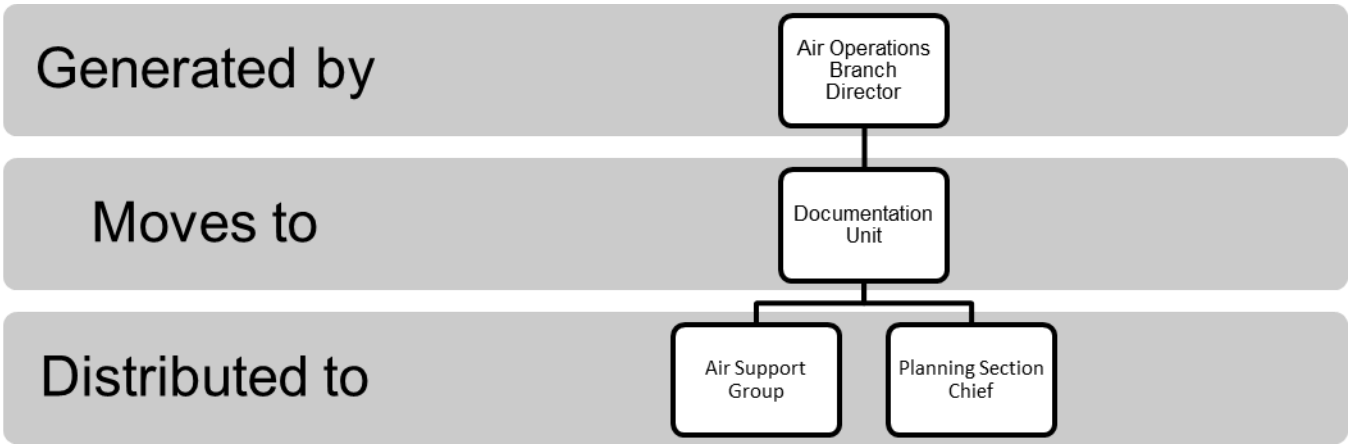
11.12.15 ICS 214 & 214a – Unit Log & Individual Log



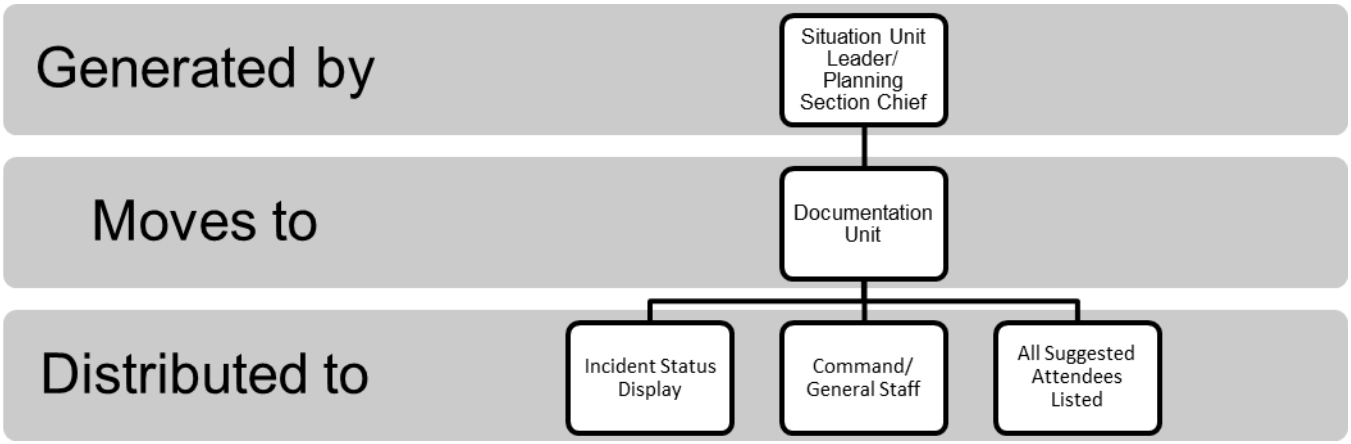
11.12.16 ICS 215 – Operational Planning Worksheet



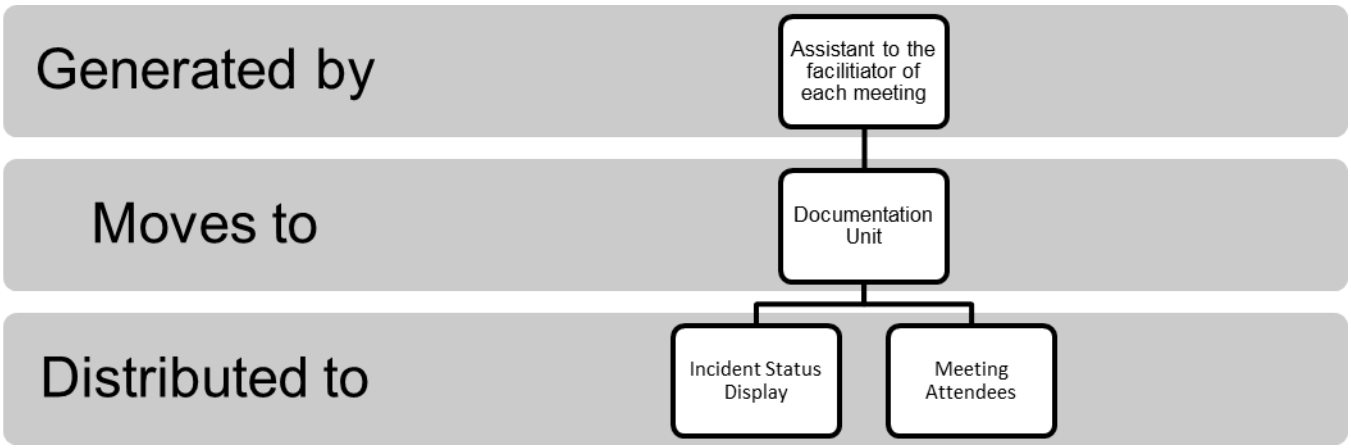
11.12.17 ICS 220 – Air Operations Summary



11.12.18 ICS 230 - Daily Meeting Schedule

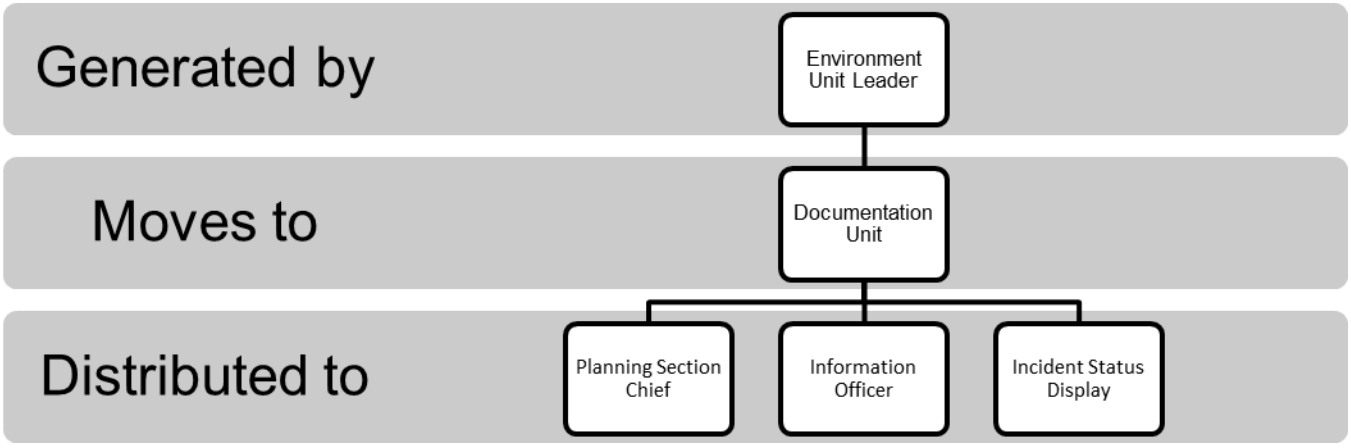


11.12.19 ICS 231 – Meeting Summary

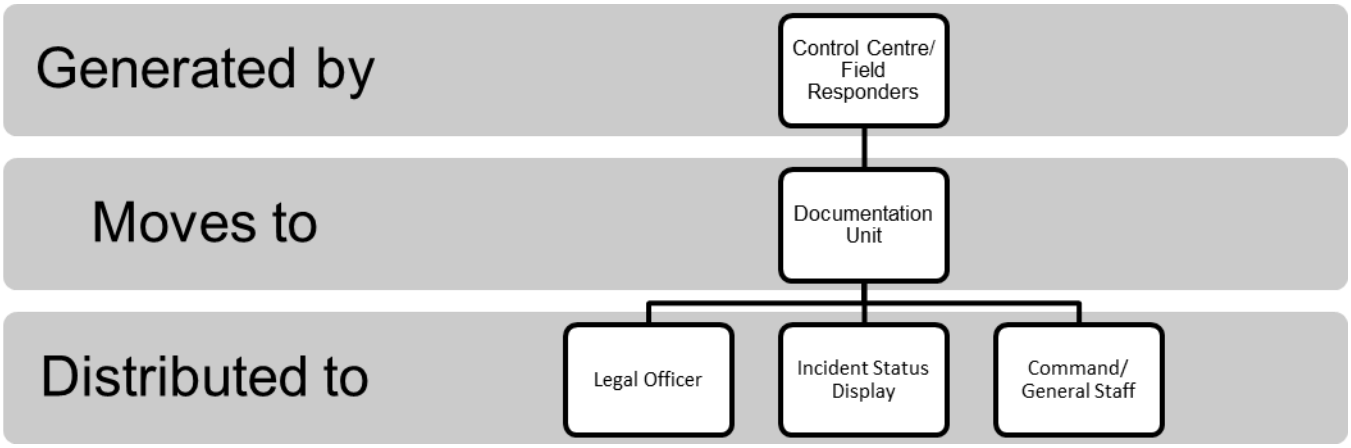


11.12.20 ICS 232 – Resources At Risk Summary

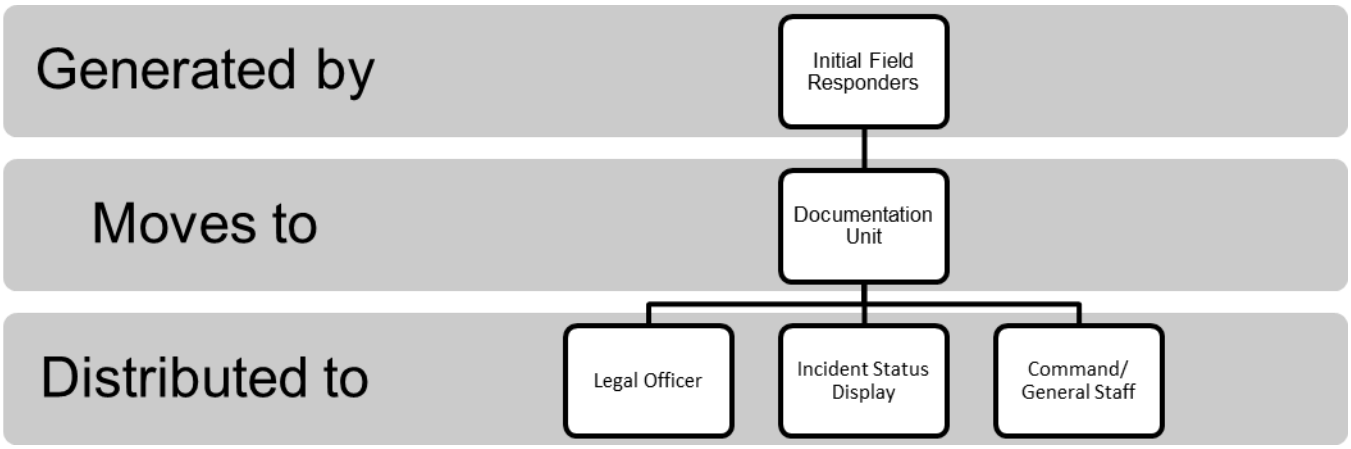
Note: Must be reviewed by Incident Command and/or Unified Command, and Stakeholder Groups.



11.12.21 Initial Incident Information Sheet

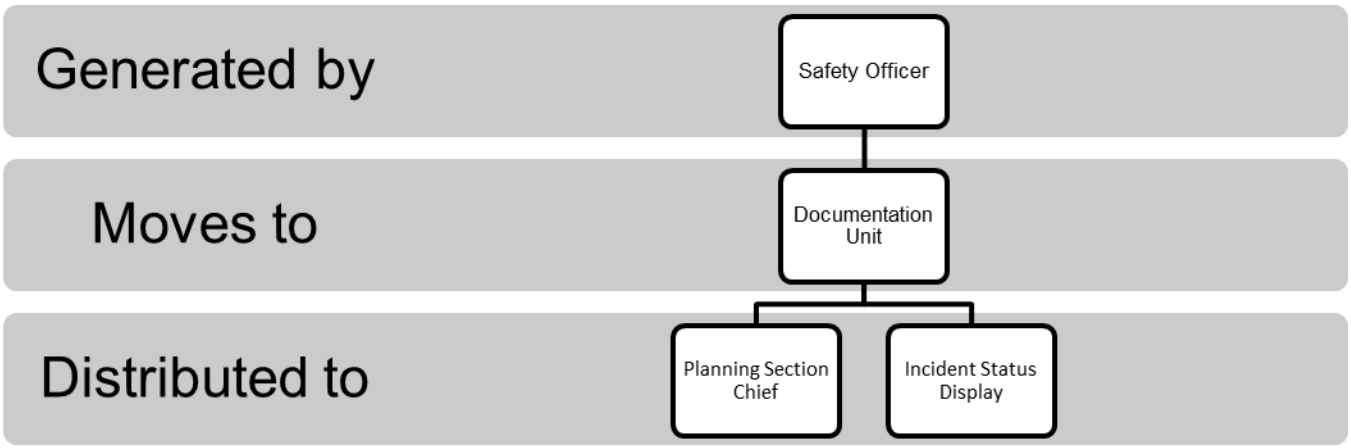


11.12.22 Initial Health and Safety Plan



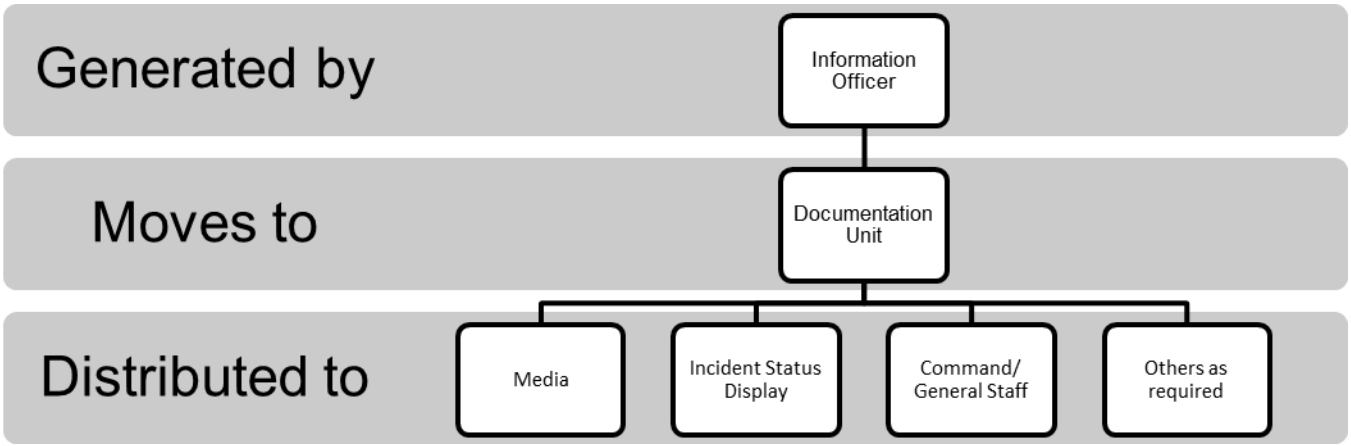
11.12.23 Health and Safety Plan

Note: MUST be approved by Incident Command and/or Unified Command.



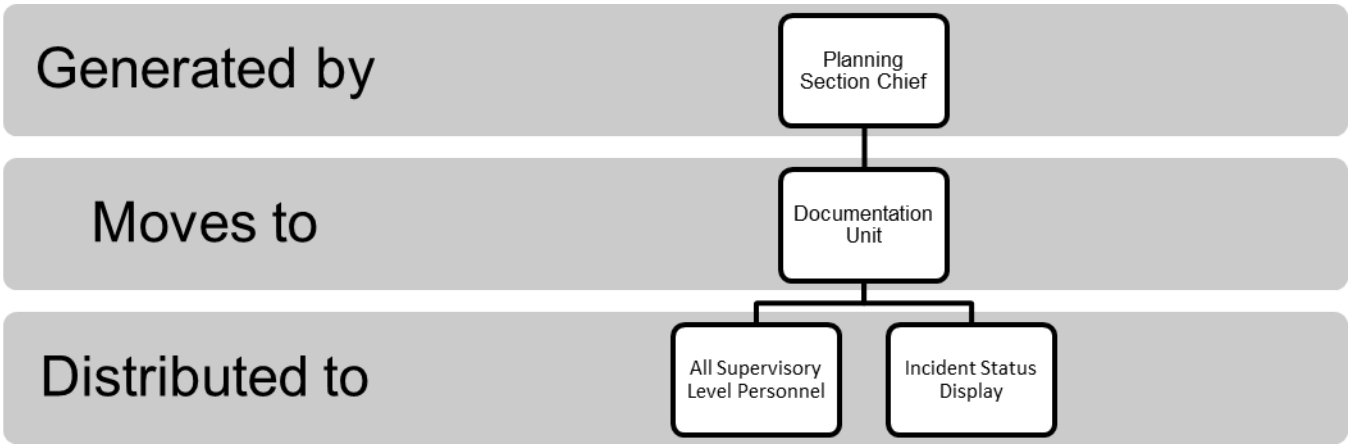
11.12.24 Media Release

Note: MUST be approved by Incident Command and/or Unified Command prior to being released.



11.12.25 Incident Action Plan

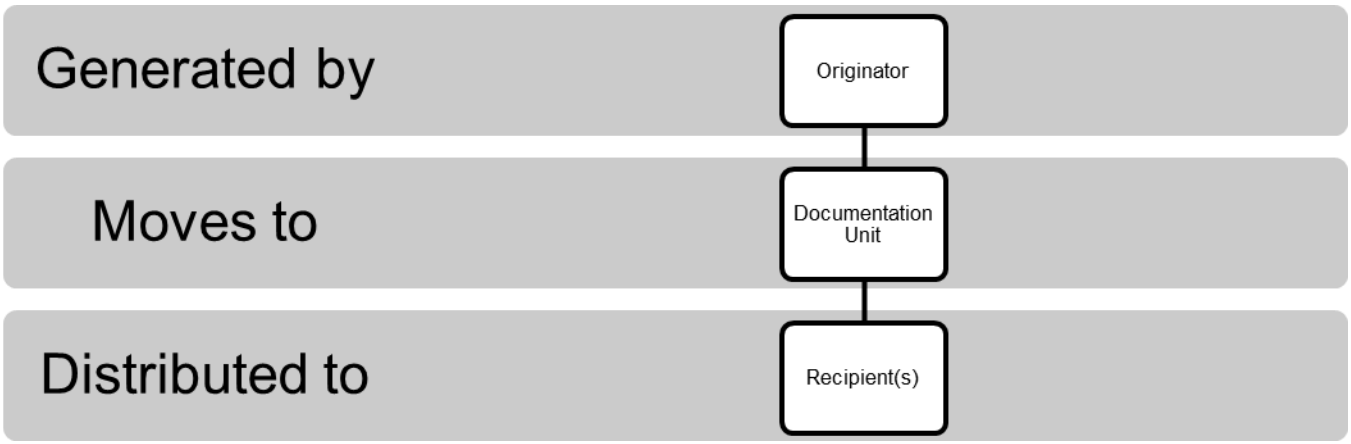
Note: MUST be reviewed and approved by Incident Command/Unified Command.



11.12.26 Other Documents – not listed

Note: This includes any document created for any purpose. All documents will be accompanied by a general message with the purpose of the document and the intended recipients. These documents may include, but is not limited to:

- Lodging Plan
- Refueling Plan
- Decontamination Plan
- Shoreline Assessment
- Environmental Monitoring/Sampling Plans

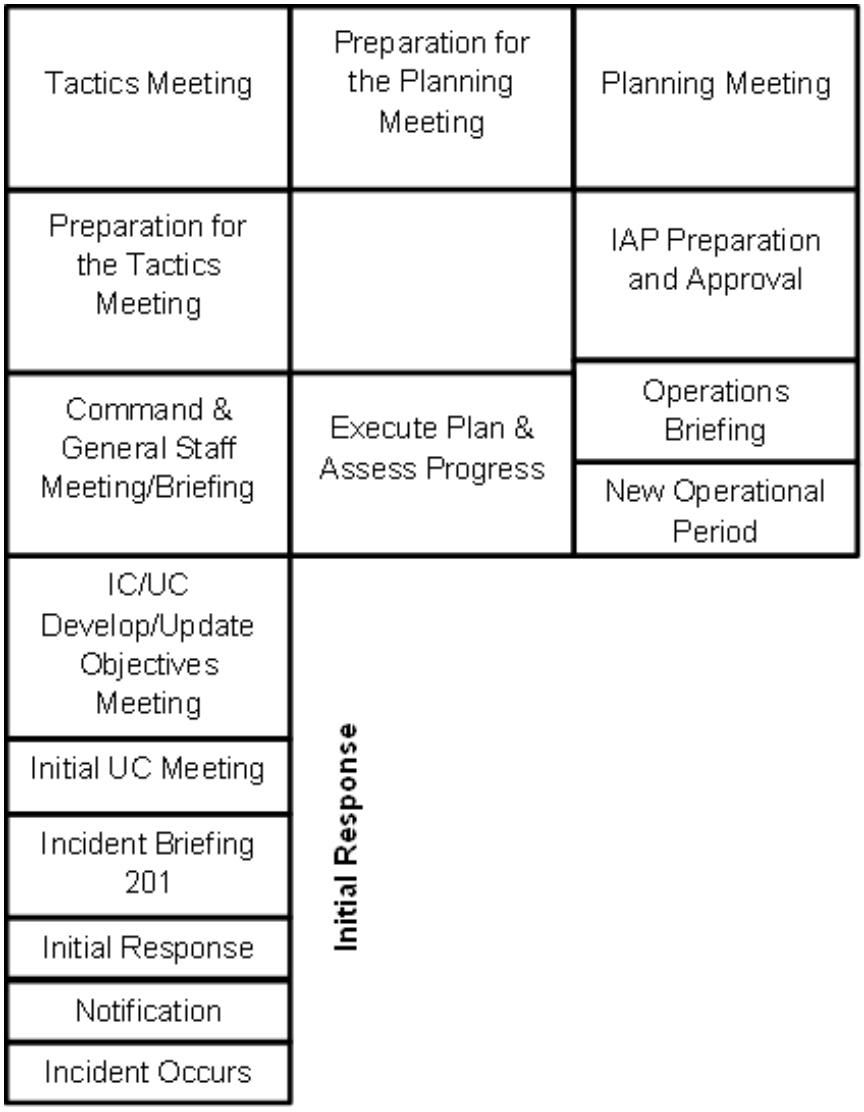


12.0 PLANNING CYCLE AND MEETINGS

12.1 Ground Rules for All Meetings

- ☐ Only attend meetings as required.
- ☐ Cell phones: OFF or VIBRATE.
- ☐ Follow the agenda.
- ☐ No side conversations.
- ☐ A meeting summary will be completed by the administrator to the facilitator (or designate) on the Meeting Summary form (ICS 231).

12.2 Planning Cycle

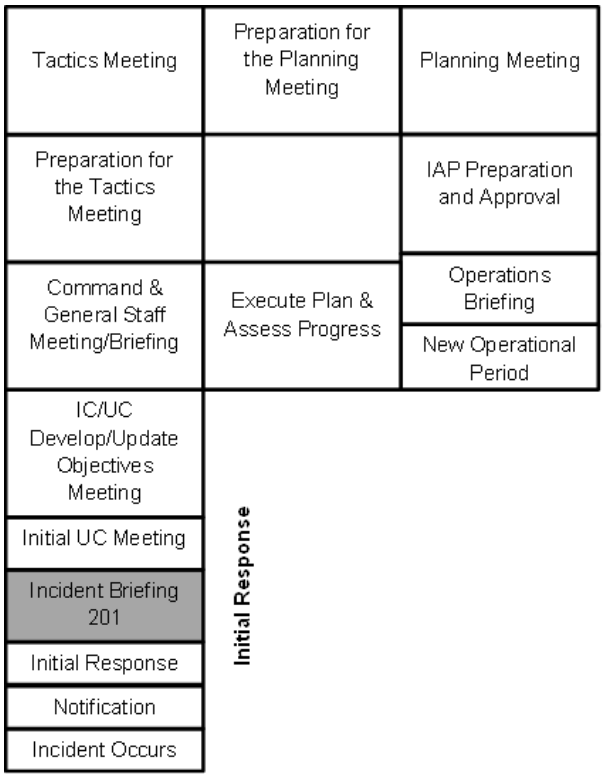


12.3 Initial Response and Assessment

The period of Initial Response and Assessment occurs in all incidents. Short-term responses, which are small in scope and/or duration (e.g., a few resources working one operational period), can often be coordinated using only the ICS-201 (Incident Briefing Form).

12.4 Incident Briefing (ICS-201)

During the transfer-of command process, an ICS-201 formatted briefing provides the incoming Incident Commander (IC)/Unified Command (UC) with basic information regarding the incident situation and the resources assigned to the incident. Most importantly, it functions as the Incident Action Plan (IAP) for the initial response and remains in force and continues to develop (updated), until the response ends or the Planning Section generates the incident's first IAP. It is also suitable for briefing individuals newly assigned to the Command and General Staff, incoming tactical resources, as well as needed assessment briefings for the staff. ICS-201 facilitates documentation of the current situation, initial response objectives, current and planned actions, resources assigned and requested, on-scene organization structure, and incident potential. This form is essential for future planning and effective management of initial response activities.



When New IC/UC; staff briefing as required
Facilitator Current IC/UC or (PSC if available)
Attendees Prospective IC/UC; Command and General Staff, as available

12.4.1 Incident Briefing (ICS-201) Agenda

Using ICS-201 as an outline, include:

- ☐ Current situation (note spilled product, territory, exposures, safety concerns, etc.; use map/charts).
- ☐ Initial objectives and priorities.
- ☐ Current and planned actions.
- ☐ Communications.
- ☐ Current on-scene organization.
- ☐ Resource assignments.
- ☐ Resources en-route and/or ordered.
- ☐ Facilities established.
- ☐ Incident potential.

12.4.2 Duties

Command
- ☐ Obtains incident briefing using ICS-201.
- ☐ Assesses operational requirements.
- ☐ Determines current/future organizational and response requirements and objectives.

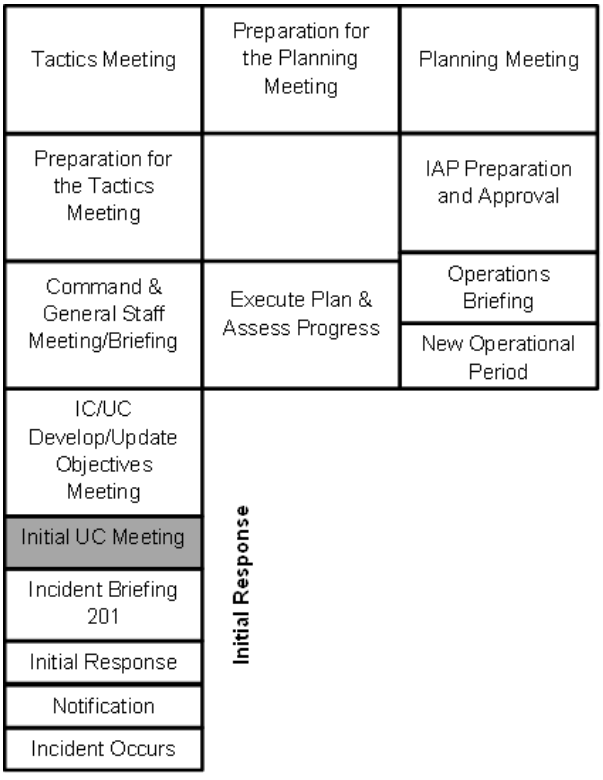
Operations
- ☐ Obtains briefing from IC.
- ☐ Considers available Contingency Plan.
- ☐ Develops strategies and tactics.
- ☐ Assembles additional resources.
- ☐ Manages response using ICS-201.

Planning
- ☐ If available, facilitates briefing.
- ☐ If/when activated, orders staff.

Logistics
- ☐ If/when activated, orders staff.

Finance/Admin
- ☐ If/when activated, orders staff.

12.5 Initial Unified Command Meeting



Provides UC with an opportunity to discuss and concur on important issues prior to the Unified Command Objectives Meeting. The meeting should be brief and all important decisions documented. Prior to the meeting, IC's should have an opportunity to review and prepare to address the agenda items. The results of this meeting will help to guide the overall response efforts.

When After the UC is established
Facilitator UC member or PSC (if available)
Attendees All available members of the UC, DOCL

12.5.1 Initial Unified Command Meeting Agenda

- ☐ Meeting brought to order, cover ground rules and reviews agenda.
- ☐ Validate makeup of newly formed UC, based on Chapter 6 criteria.
- ☐ Clarify UC Roles and Responsibilities.
- ☐ Review agency policies.
- ☐ Negotiate and agree on key decisions which may include:
  - UC jurisdictional boundaries and focus (Area of Responsibility (AOR)).
  - Name of incident.
  - Overall response organization, including:
    - Integration of assisting and cooperating agencies;
    - Location of Incident Command Post (if not already identified) and other critical facilities, as appropriate.

- Operational period length/start time and work shift hours.
- Best-qualified Operations Section Chief and Deputy.
- Other key Command and General staff assignments and technical support as needed.

☐ Summarize and document key decisions.

12.5.2 Duties

Command

☐ Negotiates UC participation.
☐ Clarifies UC roles & responsibilities.
☐ Negotiates and agrees on key decisions including:
- Area of responsibility.
- Name of the incident.
- Overall organization.
- Location of ICP, facilities, and support.
- Op Period length/start time and work shifts hours.
- OSC and Deputy OSC and other key Command and General staff and technical support as needed.

Operations

☐ Briefs UC members on current operations.

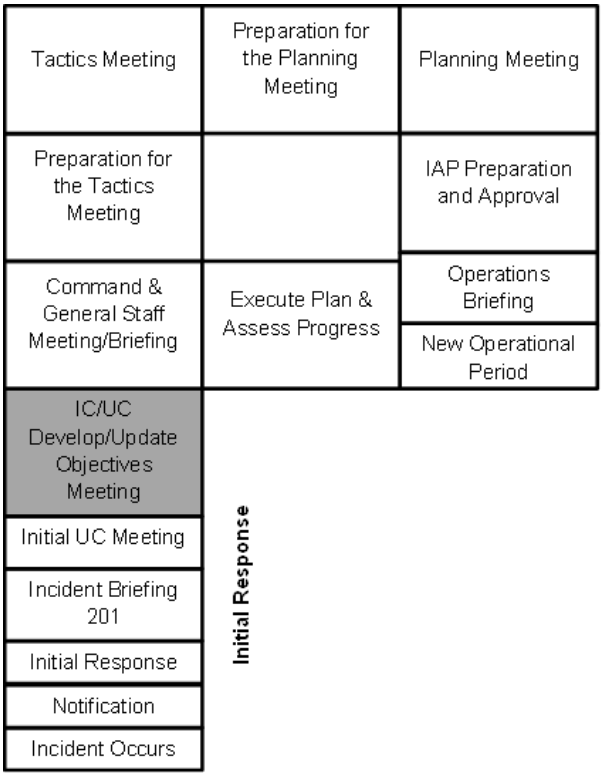
Planning

☐ If available, facilitates and documents meeting.

Logistics & Finance/Admin

☐ May not be activated yet

12.6 Unified Command Objectives Meeting



The UC will set response priorities, identify any limitations and constraints, develop incident objectives and establish guidelines for the IMT to follow. For reoccurring meetings, all products will be reviewed and updated as needed. Products resulting from this meeting along with decisions and direction from the Initial UC meeting, will be presented at the Command and General Staff Meeting.

When Prior to Command &General Staff Meeting
Facilitator IC/UC Member or PSC (if available)
Attendees IC/UC Members, Selected Command and General Staff as appropriate, DOCL

12.6.1 Unified Command Objectives Meeting Agenda

- ☐ PSC brings meeting to order, conducts roll call, covers ground rules, and reviews agenda.
- ☐ Review and/or update key decisions.
- ☐ Develop or review/update response priorities, limitations and constraints.
- ☐ Develop or review incident objectives.
- ☐ Develop or review/update key procedures which may include:
  - Managing sensitive information
  - Information flow
  - Resource ordering
  - Cost sharing and cost accounting
  - Operational security issues
- ☐ Develop or review/update tasks for Command and General Staff to accomplish (ICS-233).
- ☐ Review, document and/or resolve status of any open actions (ICS-233).
- ☐ Agree on division of UC workload.
- ☐ Prepare for the Command and General Staff Meeting.

12.6.2 Duties

Command

- ☐ Develops incident priorities.
- ☐ Identifies limitations and constraints.
- ☐ Develops incident objectives.
- ☐ Identifies key procedures.
- ☐ Develops tasks for Command and General Staff.
- ☐ Agree on division of UC workload.

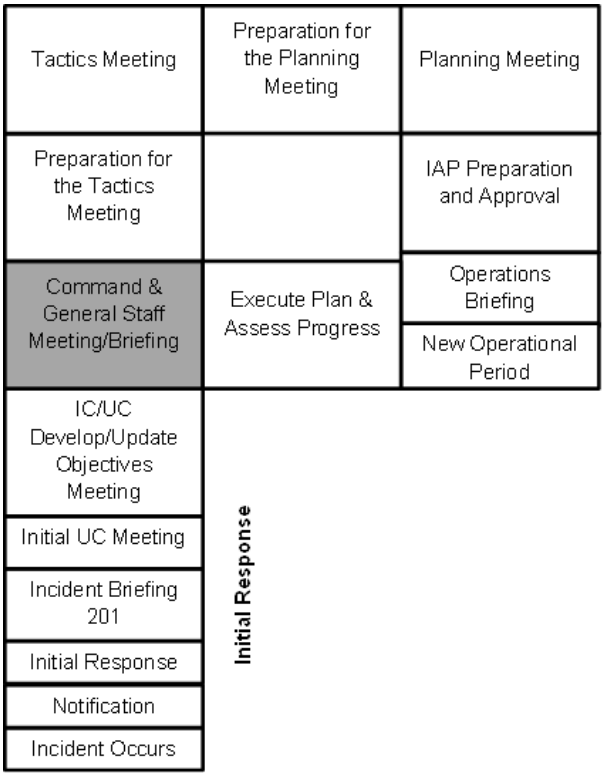
Operations

- ☐ May be present if required.

Planning

- ☐ Facilitates and documents meeting.
- ☐ Proposes draft objectives to Command.

12.7 Command and General Staff Meeting



The IC/UC will present their decisions and management direction to the Command and General Staff. This meeting should clarify and ensure understanding among the core IMT members on the decisions, objectives, procedures, and functional assignments (tasks) that the UC has reached agreement on. Ensuing Command and General Staff Meetings will cover any changes in Command direction, review open actions, and status of assigned tasks (ICS-233).

When Prior to Tactics Meeting
Facilitator PSC
Attendees IC/UC Members, Command and General Staff, SUL, and DOCL

12.7.1 Command and General Staff Meeting Agenda

- ☐ PSC brings meeting to order, conducts roll call, covers ground rules, and reviews agenda.
- ☐ SITL conducts situation status briefing.
- ☐ IC/UC:
  - Provides comments;
  - Reviews key decisions, priorities, constraints and limitations (if new or changed);
  - Discusses incident objectives;
  - Reviews key procedures (if new or changed); and
  - Assigns or reviews functional tasks/open actions (ICS-233).
- ☐ PSC facilitates open discussion to clarify priorities, objectives, assignments, issues, concerns and open actions/tasks.
- ☐ IC/UC provides closing comments.

12.7.2 Duties

Command
- ☐ Reviews key decisions, constraints, limitations, objectives and procedures.
- ☐ Presents/reviews functional work assignments (tasks), to the Command and General Staff members.
- ☐ Reviews status of open actions and work assignments from previous meetings.

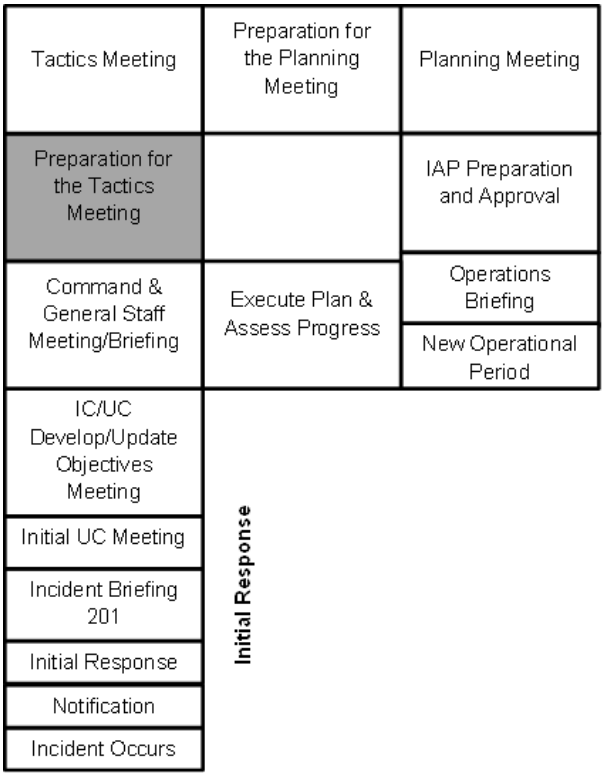
Operations
- ☐ Provides update on current operations.

Planning
- ☐ Facilitates/documents meeting.

Situation Unit Leader
- ☐ Provides update on current situation and projections.

Documentation Unit Leader
- ☐ Documents meeting and distributes meeting materials.

12.8 Preparing for the Tactics Meeting



During this phase of the Operational Planning Cycle, the OSC/PSC begins the work of preparing for the upcoming Tactics Meeting. They review incident objectives and may draft a Work Analysis Matrix (ICS-334) which helps document strategies and tactics to meet the objectives assigned, and draft an Operational Planning Worksheet (ICS- 215) and an Operations Section organization chart for the next Operational Period.

The Safety Officer should begin to develop the Hazard Risk Analysis Worksheet (ICS-215a). The PSC should facilitate/support this process to ensure that the material, information, resources, etc. to be presented in the Tactics Meeting is organized and accurate.

When	Prior to Tactics Meeting
Facilitator	PSC facilitates process
Attendees	None. This is not a meeting but a period of time

12.8.1 Duties

Operations

- ☐ Develops draft strategies and tactics for each operationally oriented incident objective and may use Work Analysis Matrix, ICS-234.
- ☐ Develops alternative and/or contingency strategies and tactics.
- ☐ Outlines work assignments (tactics) and required resources using ICS-215.
- ☐ Develops/outlines Operations Section organization for next operational period.

Planning

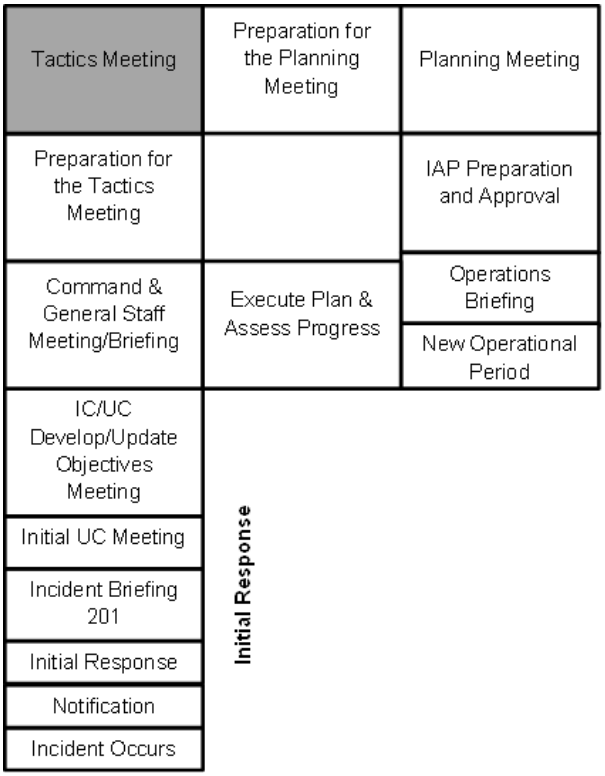
- ☐ Facilitates process.
- ☐ Reviews incident objectives and agrees on those that are the responsibility of the Operations Section to complete.
- ☐ Ensures Technical Specialists are included and prepared to contribute as appropriate.
- ☐ Presents situation information and provides projections.

Safety Officer

- ☐ Begins to develop the Hazard Risk Analysis ICS-215a.

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12.9 Tactics Meeting



This 30-minute meeting produces operational input needed to support the IAP. The OSC may present the Work Analysis Matrix (ICS-234), if completed, and will present the draft Operational Planning Worksheet (ICS-215). The proposed Operations Section organization will also be presented by OSC and solidified. The Safety Officer will present the draft Hazard Risk Analysis Worksheet (ICS-215a). OSC/PSC will solicit input of attendees in order to refine these draft products for full staff approval at the Planning Meeting.

When Prior to Planning Meeting
Facilitator PSC
Attendees PSC, OSC, LSC, RESL, SITL, SOFR, DOCL, COML, THSP (as needed)

12.9.1 Tactics Meeting Agenda

- ☐ PSC brings meeting to order, conducts roll call, covers ground rules, and reviews agenda.
- ☐ SITL reviews the current and projected incident situation.
- ☐ PSC reviews incident operational objectives and ensures accountability for each.
- ☐ OSC reviews, if completed, the Work Analysis Matrix (ICS-234) strategy and tactics.
- ☐ OSC reviews and/or completes the Operational Planning Worksheet (ICS-215), which addresses work assignments, resource commitments, contingencies and needed support facilities, e.g Staging Areas.
- ☐ OSC reviews and/or completes Operations Section organization chart.
- ☐ SOFR reviews and/or completes the Hazard Risk Analysis Worksheet (ICS-215), and identifies and resolves any critical safety issues.
- ☐ LSC discusses and resolves any logistics issues.
- ☐ PSC validates connectivity of tactics and operational objectives.

12.9.2 Duties

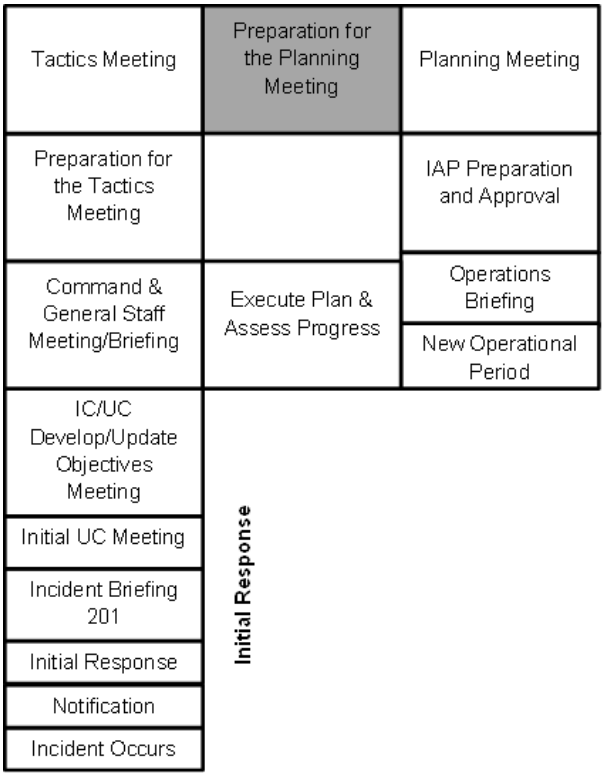
Operations
- ☐ Briefs current operations.
- ☐ Presents strategies, tactics and resource needs using ICS-215.
- ☐ Identifies alternative strategies.
- ☐ Presents Operations Section organization.

Planning
- ☐ Facilitates meeting.
- ☐ Presents current situation and provides projections.
- ☐ Presents resources status.
- ☐ Documents meeting.

Safety
- ☐ Identifies potential hazards and recommends mitigation measures.
- ☐ Presents the Hazard Risk Analysis ICS-215a.

Logistics
- ☐ Contributes logistics information, as necessary.
- ☐ Determines support requirements based on the ICS-215
- ☐ Prepares to order needed resources.

12.10 Preparing for the Planning Meeting



The Command and General Staffs prepare for the upcoming Planning Meeting. The PSC ensures the material, information, resources, etc., used or discussed in the Planning Meeting are prepared and ready for presentation during the meeting.

When Prior to the Planning Meeting
Facilitator PSC facilitates process
Attendees None. This is not a meeting but a period of time

12.10.1 Duties

Command
- ☐ Prepares further guidance/clarification.
- ☐ Meets informally with appropriate staff members, as needed.

Operations
- ☐ Prepares on-going operations update.
- ☐ Prepares final draft ICS-215.
- ☐ Coordinates with other staff, as needed.

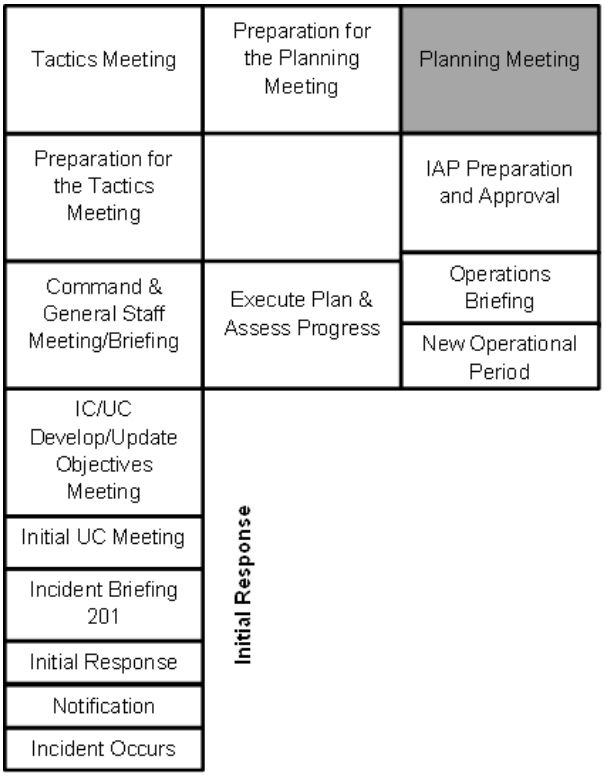
Planning
- ☐ Develops resource, support and overhead requests and submits to Logistics.
- ☐ Publishes/distributes meeting schedule and ensures attendees are prepared.
- ☐ Duplicates documents for Command needed to support presentations.

Logistics
- ☐ Orders resources to support IAP.
- ☐ Prepares for Planning Meeting.
- ☐ Verifies support requirements (communications, transportation, food, medical etc.)

Finance/Admin
- ☐ Prepares for Planning Meeting.

Verifies financial and administrative requirements

12.11 Planning Meeting



This meeting provides an overview of the tactical plan to achieve IC's current direction, priorities, and objectives. The OSC will present the proposed plan (strategy and tactics) to the Command and General Staff for review and comment. The OSC will also discuss how the incident will be managed along with work assignments resources and support required to implement the plan. The Command and General Staff discuss and resolve any issues and concerns prior to assembling the IAP. After review and updates are made, key attendees commit to support the plan.

When After the Tactics Meeting
Facilitator PSC
Attendees IC/UC, Command Staff, General Staff, SITL, DOCL, THSP (as required)

12.11.1 Planning Meeting Agenda

- ☐ PSC brings meeting to order, conducts roll call, covers ground rules, and reviews agenda.
- ☐ IC/UC provides opening remarks.
- ☐ SITL provides briefing on current situation, resources at risk, weather/sea forecast, and incident projections.
- ☐ PSC reviews Command's incident priorities, decisions, and objectives.
- ☐ OSC provides briefing on current operations followed with an overview on the proposed plan including strategy, tactics/work assignments (ICS-215), resource commitment, contingencies, Operations Section organization structure, and needed support facilities, e.g., Staging Areas.
- ☐ PSC reviews proposed plan to ensure that UC's priorities and operational objectives are met.
- ☐ PSC reviews and validates responsibility for any open actions/tasks (ICS-233), and management objectives.
- ☐ PSC conducts round robin of Command and General Staff members to solicit their final input and commitment to the proposed plan:
  - LSC covers transport, communications and supply updates and issues;
  - FSC covers fiscal issues;
  - SOFR covers safety issues;
  - PIO covers public affairs/information issues; and
  - LNO covers interagency issues.
- ☐ PSC requests Command's tacit approval of the plan as presented. IC/UC may provide final comments.
- ☐ PSC issues assignments to appropriate IMT members for developing IAP support documentation along with deadlines.

12.11.3 Duties

Command

- ☐ Ensures all of Command's direction, priorities, and objectives have been met.
- ☐ Provides further direction and resolves differences, as needed.
- ☐ Gives tacit approval of proposed plan.

Operations

- ☐ Provides overview of current OPS.
- ☐ Presents plan of action, including, strategies, tactics, contingencies, resources, organization structure and overall management considerations e.g., divisions/ groups etc.

Planning

- ☐ Facilitates meeting.
- ☐ Briefs current situation.
- ☐ Provides projections.
- ☐ Documents meeting.

Logistics

- ☐ Briefs logistical support/services and resource ordering status.
- ☐ Discusses operational facility issues.

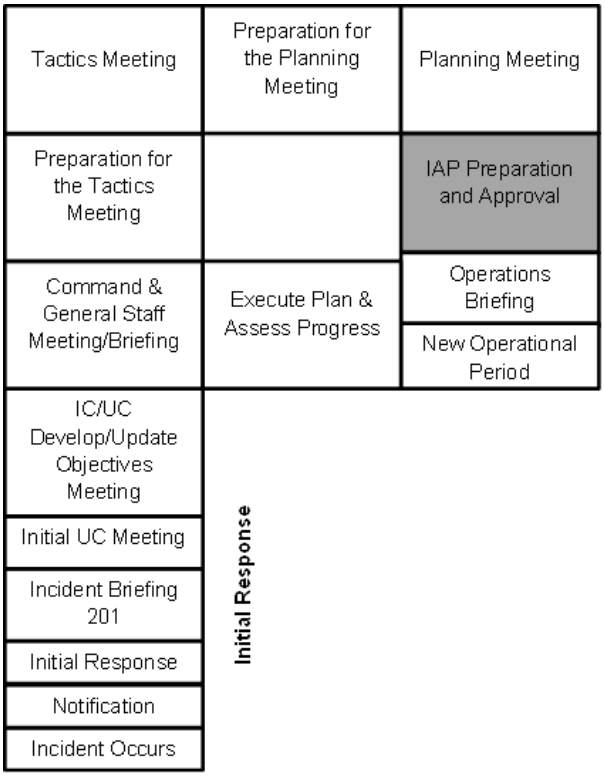
Finance/Admin

- ☐ Briefs administrative and financial status/projections

Command Staff

- ☐ Discusses and resolves any Safety, Liaison and Media considerations and issues.

12.12 IAP Preparation and Approval



Appropriate IMT members must immediately complete the assigned task/products that are needed to include in the IAP. These products must meet the deadline as set by the PSC so that planning can assemble the IAP components. The deadline must be early enough to permit timely IC/UC review, approval, and duplication of sufficient copies for the Operations Briefing and other IMT members.

When	Immediately following the Planning Meeting, the PSC assigns the deadline for products
Facilitator	PSC facilitates process
Attendees	None. This is not a meeting but a period of time

12.12.1 Duties

Command
- ☐ Reviews, approves, and signs IAP.

Operations
- ☐ Provides required information for inclusion into IAP (ICS-220).
- ☐ Works with Planning to ensure that the chart and ICS-204(s) are complete.

Planning
- ☐ Facilitates gathering of required documents and assembles IAP.
- ☐ Reviews IAP for completeness.
- ☐ Provides completed IAP to IC/UC for review/approval.
- ☐ Makes sufficient copies of the IAP.
- ☐ Distributes IAP to appropriate team members, and files original.

Logistics
- ☐ Reviews Logistics Section products for completeness (ICS-205, ICS-206, etc.).
- ☐ Provides logistics information for IAP.
- ☐ Verifies resources ordered/status.

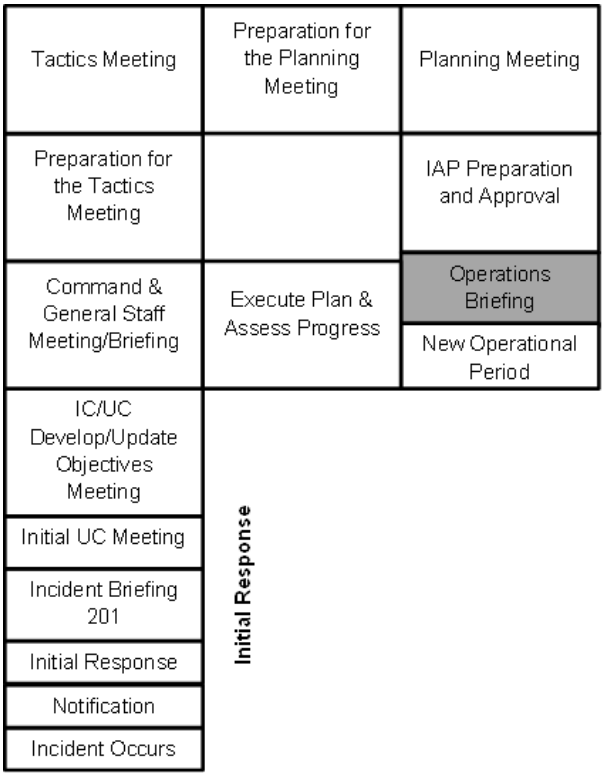
Finance/Admin
- ☐ Verifies financial and administrative requirements for IAP.

12.12.2 IAP Common Components and Primary Responsibility

Incident Objectives (ICS-202)	PSC
Organization List/Chart (ICS-203/207)	RESL
Assignment List (ICS-204)	RESL
Communication Plan (ICS-205)	COML
Medical Plan (ICS-206)	MEDL
Site Safety Plan (KM Template or ICS-208)	SOFR
Incident Map/Chart	SITL
Weather, tide forecast, trajectory	SITL

Air Operations Summary (ICS-220)	AOBD
Demobilization Plan	DMOB
Transportation Plan	GSUL
Decontamination Plan	THSP
Waste Management or Disposal Plan	THSP
Other Plans and/or documents, as required	

12.13 Operations Briefing



This 30-minutes (or less) briefing presents the IAP to the Operations Section oncoming Division and Group Supervisors. After this briefing, and during shift change, off-going Supervisors should be interviewed by their relief, and by OSC, in order to validate IAP effectiveness. The Division/Group Supervisors may make last minute adjustments to tactics over which they have purview. Similarly, a Supervisor may reallocate resources within that Division/Group to adapt to changing conditions.

When Approximately one hour prior to start of each Operational Period
Facilitator OSC
Attendees IC/UC, Command and General Staff, Branch Directors, Division/Group Supervisors, Task Force/Strike Team Leaders (if possible), Unit Leaders, others as appropriate.

12.13.1 Operations Briefing Agenda

- ☐ PSC opens briefing, covers ground rules and agenda, and takes roll call of Command and General Staff and Operations personnel required to attend.
- ☐ PSC reviews IC/UC objectives and changes to the IAP.
- ☐ IC/UC provides remarks.
- ☐ SITL conducts Situation briefing.
- ☐ OSC discusses current response actions and accomplishments.
- ☐ OSC briefs Operations Section personnel.
- ☐ LSC covers transport, communications, and supply updates.
- ☐ FSC covers fiscal issues.
- ☐ SOFR covers safety issues, PIO covers public affairs and public information issues, LNO covers interagency issues and INTO covers intelligence issues.
- ☐ PSC solicits final comments and adjourns briefing.

12.13.2 Duties

Command
- ☐ Provides guidance/ clarification.
- ☐ Provides leadership presence and motivational remarks.

Operations
- ☐ Provides operations briefing for next operational period.
- ☐ Ensures ICS-204 tasking is clear.

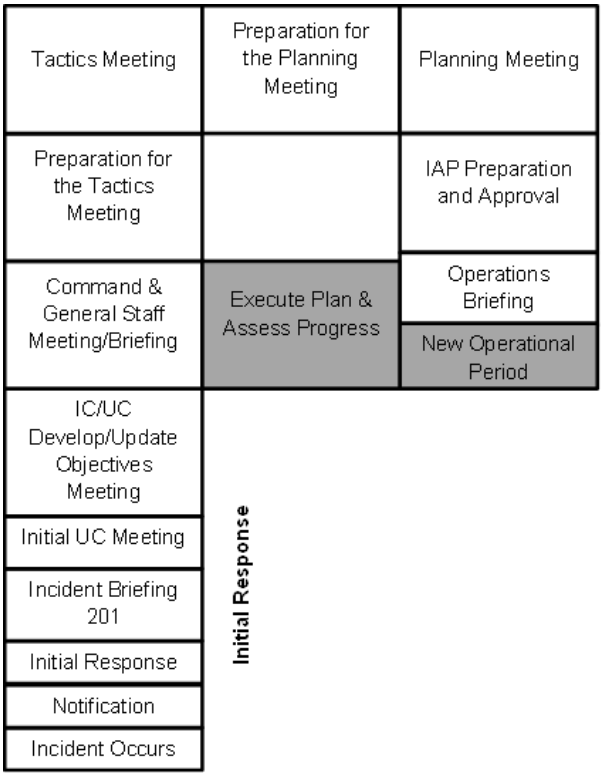
Planning
- ☐ Sets up briefing area.
- ☐ Facilitates Command and General Staff and attendees briefing responsibilities.
- ☐ Resolves questions.
- ☐ Explains support plans as needed.

Logistics
- ☐ Briefs transportation, communication, and supply issues.

Finance/Admin
- ☐ Briefs administrative issues and provides financial report

12.14 Assess Progress

Assessment is an on-going continuous process to help adjust current operations and help plan for future operations. Following the briefing and shift change, all Command and General Staff Section Chiefs will review the incident response progress, and make recommendations to the IC/UC in preparation for the next IC/UC Objectives Meeting. This feedback/ information is continuously gathered from various sources, including Field Observers, responder debriefs, stakeholders, etc. IC/UC should encourage Command and General Staff to get out of the ICP and view firsthand the areas of the incident they are supporting.



12.14.1 Duties

Command
- ☐ Monitors on-going incident management activities.
- ☐ Considering best response practices, evaluates prior decisions, direction, priorities, and task assignments.

Operations
- ☐ Monitors on-going operations and makes changes, as necessary.
- ☐ Measures/ensures progress against assigned objectives.
- ☐ Briefs Command on a scheduled basis.

Planning
- ☐ Ensures on-going operational information is being collected and documented.
- ☐ Develops new/revised incident objectives and provides to IC/UC.

Logistics

- ☐ Evaluates logistical support effectiveness and makes organizational and procedural adjustments, as needed.

Finance/Admin

- ☐ Monitors ongoing operations to ensure accurate and timely administrative and financial reporting.

Safety Officer

- ☐ Monitors ongoing operations and corrects unsafe practices.
- ☐ Evaluates effectiveness of the Risk Hazard Analysis (ICS-215a) and Site Safety Plan.

12.15 Special Purpose Meetings

Special Purpose meetings are most applicable to larger incidents requiring an Operational Period Planning Cycle, but may also be useful during the Initial Response Phase.

12.15.1 Business Management Meeting

The purpose of this meeting is to develop and update the Business Management Plan for finance and logistical support. The agenda could include: documentation issues, cost sharing, cost analysis, finance requirements, resource procurement, and financial summary data. Attendees normally include: FSC, COST, PROC, LSC, SUL, and DOCL.

12.15.2 Agency Representative Meeting

This meeting is held to update agency representatives and ensure that they can support the IAP. It is most appropriately held shortly after the Planning Meeting in order to present the plan (IAP) for the next operational period. It allows for minor changes should the plan not meet the expectations of the agency representatives.

12.15.3 Media Briefing

This meeting is normally conducted at the Joint Information Center (JIC). Its purpose is to brief the media and the public on the most current and accurate facts. It is set up by the PIO, moderated by a UC spokesperson, and features selected spokespersons. Spokespersons should be prepared by the PIO to address anticipated issues. The briefing should be well planned, organized, and scheduled to meet media's needs.

12.15.4 Technical Specialist Meeting

Meetings to gather THSP input to IAP, held shortly after the planning meeting to gather information for the IAP.

12.15.5 Demobilization Planning Meeting

This meeting is held to gather functional requirements from Command, Command Staff, and General Staff that would be included in the incident Demobilization Plan. Functional requirements would include: safety, logistic, and fiscal considerations, and release priorities that would be addressed in the plan. Attendees normally include: Command, OSC, PSC, LSC, FSC, LNO, SOFR, INTO PIO and DMOB. The DMOB then prepares a draft Demobilization Plan to include the functional requirements and distributes to Command, Command Staff, and General Staff for review and comment.

13.0 GLOSSARY OF TERMS AND ACRONYMS

13.1 Terms

Agency Representative - Individual assigned to an incident from an assisting or cooperating agency who has been delegated full authority to make decisions on all matters affecting his/her agency's participation at the incident. Agency Representatives report to the Liaison Officer upon arrival at the ICP.

Air Operations Branch Director - The person primarily responsible for preparing and implementing the air operations portion of the Incident Action Plan. Also responsible for providing logistical support to helicopters assigned to the incident.

Allocated Resources - Resources (personnel and equipment) dispatched to an incident.

Assigned Resources - Resources checked-in and assigned work tasks.

Assignments - Tasks given to resources to perform within a given operational period, based upon tactical objectives in the Incident Action Plan.

Assistant - Title for subordinates of the Command Staff positions. The title indicates a level of technical capability, qualifications, and responsibility subordinate to the primary positions. Assistants may also be used to supervise unit activities at camps.

Assisting Agency - An agency which directly contributes tactical or service resources in support of an incident response.

Available Resources - Incident-based resources which are immediately-available for an assignment.

Base - The location at which some logistics functions are coordinated and administered. Incident name or other designator will be added to the term "Base". The Incident Command Post may be collocated with the base. There is only one base per incident.

Branch - The organizational level having functional/geographic responsibility for major incident operations. The Branch level is organizationally between Section and Division/Group in the Operations Section, and between Section and Units in the Logistics Section.

Cache - A pre-determined complement of tools, equipment, and/or supplies stored in a designated location, and available for incident use.

Camp - A geographical site, within the general incident area, separate from the base, equipped and staffed to provide sleeping areas, food, water, and sanitary services to out-of-service incident personnel.

Check-In - The process whereby resources first report to an incident response. Check-in locations include: Incident Command Post (Resources Unit), Incident Base, Camps, Staging Areas, Helibases, and Division/Group Supervisors (for direct line assignments).

Chief - The ICS title of individuals responsible for command of functional sections: Operations, Planning, Logistics, and Finance/Administration.

Clear Text - The use of plain English in radio communications transmissions. No Ten Codes nor agency specific codes are used when using Clear Text.

Command - The act of directing, ordering, and/or controlling resources by virtue of explicit legal, agency, or delegated authority. May also refer to the Incident Commander/Unified Command.

Command Post - See Incident Command Post.

Command Staff - The Command Staff consists of the Information Officer, Safety Officer, Liaison Officer, and Legal Officer, who report directly to the Incident Commander. They may have an assistant or assistants, as needed.

Communications Unit - Functional unit within the Logistics Sections responsible for Incident communications equipment and facilities, supervising the Incident Communications Center, distributing communications equipment to incident personnel, and the maintenance and repair of communications equipment.

Control Point – A location-specific response tactic used to contain or recover oil. A river, stream or creek may include many control points along its path where resources response resources (boom, skimmers, etc.) may be deployed. Control Points are described in the Emergency Response Plans.

Cooperating Agency - An agency supplying assistance other than direct tactical, support, or service functions or resources to the incident control effort (e.g., Red Cross, telephone company, etc.).

Cost Unit - Functional unit within the Finance/ Administration Section responsible for tracking costs, analyzing cost data, making cost estimates, and recommending cost-saving measures.

Decontamination – The process of removing or neutralizing contaminants that have accumulated on personnel and equipment.

Deputy - A fully-qualified individual who, in the absence of a superior, could be delegated the authority to manage a functional operation or perform a specific task. In some cases, a Deputy could act as relief for a superior, and, therefore, must be fully qualified in the position. Deputies can be assigned to the Incident Commander, General Staff, and Branch Directors.

Demobilization Unit - Functional unit within the Planning Section responsible for assuring orderly, safe, and efficient demobilization of incident resources.

Director - The ICS title for individuals responsible for supervising a Branch.

Dispatch - The implementation of a command decision to move resources from one place to another.

Dispatch Center - A facility from which resources are directly assigned to an incident.

Division - The organization level having responsibility for operation within a defined geographic. The Division level is organizationally between the Task Force/Strike Team and the Branch. (See also "Group"). Divisions may be led by a Division Supervisor.

Documentation Unit - Functional unit within the Planning Section responsible for collecting, recording, and safeguarding all documents relevant to the incident.

Emergency Management – Management of an emergency or incident. The KM ICS organization is designed to fulfill the emergency management role.

Emergency Medical Technician (EMT) - A health-care specialist with particular skills and knowledge in pre-hospital emergency medicine.

Emergency Operations Center (EOC) - A pre-designated facility established by a company, agency or jurisdiction to coordinate the overall agency or jurisdictional response and support to an emergency response.

Facilities Unit - Functional unit within the Support Branch of the Logistics Section that provides fixed facilities for the incident. These facilities may include the Incident Base, feeding areas, sleeping areas, sanitary facilities, etc.

Federal On-Scene Coordinator (FOSC) - The predesignated Federal On-Scene Coordinator operating under the authority of the National Contingency Plan (NCP).

Field Operations Guide (FOG) - A pocket-size manual of guidelines regarding application of the Incident Command System.

Finance/Administration Section - The Section responsible for all incident costs and financial considerations. Includes the Time Unit, Procurement Unit, Compensation/Claims Unit, and Cost Unit.

Food Unit - Functional unit within the Service Branch of the Logistics Section responsible for providing meals for incident personnel.

Function - In ICS, function refers to the five major activities in the ICS, i.e., Command, Operations, Planning, Logistics, and Finance/Administration. The term function is also used when describing the activity involved, e.g., "the planning function."

General Plan – A long-range plan to manage an incident. The General Plan is used to identify long-range objectives and resource requirements. The General Plan defines a time line and framework looking into the future and covering the duration of the response.

General Staff - The group of incident management personnel comprised of: Incident Commander, Operations Section Chief, Planning Section Chief, Logistics Section Chief, and Finance/Administration Section Chief.

Geographic Information System (GIS) - An electronic information system which provides a geo-referenced data base to support management decision-making.

Ground Support Unit - Functional unit within the Support Branch of the Logistics Section responsible for fueling, maintaining, and repairing vehicles, and the ground transportation of personnel and supplies.

Group - Groups are established to divide the incident into functional areas of operation. Groups are composed of resources assembled to perform a special function not necessarily within a single geographic Division (see Division). Groups are located between Branches (when activated) and Single Resources in the Operations Section.

Helibase - A location within the general incident area for parking, fuelling, maintaining, and loading helicopters.

Helispot - A location where a helicopter can take off and land. Some Helispots may be used for temporary loading.

Incident Action Plan (IAP) - The Incident Action Plan contains objectives reflecting the overall incident strategy and specific strategies and tactics for the next operational period. When complete, the Incident Action Plans will include a number of attachments including forms.

Incident Area - Legal geographical area of the incident including affected area(s) and traffic route(s) to corresponding storage and disposal sites.

Incident Base - See Base.

Incident Commander (IC) - The individual(s) responsible for managing all incident activities.

Incident Command Post (ICP) - The location at which the primary Command functions are executed; may be collocated with the Incident Base.

Incident Command System (ICS) - A standardized on-scene emergency management system specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

Incident Communication Center - The location of the Communications Unit and the Message Center.

Incident Objectives - Statements of guidance and direction necessary for the selection of appropriate strategies and the tactical direction of resources. Incident objectives are based on realistic expectations of what can be accomplished when all allocated resources have been effectively deployed. Incident objectives must be achievable and measurable, yet flexible enough to allow for strategic and tactical alternatives.

Incident Situation Display - The Situation Unit is responsible for maintaining a display of status boards which communicate critical incident information vital to establishing and maintaining an effective command and control environment.

Information Officer (IO) - A member of the Command Staff responsible for providing incident information to the public and news media or other agencies or organizations. There is only one Information Officer per incident. The Information Officer may have assistants.

Joint Information Center (JIC) - A facility established within, or near, the Incident Command Post where the Information Officer and staff can coordinate and provide incident information to the public, news media, and other agencies or organizations. The JIC is normally staffed with representatives from the FOSC, SOSC and Kinder-Morgan.

Jurisdiction - A range or sphere of authority. At an incident, public agencies have jurisdiction related to their legal responsibilities and authority for incident mitigation. Jurisdictional authority at an incident can be political/geographical (e.g., city, county, state, or Federal boundary lines), or functional (e.g., police department, health department, etc.). (See Multi-Jurisdiction).

Jurisdictional Agency - The agency having jurisdiction and responsibility for a specific geographical area, or a mandated function.

Landing Zone - See Helispot.

Leader - The ICS title for an individual responsible for a Task Force/Strike Team or functional Unit.

Liaison Officer (LO) - A member of the Command Staff responsible for coordinating with stakeholder groups and representatives from assisting and cooperating agencies.

Logistics Section - The Section responsible for providing facilities, services, and materials for the incident.

Managers - Individuals within ICS organizational units who are assigned specific managerial responsibilities (e.g., Staging Area Manager or Camp Manager).

Medical Unit - Functional unit within the Service Branch of the Logistics Section responsible for developing the Medical Plan, and for providing emergency medical treatment for incident response personnel.

Message Center - The message center is part of the Communications Center and collocated with or adjacent to it. It receives, records, and routes information about resources reporting to the incident, resource status, and handles administration and tactical traffic.

Multi-Agency Coordination (MAC) – A generalized term which describes the functions and activities of representatives of involved agencies and/or jurisdictions who come together to make decisions regarding the prioritizing of incidents, and the sharing and use of critical resources. The MAC organization is not part of the on-scene ICS and is not involved in developing incident strategy or tactics.

Multi-Agency Incident - An incident where one or more agencies assists a jurisdictional agency or agencies. May be single or Unified Command.

Multi-Jurisdiction Incident- An incident requiring action from multiple agencies that have statutory responsibility for incident mitigation. In ICS, these incidents will normally be managed using a Unified Command.

Natural Resource Damage Assessment (NRDA) - The process of collecting and analyzing information to evaluate the nature and extent of injuries resulting from an incident, and determine the restoration actions needed to bring injured natural resources and services back to baseline and make the environment whole for interim losses. (15 CFR 990.30)

Officer - The ICS title for personnel responsible for the Command Staff positions of Safety, Liaison, and Information.

Operational Period - The period of time scheduled for execution of a given set of operational actions specified in the Incident Action Plan. Operational Periods can be various lengths, usually not over 24 hours.

Operations Section - Responsible for all operations directly applicable to the primary mission. Directs unit operational plans preparation, requests or releases resources, makes expedient changes to the Incident Action Plan (as necessary), and reports changes to the Incident Commander. Includes the Recovery and Protection Branch, Emergency Response Branch, Air Operations Branch, and Wildlife Branch.

Out-Of-Service Resources - Resources assigned to an incident but unable to respond for mechanical, rest, or personnel reasons.

Planning Meeting - A meeting, held as needed throughout the duration of an incident, to select specific strategies and tactics for incident control operations and for service and support planning.

Planning Section - Responsible for collecting, evaluating, and disseminating tactical information related to the incident, and for preparing and documenting Incident Action Plans. The section also maintains information on the current and forecast situation, and on the status of resources assigned to the incident. Includes the Situation, Resource, Environmental, Documentation, and Demobilization Units, and Technical Specialists.

Polrep - Pollution report.

Preplanned Strategy – Strategies developed and documented prior to an incident.

Procurement Unit - Functional unit within the Finance/Administration Section responsible for financial matters involving vendor contracts.

Qualified Individual (Q.I.) - The person authorized by the responsible party to expend funds and obligate resources.

Radio Cache - A cache may consist of a number of portable radios, a base station, and, in some cases, a repeater stored in a predetermined location for dispatch to incidents.

Recorders - Individuals within ICS organizational units who are responsible for recording information. Recorders may be found in Planning, Logistics, and Finance/Administration.

Regional Response Team (RRT) - A Federal response organization, consisting of representatives from specific Federal and state agencies, responsible for regional planning and preparedness before an oil spill occurs and for providing advice to the FOSC in the event of a major or substantial spill.

Reporting Location - Any one of six facilities/locations where incident assigned resources may be checked in. The locations are: Incident Command Post-Resources Unit, Base, Camp, Staging Area, Helibase, or Division/Group Supervisors (for direct line assignments.) Check-in for each specific resource occurs at one location only.

Resources - All personnel and major items of equipment available, or potentially available, for assignment to incident tasks on which status is maintained.

Resource Status – Describes the current operational status of response resources. ICS recognizes three definitions – *available*, *assigned* and *out-of-service*. Oil spill resource tracking also recognizes an en-route status.

Resources Unit - Functional unit within the Planning Section responsible for recording the status of resources committed to the incident. The Unit also evaluates resources currently committed to the incident, the impact that additional responding resources will have on the incident, and anticipated resource needs.

Responsible Party (RP) – The owner/operator (Kinder-Morgan) of the infrastructure which is the spill source.

RP Incident Commander (RPIC) - Kinder-Morgan`s designated Incident Commander.

Safety Officer (SO) - A member of the Command Staff responsible for monitoring and assessing safety hazards or unsafe situations, and for developing measures for ensuring personnel safety. The Safety Officer may have assistants.

Section - The organization level having functional responsibility for primary segments of incident operation such as: Operations, Planning, Logistics, Finance/ Administration. The Section level is organizationally between Branch and Incident Commander.

Service Branch - A Branch within the Logistics Section responsible for service activities at the incident. Includes the Communications, Medical, and Food Units.

Single Resource - An individual, a piece of equipment and its personnel complement, or a crew or team of individuals with an identified work supervisor that can be used on an incident.

Site Safety And Health Plan (SSHP) – Site-specific document required by State and Federal OSHA regulations and specified in the Area Contingency Plan. The SSHP, at minimum, addresses, includes, or contains the following elements: health and safety hazard analysis for each site task or operation, comprehensive operations workplan, personnel training requirements, PPE selection criteria, site-specific occupational medical monitoring requirements, air monitoring plan, site control measures, confined space entry procedures (if needed), pre-entry briefings (tailgate meetings, initial and as needed), pre-operations commencement health and safety briefing for all incident participants, and quality assurance of SSHP effectiveness.

Situation Unit - Functional unit within the Planning Section responsible for collecting, organizing, and analyzing incident status information, and for analyzing the situation as it progresses. Reports to the Planning Section Chief.

Situation Status – Activity of documenting and communicating operational response status.

Source Control - Actions necessary to control the spill source and prevent the continued release of oil or hazardous substance(s) into the environment.

Span of Control – Span of Control means how many organizational elements may be directly managed by one person. Span of Control may vary from three to seven, and a ratio of one to five reporting elements is recommended.

Staging Area - The location where incident personnel and equipment are staged awaiting tactical assignment.

Stakeholders - Any person, group, or organization affected by, and having a vested interest in, the incident and/or the response operation.

State On-Scene Coordinator (SOSC) - The predesignated State On-Scene Coordinator.

Strategy - The general plan or direction selected to accomplish Incident Objectives.

Strike Team - Specified combinations of the same kinds and types of resources, with common communications and a leader.

Supervisor - The ICS title for individuals responsible for directing the activities of a Division or Group.

Supply Unit - Functional unit within the Support Branch of the Logistics Section responsible for ordering equipment and supplies required for incident operations.

Support Branch - A Branch within the Logistics Section responsible for providing personnel, equipment, and supplies to support incident operations. Includes the Supply, Facilities, Ground Support, and Vessel Support Units.

Supporting Materials - Refers to the several attachments that may be included with an Incident Action Plan (e.g., communications plan, map, site safety and health plan, traffic plan, and medical plan).

Tactical Direction - Directions given by the Operations Section Chief including: the tactics appropriate for the selected strategy; the selection and assignment of resources; tactics implementation; and performance monitoring for each operational period.

Tactics – Deploying and directing resources during an incident to accomplish the desired objective.

Task Force - A group of resources with common communications and a leader assembled for a specific mission.

Technical Specialists - Personnel with special skills who can be used anywhere within the ICS organization.

Temporary Flight Restrictions (TFR) - Temporary airspace restrictions for non-emergency aircraft in the incident area. TFRs are established by the FAA to ensure aircraft safety and are normally limited to a five-nautical-mile radius and 2000 feet in altitude.

Time Unit - Functional unit within the Finance/Administration Section responsible for recording time for incident personnel and hired equipment.

Unified Command (UC) - A unified team which manages an incident by establishing a common set of incident objectives and strategies.

Unit - The organizational element having functional responsibility for a specific Incident Planning, Logistic, or Finance/Administration activity.

Vessel Support Unit - Functional unit within the Support Branch of the Logistics Section responsible for implementing the Vessel Routing Plan; for fueling, maintaining, and repairing vessels and other

vessel support equipment; and coordinating transportation on the water and between or among shore resources.

Volunteer - Any individual accepted to perform services by an agency which has the authority to accept volunteer services. A volunteer is subject to the provisions of the authorizing statute or regulations.

13.2 Acronyms

ACP	Area Contingency Plan
ADIOS	Automated Data Inquiry for Oil Spills
AOBD	Air Operations Branch Director
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
ATV	All Terrain Vehicle
bbl	Barrel
C	Centigrade (temperature)
CCG	Canadian Coast Guard
CHS	Canadian Hydrographic Service
cm	Centimetre
cm/s	Centimetre per second
cp	Centipoises
cs (cSt)	Centistokes
CUL	Communications Unit Leader
decon	Decontamination
DHP	Duty Harbour Pilot
DMOB	Demobilization Unit Leader
DWT	Deadweight
EHS	Environment, Health and Safety
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ESI	Environmental Sensitivity Index
F	Fahrenheit (temperature)
FMO	Federal Monitoring Officer (CCG)
FOG	Field Operations Guide
FOSC	Federal On-Scene Coordinator
FOSET	Fisherman's Oil Spill Emergencies Team
FSA	Forward Staging Area
FSC	Finance/Administration Section Chief
ft	Feet
GIS	Geographic Information System
gpm	Gallons per Minute
GPS	Global Positioning Satellite
GRT	Gross Registered Tons
GSUL	Ground Support Unit Leader
H/C	Historic/Cultural
H2S	Hydrogen Sulphide
Ha	Hectare
HAZMAT	Hazardous Materials
HAZSUB	Hazardous Substances
HAZWOPER	Hazardous Waste Operations and Emergency Response
HF	High Frequency
HFO	Heavy Fuel Oil
HP	Horsepower
HQ	Headquarters
HR	Human Resources
IACS	International Association of Classification Societies
IAP	Incident Action Plan
IBRRC	International Bird Rescue and Rehabilitation Centre
IC	Incident Commander
IC	Incident Command (Commander)
ICLL	International Convention on Load Lines
ICP	Incident Command Post
ICS	Incident Command System
IMO	International Maritime Organisation
IMT	Incident Management Team
IO	Information Officer
IPIECA	International Petroleum Industry Environmental Conservation Association
IR	Infra Red
IRG	Incident Response Guide
IRT	Initial Response Team (Tier 1)
ISB	In-situ Burn
ISF	International Shipping Federation
ISGOTT	International Safety Guide for Oil Tankers and Terminals

ISM	International Management Code for Safe Operations of Ships and for Pollution Prevention
ITOPF	International Tanker Owners Pollution Federation
ITZ	Intertidal Zone
IUCN	International Union for Conservation of Nature and Natural Resources
JIC	Joint Information Center
KBOD	Thousand Barrels of Oil per Day
kg	Kilogram
km	Kilometre
kts	Knots (nautical miles per hour)
kW	Kilowatt
l	Litre
LFO	Light Fuel Oil
LO	Liaison Officer
LOA	Length Over all
LR	Lloyd's Register of Shipping
LSC	Logistics Section Chief
m	Metre
m/s	Metres per Second
m3	Cubic Meter
MACS	Multi-agency Coordination System
MARPOL	Marine Pollution (International Convention for the Prevention of Pollution from Ships)
MB	Million Barrels
MCTS	Marine Communications and Traffic Services
MFO	Medium Fuel Oil
MGO	Marine Gas Oil
MHz	Megahertz
min	Minute
mm	Millimetre
MOV	Manually Operated Valve
MSDS	Material Safety Data Sheet
MUL	Medical Unit Leader
NAPL	Non-Aqueous Phase Liquids
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCP	National Contingency Plan
NEB	National Energy Board
NEBA	Net Environmental Benefit Analysis
NGL	Natural Gas Liquid
NIMS	National Incident Management System
NO2	Nitrogen Oxides
NOAA	National Oceanic and Atmospheric Administration
NOAA	National Oceanic and Atmospheric Administration (USA)
NRDA	Natural Resource Damage Assessment
NRS	National Response System
O2	Oxygen
OEL	Occupational Exposure Limit
OGC	Oil and Gas Commission
OHF	Oil Handling Facility
OPA 90	Oil Pollution Act of 1990
OPRC	Oil Pollution Preparedness, Response and Co-operation Convention 1990
OPS	Operations Section Chief
Ops	Operations
OSC	On-Scene Coordinator
OSCP	Oil Spill Contingency Plan
OSHA	Occupational Safety and Health Administration (USA)
OSIC	On-Scene Incident Commander (Facility Manager/Designated IRT Supervisor)
OSR	Oil Spill Response
OSRL	Oil Spill Response Limited (UK)
OSRO	Oil Spill Response Organization
OSRPs	Oil Spill Response Plans
OSRV	Oil Spill Response Vessel
PA	Programmatic Agreement
PAHs	Polynuclear Aromatic Hydrocarbons
PC	Personal Computer (IBM based)
PEL	Permissible Exposure Limits
PEP	Provincial Emergency Program
PFD	Personal Flotation Device
PIC	Person In Charge
PM10	Particulate Matter having a diameter less than 10 microns
PPE	Personal Protective Equipment
ppm	Parts per Million
PSC	Planning Section Chief
psi	Pounds per square inch (pressure)
PVC	Poly Vinyl Chloride
QI	Qualified Individual (OPA 90)

RAR	Resources at Risk
REET	Regional Environmental Emergencies Team
RO	Response Organization
RP	Responsible Party
RPIC	Responsible Party Incident Commander
RRT	Regional Response Team
RUL	Resources Unit Leader
SAR	Search and Rescue
SCAT	Shoreline Cleanup Assessment Team
SCBA	Self-Contained Breathing Apparatus
sec	Second
SO	Safety Officer
SO2	Sulfur Dioxide
SOLAS	(International Convention for) Safety of Life at Sea
SONS	Spill of National Significance
SOS	Shoreline Oiling Summary
SOSC	State On-Scene Coordinator
SSB	Single Side Band (Radio)
SSC	Scientific Support Coordinator
SSHP	Site Safety and Health Plan
STEL	Short-term Exposure Limit
SUL	Situation Unit Leader
TFR	Temporary Flight Restrictions
TLV	Threshold Limit Value
TRS	Tiered Response System
TWA	Time-weighted Average
UC	Unified Command
UHF	Ultra High Frequency
UK	United Kingdom
USA	United States of America
USCG	United States Coast Guard
UV	Ultra Violet
VCR	Videotape Cassette Recorder
VHF	Very High Frequency
VOSS	Vessel of Opportunity Skimming System
VRP	Vessel Response Plan
VTC	Vessel Traffic Control
VTS	Vessel Traffic Services
WCB	WorkSafe BC
WCMRC	Western Canada Marine Response Corporation

WA State Primary Response Contractor (PRC) List

The following is a list of Primary Response Contractors that meet the requirements set forth in WAC 173-182-800, 810, and 820.

COMPANY NAME	COMPANY LOCATION	SPILL NUMBER	OIL SPILL		Land Spill	Marine Spill	Vac Truck	STATE COVERAGE	
			Small*	Large				Eastern	Western
Able Clean-up Technologies	Spokane	(509) 466-5255	X		X	X	X	X	
Big Sky Industrial	Spokane	(509) 624-4949	X		X		X	X	
Cowlitz Clean Sweep	Longview, Port Angeles, Aberdeen	(888) 423-6316	X	X	X	X	X		X
Global Diving and Salvage	Seattle/Anacortes/Port Angeles	(206) 623-0621	X	X		X			X
Moran Environmental Recovery	Kent	(888) 233-5338	X		X	X	X		X
Islands' Oil Spill Association	San Juan Islands	(360) 378-5322	X			X		San Juans Only	
NWFF Environmental	Philomath, OR/Portland	(800) 942-4614	X			X		Columbia River	
NRC Environmental Services, Inc.	Seattle/Tacoma/Spokane/Portland	(800) 337-7455	X	X	X	X	X	X	X

PRC's keep updated equipment lists on the Western Response Resource List (WRRL). http://www.wrrl.us/fmi/iwp/res/download.html

A map of PRC equipment can be found at the following link: http://www.ecy.wa.gov/programs/spills/preparedness/prc/mapdefinitions.html

WA State Class 2 Mobile Facilities

The following is a list of Class 2 Mobile Facilities that meet the requirements set forth in WAC 173-180.

COMPANY NAME	COMPANY LOCATION	SPILL NUMBER	OIL SPILL		Land Spill	Marine Spill	Vac Truck	STATE COVERAGE	
			Small*	Large				Eastern	Western
Certified Cleaning Services	Seattle/Tacoma/Spokane/Vancouver	(888)-927-0078	X		X		X	X	X
Emerald Services	Seattle	(888)-832-3008			X		X		X
Marine Vacuum Service (MARVAC)	Seattle	(800) 540-7491	X		X		X		X

* Small= roadside, home tank, saddle tank, storm drains, etc.

Exhibit 8022

The Following is a List of Regional Treatment Centers for Petroleum Contaminated Soil:

CRO	Roosevelt	Roosevelt Regional Landfill	1-800-275-5641	Disposal Only
ERO	Spokane	Remtech, Inc.	(509) 624-0210	Thermal Desorption
NWRO	Everett	Rinker Materials	(425) 355-2111	Soil Remediation
NWRO	Seattle	Leforge Cement	(206) 937-8025	Cement Incorporation
SWRO	Tacoma	Petroleum Reclaiming Services	(253)383-4175	Stabilization/Disposal
SWRO	Port Angeles	Fields Shotwell Corp.	(360) 457-1417	Thermal Treatment/Recycling
SWRO	Portland OR	Waste Management	(800) 685-8001	Disposal Only
SWRO	Fife	Fife Sand & Gravel	(253) 922-7710	Bio-Remediation

KEY: CRO: Central Region ERO: Eastern Region NWRO: Northwest Region SWRO: Southwest Region

Washington State Department of Ecology Regional Office 24-Hour Oil Spill/Release Reporting Numbers

WHAT WE NEED TO KNOW

- Reporting Party
- Contact Phone(s)
- Responsible Party
- Material Released
- Resource Damages (e.g. dead fish)
- Quantity
- Concentration
- Location
- Cleanup Status



Or call the **Department of Emergency Management 24-hour Number: 1-800-258-5990**

For EPA and US Coast Guard reporting, call the National Response Center: 1-800-424-8802

Idaho: Communications Center (208) 327-7442 ***Oregon***: Emergency Management (503) 378-6377

BC: Provincial Emergency Program (800) 663-3456 ***EPA Region X, Seattle***: (206) 553-1263

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 14-001

REBUTTAL TESTIMONY BY KEVIN E. CAHILL, Ph.D.
on behalf of STANDING ROCK SIOUX TRIBE

APRIL 28, 2015

Exhibit 8029

Q. State your name and occupation.

A. My name is Kevin E. Cahill. I serve as Project Director / Senior Economist for ECONorthwest, an economics, finance, and planning consulting firm with offices in Portland and Eugene, Oregon, Seattle, Washington, and Boise Idaho. I am also a Research Economist for the Sloan Center on Aging and Work at Boston College, in Chestnut Hill, Massachusetts.

Q. Summarize your education and professional background.

A. My resume is attached as Appendix A to the REBUTTAL EXPERT REPORT OF ECONOMIST KEVIN E. CAHILL, PH.D., ON BEHALF OF THE STANDING ROCK SIOUX TRIBE.

I earned my Ph.D. in Economics from Boston College in 2000, after receiving my M.A. in Economics from Boston College in 1997, and my B.A. with honors in Mathematics and Economics from Rutgers College in 1993. Since earning my Ph.D., I have worked as a research economist both in academia (Sloan Center at Boston College, 2005-present; Center for Retirement Research, Boston College, 2003) and as a consultant providing expert reports and testimony. I specialize in applied microeconomics – including but not limited to the economics of aging, health and labor economics – applied econometrics and statistical methods and public policy. I have conducted extensive research and analysis related to patterns of labor force withdrawal, occupational changes with age and related economic issues and statistical analyses.

Q. Summarize your publications.

A. My resume lists my academic papers and publications. This includes co-authoring a forthcoming essay entitled *Evolving Patterns of Work and Retirement*, to be published in THE HANDBOOK OF SOCIAL SCIENCES (8th Edition), as well as nearly 50 published academic articles, papers and professional and expert reports. My publications have addressed a wide range of labor and health economic issues ranging from *Linking Shifts in the National Economy with Changes in Job Satisfaction, Employee Engagement and Work-Life Balance*, in 56 JOURNAL OF BEHAVIORAL AND EXPERIMENTAL ECONOMICS (2015), to *Did the 9/11 Compensation Fund Accurately Assess Economic Losses* in TOPICS IN ECONOMIC ANALYSIS AND POLICY, Vol. 6, Issue 1 (2006).

Q. Describe any professional honors or awards you have received.

A. My professional activities, honors and awards are listed on my resume. They include the 2011 Lawrence R. Klein Award for Best MONTHLY LABOR REVIEW article in 2011, and Teaching Excellence Award, Boston College, Graduate School of Arts and Sciences, 1998.

Q. Describe any professional presentations you have given at professional or academic conferences.

A. I have made many professional presentations, on a wide variety of topics related to applied microeconomics and public policy. They are listed on my resume. My presentations range from *How Might the Affordable Care Act Impact Retirement Transitions?* Presentation at the 89th Annual Conference of the Western Economic Association International, Denver, CO June 28, 2014, to *The Role of the Economist in Assessing Damages for Defendants*, Presentation at Liberty Mutual Group, Marlton, NJ March 18, 2005.

Q. Do you have a leadership role in any professional associations?

A. My leadership roles and professional memberships are listed on my resume. I am a founding Editorial Board member of WORK, AGING AND RETIREMENT. I serve as an At-Large Vice President of the National Association of Forensic Economics. I am a member of the American Economics Association and the Gerontological Society of America, among other professional organizations.

Q. Describe your experience providing expert witness testimony in legal proceedings.

A. My experience providing expert witness testimony in legal proceedings is described on my resume. I have provided expert witness testimony in over a dozen court proceedings, ranging from opinions on economic loss and damages in state court contract claims, to the apportionment of damages across purchaser and product groups in federal anti-trust litigation.

Q. On whose behalf are you testifying today?

A. I am providing rebuttal testimony on behalf of the Standing Rock Sioux Tribe, to rebut testimony presented by the Staff of the Public Utilities Commission, namely the direct testimony of Kimberly Lorrene McIntosh and Brian Walsh.

Q. Are you familiar with the petition by TransCanada for re-certification under SDCL §49-41B-27 of its permit to construct the Keystone XL Pipeline in South Dakota?

A. Yes. Appendix B to my report outlines the documents that I have read and analyzed regarding the Keystone Pipeline, the Keystone XL Pipeline and the re-certification of the South Dakota permit. My review included many of the documents filed with the Public Utilities Commission in HP 14-001, the pre-filed testimony of key witnesses of the Commission Staff, as well as the U.S. Department of State *Final Supplemental Environmental Impact Statement on the Keystone XL Pipeline Project*.

Q. Is the Final SEIS relevant to this certification proceeding?

A. Yes, it is definitely relevant. It is my understanding that under the statute, "the utility must certify to the Public Utilities Commission that (it) continues to meet the conditions upon which the permit was granted." The Amended Conditions require compliance with applicable health and safety and environmental laws, including the National Environmental Protection Act of 1969 (NEPA). It is also my understanding that NEPA requires that projects affecting the quality of the human environment, such as the Keystone XL Pipeline, undergo a rigorous environmental review. The Department of State released the FSEIS in January, 2014. I respectfully strongly recommend that the PUC evaluate the FSEIS in determining whether the Keystone XL Pipeline continues to comply with all applicable health and safety laws.

Q. Did you evaluate the efficacy of the FSEIS as a complete and accurate review of the impacts of the Keystone XL Pipeline?

A. Under the Council on Environmental Quality regulations, "Environmental impact statements shall be prepared using an inter-disciplinary approach which will insure the integrated use of the natural and social sciences." 40 CFR §1502.6. Accordingly, the FSEIS contains a chapter on the Socioeconomic Impacts of the Keystone XL Pipeline. As a labor and health

economist and applied econometrician, I evaluated the socioeconomic impacts analysis in the FSEIS.

Q. Explain further.

A. I shall elaborate by reference to the pre-filed testimony of Brian Walsh, on behalf of the Commission staff. Mr. Walsh gave the opinion that pursuant to "the recommendations in the FSEIS, risks to South Dakota's natural resources is minimized." (p. 2, lines 22-23). As a labor and health economist and applied econometrician with extensive experience analyzing the economic consequences of risk, I can attest that Mr. Walsh is incorrect. The application in the FSEIS of the Impact Analysis for Planning (IMPLAN) economic forecasting model contains no quantitative analysis of non-positive socioeconomic impacts of either construction or operation of the Keystone XL Pipeline. The State Department wrote, "The economic effects of the potential pipeline spills are beyond the scope" of the FSEIS (FSEIS, p. 4.10-32). That statement, and other significant shortcomings, demonstrates the inadequacy of the FSEIS under NEPA. Mr. Walsh's assertion that the FSEIS protects the natural resources of South Dakota ignores the fact that extremely important data on negative socioeconomic factors were not factored into the IMPLAN model. My report analyzes the deficiencies in the FSEIS in more detail.

Q. Do you have any other reasoned opinions on the pre-filed testimony in this docket?

A. Yes. The pre-filed testimony of Kimberly Lorrene McIntosh highlights the same misconceptions. Her opinion that any oil spill may be totally remediated "given sufficient time and resources" and the natural environment totally protected notwithstanding the operation of an oil pipeline (p. 4) lacks grounding in reality. The relevant issue is given *limited* resources and time, can petroleum spills, in particular those that can be expected from the Keystone Pipeline, be remediated such that the expected benefits of the pipeline are greater than the expected costs to the residents and businesses in South Dakota.

Q. Do you have any opinion on the impacts of the Keystone XL Pipeline on the Standing Rock Sioux Tribe?

A. The Tribe receives negligible, if any, economic benefits from this project. According to the State Department, "Keystone estimates that only approximately 10 percent of

the construction workforce would be hired from the four proposed project area states." (FSEIS, p. 4.10-2). The purported benefits associated with operations are even more negligible. So the state of South Dakota as a whole would receive little or no economic benefit from the Keystone XL Pipeline, and the net economic impact could very well be negative. The economic impacts associated with the environmental risks of the project have not been adequately evaluated for the Tribe, or for South Dakota generally, so it is not possible to ascertain the net quantitative impacts at this time.

Q. Do you have anything else to add?

A. I respectfully request that the Public Utilities Commission accept my REBUTTAL EXPERT REPORT OF ECONOMIST KEVIN E. CAHILL, PH.D., ON BEHALF OF THE STANDING ROCK SIOUX TRIBE into evidence and give it due consideration in this proceeding.

Dated this 28 day of April, 2015

By: _____
Kevin E. Cahill

STATE OF IDAHO)
:
COUNTY OF ADA)

KAREN L. PATTERSON
NOTARY PUBLIC
STATE OF IDAHO

SUBSCRIBED and SWORN to before me this 28th day of April, 2015

_____
NOTARY PUBLIC exp. 04.05.19

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	PETITION FOR ORDER ACCEPTING CERTIFICATION UNDER SDCL §49-41B-27 DOCKET HP14-001

REBUTTAL EXPERT REPORT OF ECONOMIST KEVIN E. CAHILL, PH.D. ON BEHALF OF THE STANDING ROCK SIOUX TRIBE

April 28, 2015

Rebuttal Expert Report of Economist Kevin E. Cahill, PhD on Behalf of the Standing Rock Sioux Tribe

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I. INTRODUCTION

A. Summary of Opinions

1. Economics is the study of the efficient allocation of scarce resources. Decision making in the face of scarcity is simply a fact of life and, because resources are scarce, it is necessary to choose how to produce, distribute, and consume those resources. To allocate resources efficiently economists generally agree that it is important to consider not just the benefits of decisions, but also the costs.
2. Ms. McIntosh ignores this fundamental reality of economics when she states that "I do not believe there are any petroleum spills that can not [sic] be remediated given sufficient time and resources."[1] I don't think anyone would argue that Ms. McIntosh's response is not accurate. While accurate, it is not meaningful, and in many respects it is nonsensical from an economic standpoint. The relevant issue is given *limited* resources and time, can petroleum spills, in particular those that can be expected from the proposed Keystone oil pipeline, be remediated such that the expected benefits of the oil pipeline are greater than the expected costs to the residents and businesses in South Dakota and other jurisdictions along the route of the proposed pipeline.
3. The socioeconomic analyses conducted to date are grotesquely insufficient in this regard. They are incomplete, inadequate and fail to employ professional methods and standards for conducting such analyses. The quantitative analyses that I have reviewed in this matter as they pertain to socioeconomic impacts, including the State Department's Final Supplemental Environmental Impact Statement for the Keystone XL Project (FSEIS), have all been conducted in the absence of any quantitative assessment of potential negative socioeconomic impacts.[2] Not surprisingly, when socioeconomic costs are assumed to be zero and socioeconomic benefits are assumed to be positive, the conclusion is a positive socioeconomic impact. Such an approach is inconsistent with commonly-accepted principles and practices in the field of economics.

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[1] Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September), p. 4.

[2] United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, January 2014.

4. This fundamental flaw applies to two recent analyses in particular that I have reviewed, and their resulting conclusions regarding socioeconomic impacts are grossly insufficient as a result. First, in its FSEIS, the State Department uses the Impact Analysis for Planning (IMPLAN) economic forecasting model to conduct a large part of its socioeconomic impact analysis. The IMPLAN methodology is a valid technique in some cases; however, the State Department's application of the IMPLAN model in this case contains no quantitative analyses of non-positive socioeconomic impacts of either construction or operations of the Keystone oil pipeline. Nowhere in the entire 11-volume report's socioeconomic assessment is there any mention of the prospect of jobs lost in the State of South Dakota in future years. The reason is due to the fact that negative impacts are simply impossible given the IMPLAN methodology used by the State Department. As a result, in no way does the State Department analysis reflect the net socioeconomic impact of the Keystone oil pipeline on the State of South Dakota.
5. The State Department's justification for not including the implications of pipeline spills in its socioeconomic analysis is that it did not have the resources to do so. In the State Department's words, "The economic effects of potential pipeline spills are beyond the scope of this operations assessment."[3] One has to wonder what the actual economic implications of a spill involve if simply estimating the costs of a spill is too much work for an agency with an annual budget of more than $50 billion.
6. The IMPLAN methodology that the State Department uses, therefore, naively assumes a positive impact and then portends to calculate just how positive. This methodology is seriously flawed, as any spill from the Keystone oil pipeline will have at least some negative impact on the local, if not state, economy. The State Department's socioeconomic estimates, in contrast, use the following dollar value for negative impacts: $0.
7. The State Department fails to conduct even the most rudimentary assessment of impact on Quality of Life (QoL) and productivity – a survey of individuals who have experienced the negative implications of oil spills due to the construction and operations of oil pipelines.
8. The State Department fails to conduct any kind of real-world comparables analysis as part of its socioeconomic assessment, such as the socioeconomic implications of oil spills on local

[3] FSEIS, p. 4.10-32.

economies – including jobs lost – to evaluate the economic impact of an unplanned release of oil. Such an analysis could include places where the construction of an oil pipeline or comparable project was performed recently.

9. While the SEIS implicitly assumes a zero dollar value for negative socioeconomic impacts and ignores other well-known methods to quantify costs, the SEIS is very explicit about the miniscule positive socioeconomic benefits to the State of South Dakota and the Standing Rock Sioux Tribe. Further, according to the SEIS, "Because of the specialized nature of the work, Keystone estimates that only approximately 10 percent of the construction workforce would be hired from the four proposed Project area states."[4] Apparently South Dakota's own workers are not good enough for this work. Further, neither the construction nor the operations of the Keystone oil pipeline will have any meaningful impact on the estimated 37.2 percent employment rate of the Standing Rock Reservation.[5]
10. The second document is a risk analysis of the proposed Keystone oil pipeline conducted by a research team hired by TransCanada Keystone Pipeline, LP.[6] This report spans a full 36 single-spaced pages and includes potentially-valuable information about the source of spills (corrosion, natural forces, excavation damage, other outside force damage, material and/or weld failures, equipment, and incorrect operation) and the costs associated with each cause. The authors use the term "total cost" to describe costs, however, the term "socioeconomic" is not mentioned once in the entire report and neither is the word "jobs" (as in jobs lost), an interesting juxtaposition with the SEIS that touts socioeconomic benefits almost entirely in terms of jobs created.
11. Any decent economic analysis contains a summary of high-level findings. The TransCanada Keystone Pipeline, LP risk assessment does not. In fact, the word "dollar" and the symbol "$" are completely absent from the report summary. One has to wonder what the point of this study is if: 1) the entire methodology section is grounded with an expected cost risk equation, and 2) the main conclusion is silent about what these expected costs are.

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[4] FSEIS, Section 4.10 (Socioeconomics), January 2014, p. 4.10-2.
[5] United States Department of the Interior. 2014. *2013 American Indian Population and Labor Force Report*. Washington, D.C. Available at: http://www.bia.gov/cs/groups/public/documents/text/idc1-024782.pdf.
[6] McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute.

12. The authors even acknowledge their inability to identify costs in any meaningful way and conclude that they are unable to conduct even a rudimentary cost-benefit analysis. It is very concerning that those most knowledgeable about spills are unable to attempt a straightforward cost-benefit assessment.
13. Even more egregious, when examining the extent to which the spills in their database are indicative of the proposed Keystone oil pipeline, the authors limit their comments to biases that operate in favor of their client. The authors are silent about well-known biases that operate in the other direction, such as the pressure under which the pipeline will operate and the caustic nature of the tar sands oil. The fact that the authors are silent about biases that go against their client's interests calls into question their entire analysis and makes one wonder what else they are not telling the reader.
14. The evidence presented by TransCanada's research team runs counter to an independent study – most notably, one not funded by TransCanada, but also not funded by the intervenors in this case – conducted by Professor John Stansbury from the University of Nebraska – Lincoln. Economists are oftentimes faced with this type of situation, where experts in a particular field disagree. The response of a well-trained economist is to conduct what is known as a sensitivity analysis. Simply put, you perform your calculations using different scenarios and show how the results change when the underlying assumptions change. Clearly there are differences of opinion among experts with respect to the consequences of an oil spill. None of the socioeconomic impact analyses I have seen include any kind of sensitivity analysis with respect to these obvious differences of opinion among qualified experts.
15. Simply put, the socioeconomic impact analyses of the Keystone oil pipeline are a statement about the expected socioeconomic benefits of the project – marginal in the case of South Dakota – in the absence of any costs or risks. As a PhD economist I find it inexplicable why the quantitative portion of the socioeconomic cost analysis in the SEIS completely ignores the cost side of this cost-benefit analysis. A balanced and well-informed socioeconomic impact analysis would, at an absolute minimum, at least attempt to model the potential negative implications of the construction and operating impacts of the Keystone oil pipeline to arrive at net impacts.
16. Because of these shortcomings, Mr. Walsh is incorrect when he asserts in his pre-filed testimony that pursuant to "the recommendations in the FSEIS, risks to South Dakota's

natural resources is minimized."[7] As noted above, and as explained in detail below, the application in the FSEIS of the IMPLAN economic forecasting model contains no quantitative analysis of non-positive socioeconomic impacts of either construction or operation of the Keystone XL Pipeline. Minimized does not imply minimal and certainly does not imply zero, as the State Department assumes in its IMPLAN analysis.

17. In further regard to Ms. McIntosh, she also provides other testimony regarding a generic or non-specific "petroleum spill" or "hydrocarbon spill." Such generic or sweeping statements ignore the specifics of the Keystone pipeline, or the risks associated with the corrosive and toxic nature of the tar sands oil that would flow through the pipeline.

18. This report is structured as follows. The remainder of this section presents my qualifications, assignment, compensation and materials considered. Section II contains a summary of the relevant background information in this case as it pertains to my rebuttal report. Section III presents and comments on the pretrial testimony of Ms. McIntosh. Section IV follows up on my comments regarding Ms. McIntosh's testimony with an assessment of the IMPLAN methodology used by the State Department to assess socioeconomic impact. Section V follows up on my comments regarding Ms. McIntosh's testimony and Mr. Walsh's testimony with an assessment of the empirical analysis contained in the SEIS and TransCanada's risk assessment. Section VI follows up on my comments regarding Ms. McIntosh's testimony by noting some obvious inconsistencies in the SEIS analysis and TransCanada's assessments of risk. Section VII comments on how Ms. McIntosh trivializes the potential costs of the Keystone oil pipeline. Section VIII summarizes the main points of this report.

B. Qualifications

19. My name is Kevin E. Cahill, Ph.D. I hold a B.A. in both economics and mathematics from Rutgers College and an M.A. and Ph.D. in economics from Boston College, with a focus in applied econometrics and labor economics. I am currently a project director and senior economist at ECONorthwest, a Northwest-based economic consulting firm, and a research economist with the Center on Aging & Work at Boston College ("the Center"). I have been

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[7] Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2015. 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 (April), p. 2.

with ECONorthwest since April 2012. I have been affiliated with the Center since its inception in 2005. Prior to joining ECONorthwest, I was a manager at Analysis Group, an economics and financial consulting firm headquartered in Boston, Massachusetts. While at Analysis Group, I worked as an economist on a variety of litigation-related cases involving contract disputes, antitrust issues and improper marketing, and the calculation of damages in such cases. My casework at Analysis Group also included an assessment of competition in the pharmaceutical benefit manager industry, an analysis of topping bids in mergers and acquisitions, and an assessment of age discrimination claims within cash balance pension plans.

20. In addition to my consulting work, I conduct economic analyses related to public policy. My research focuses on applied microeconomics with a concentration in the economics of aging. My work has been published in academic journals, including *The Gerontologist*, *Research on Aging*, *Monthly Labor Review*, *Topics in Economic Analysis and Policy*, *Current Medical Research and Opinion*, *Journal of Managed Care Pharmacy*, *Expert Opinion on Pharmacotherapy*, as well as by the Center for Retirement Research, the Center on Aging & Work, and the U.S. Bureau of Labor Statistics.
21. Prior to joining Analysis Group, I served as the associate director for research at the Center for Retirement Research at Boston College, as an economist and expert witness with Tinari Economics Group, and as an associate at Abt Associates, Inc., a for-profit public policy research firm based in Cambridge, Massachusetts. I am a member of the American Economics Association and I am currently vice president at-large on the Board of the National Association of Forensic Economists.
22. I have previously testified in deposition and at trial. My expert opinions pertained to lost profits to business, lost earnings, including fringe benefits and pensions, and other economic losses.
23. Although I hold positions with ECONorthwest in Portland, Oregon and with Boston College in Chestnut Hill, Massachusetts, I currently reside in Boise, Idaho and have been a resident of Boise since March 2010. Prior to living in Boise, Idaho, I was a resident of Marshfield, Massachusetts.

24. My professional and academic qualifications, publications in the past ten years, and testimony in the past four years are described in my curriculum vitae, which is attached as Appendix A.

C. Assignment

25. I have been asked by counsel for the Standing Rock Sioux Tribe to rebut the testimony offered by Brian Walsh and Kimberly Lorrene McIntosh as it pertains to the socioeconomic impacts of the Keystone oil pipeline.[8]
26. To the extent relevant to my rebuttal comments, I have also been asked by counsel for the Standing Rock Sioux Tribe to: (1) review TransCanada's Petition for Order Accepting Certification under SDCL §49-41B-27 and the FSEIS issued by the State Department; (2) assess the methodology used by the State Department to determine the socioeconomic impact on the citizens of South Dakota; and (3) comment on the extent to which the claims by the State Department reflect current conditions and knowledge with respect to the true socioeconomic impact of the Keystone oil pipeline on the citizens of South Dakota and the Standing Rock Sioux Tribe.
27. I would like to note that I feel an incredible pride in our country. I am deeply appreciative of the fact that I live in a country where civilians can offer without fear of retribution opinions on an analysis conducted by a government agency that pertains to such a high-profile project as the Keystone oil pipeline.
28. I am willing to testify under oath as to the opinions expressed in this report.
29. I may offer additional opinions if additional relevant information becomes available.

D. Compensation

30. I have been compensated for my time on this matter at my standard hourly rate for litigation-related work through ECONorthwest. This rate is $300 per hour. None of my compensation is based on the outcome of the Keystone oil pipeline. The time that I have spent on this matter was conducted through ECONorthwest and is unrelated to my work with the Center.

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[8] Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September); Pre-filed Testimony of Brian Walsh. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April).

31. Under my direction, staff at ECONorthwest assisted with the preparation of this report. Staff at ECONorthwest were compensated for their time on this matter according to their standard hourly rate for litigation-related work through ECONorthwest.

32. Should other parties involved in this case request further analyses from me, they will be billed through ECONorthwest at my hourly rate for litigation-related consulting services. This rate is currently $300 per hour. Any follow-up work that I deem requires the assistance of ECONorthwest staff will also be billed at ECONorthwest's standard hourly rates for litigation-related consulting services.

E. Materials Considered

33. I have reviewed documents provided by counsel for the Standing Rock Sioux Tribe and other documents that are publicly available. A list of these documents is contained in Appendix B.

II. BACKGROUND

34. The Public Utilities Commission of the State of South Dakota (PUC) is considering an application by TransCanada Keystone Pipeline, LP (Applicant) for certification under SDCL §49-41B-27 to site and build the Keystone XL hydrocarbon pipeline project (the Keystone oil pipeline) through western South Dakota. The Applicant sought and obtained a permit from the PUC in 2010 to build and operate the Keystone oil pipeline on June 29, 2010.[9] My understanding is that, while permits are perpetual, if construction does not start within four years of approval, then an applicant must certify that a project continues to meet the conditions of the initial permit.[10] In this case, the Applicant must certify to the PUC that the Keystone oil pipeline continues to meet the conditions of SDCL §49-41B-27.[11]

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[9] Petition for Order Accepting Certification under SDCL §49-41B-27. In re: 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 before the Public Utilities Commission of the State of South Dakota, September 15, 2014 (TransCanada Keystone Oil Pipeline Petition).

[10] SDCL 49-41B-27 states: "Construction, expansion, and improvement of facilities. Utilities which have acquired a permit in accordance with the provisions of this chapter may proceed to improve, expand, or construct the facility for the intended purposes at any time, subject to the provisions of this chapter; provided, however, that if such construction, expansion and improvement commences more than four years after a permit has been issued, then the utility must certify to the Public Utilities Commission that such facility continues to meet the conditions upon which the permit was issued." (Source: South Dakota Legislature, Legislative Research Council, http://legis.sd.gov/Statutes/Codified_Laws/DisplayStatute.aspx?Type=Statute&Statute=49-41B-27, accessed April 13, 2015.)

[11] TransCanada Keystone Oil Pipeline Petition.

35. The Applicant, through their attorneys, have submitted a petition and supporting documents that they believe "provides the necessary basis for the Commission to find that the Project continues to meet the conditions upon which the June 2010 permit was issued." As such, they have requested that the PUC accept certification of the Keystone oil pipeline through western South Dakota.[12]

36. In January 2014 the United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs (State Department) issued a Final Supplemental Environmental Impact Statement (FSEIS) for the Keystone oil pipeline in order to "assess the potential impacts associated with the proposed Project and its alternatives."[13] The State Department states that the FSEIS includes several changes from the initial EIS, dated November 2008, including "an expanded analysis of potential oil releases; expanded climate change analysis; updated oil market analysis incorporating new economic modeling; and expanded analysis of rail transport as a part of the No Action Alternative scenario."[14] The State Department does not include its socioeconomic impact analysis among its highlighted list of changes.

37. According to the SEIS, construction for the Keystone oil pipeline will "contribute approximately $3.4 billion to the U.S. GDP" and "[c]onstruction spending would support a combined total of approximately 42,100 jobs throughout the United States."[15] Further, the FSEIS states that "[a]bout 12,000 jobs, or 29 percent of the total 42,100 jobs, would be supported in Montana, South Dakota, Nebraska, and Kansas, approximately 3,900 (or 1,950 per year if construction took 2 years) would comprise of direct, temporary, construction workforce in the proposed Project area."[16]

38. Regarding operations, the FSEIS states that the Keystone oil pipeline will "require approximately 50 total employees in the United States: 35 permanent employees and 15 temporary contractors" and that "[t]he total estimated property tax from the proposed Project

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[12] Petition for Order Accepting Certification under SDCL §49-41B-27. In re: 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 before the Public Utilities Commission of the State of South Dakota, September 15, 2014 (p. 6).

[13] United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Executive Summary, January 2014, p. ES-1.

[14] FSEIS, p. ES-1.

[15] FSEIS, p. ES-20.

[16] FSEIS, p. ES-20.

in the first full year of operations would be approximately $55.6 million spread across 27 counties in three states."[17]

III. MS. MCINTOSH'S STATEMENTS ARE ECONOMICALLY NONSENSICAL

39. Economics is the study of the efficient allocation of scarce resources. Decision making in the face of scarcity is simply a fact of life and, because resources are scarce, it is necessary to choose how to produce, distribute, and consume those resources. To allocate resources efficiently economists generally agree that it is important to consider not just the benefits of decisions, but also the costs.

40. In her pre-filed testimony, Ms. McIntosh is asked, "Are there spills that cannot be remediated?"[18] In response, she states, "I do not believe there are any petroleum spills that can not [sic] be remediated given sufficient time and resources."[19] I don't think anyone would argue that Ms. McIntosh's response is not accurate. While accurate, it is not meaningful, and in many respects it is nonsensical from an economic standpoint. The relevant issue is given *limited* resources and time, can petroleum spills, in particular those that can be expected from the proposed Keystone oil pipeline, be remediated such that the expected benefits of the oil pipeline are greater than the expected costs.

41. A socioeconomic cost analysis has been conducted by the State Department as part of the FSEIS. I have reviewed this analysis and others pertaining to this case to assess if Ms. McIntosh's statements, even if corrected to be economically meaningful, would be considered valid among qualified professionals in the field of economics. As I explain in the following sections, the answer is no. In particular, the socioeconomic analysis contained in the FSEIS is in no way an accurate reflection of the net socioeconomic impact of the Keystone oil pipeline.

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[17] FSEIS, p. ES-20.

[18] Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September), p. 4.

[19] Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September), p. 4.

IV. THE CURRENT SOCIOECONOMIC ANALYSES ARE FUNDAMENTALLY FLAWED FROM A METHODOLOGICAL STANDPOINT

42. The methodology that the State Department uses for assessing socioeconomic impact of the Keystone oil pipeline examines "the potential impacts to socioeconomic resources associated with the construction and operation of the proposed Project and connected actions, and discusses potential mitigation measures that would avoid or minimize the potential impacts."[20] The State Department explains that "[e]conomic activity is defined as the production of goods and services required to meet the demand for construction of the proposed Project. Funds spent by Keystone would trigger production activity, which could be expressed in terms of employment and earnings."[21]

43. The State Department then concludes that the relevant research question is to estimate the magnitude of the (positive) ripple effects throughout the economy, including direct and indirect impacts, as well as induced impacts, described as "the spending of earnings that would be received by employees working for either the construction contractor or for any supplier of goods and services required in the construction process."[22] The State Department's promise to discuss "potential mitigation measures that would avoid or minimize potential impacts" is oddly relegated to another section of the report,[23] and is not used to inform the State Department's economic calculations in any way.

44. The State Department is rather explicit about its abdication of its responsibility to assess negative impacts, claiming it does not have the resources to do so. In the State Department's words, "The economic effects of potential pipeline spills are beyond the scope of this operations assessment."[24] One has to wonder how a government agency with an annual budget exceeding $50 billion does not have the resources to quantify the negative impacts associated with an oil spill.

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[20] FSEIS, p. 4.10-1.

[21] FSEIS, p. 4.10-13-4.

[22] FSEIS, p. 4.10-14.

[23] The State Department states, "Section 4.13.5, Potential Impacts, discusses the potential impacts of a spill on socio-economic resources." FSEIS, p. 4.10-10.

[24] FSEIS, p. 4.10-32.

A. The IMPLAN Model Does Not Take into Account the Impact of Potential Oil Spills

45. The State Department uses the Impact Analysis for Planning (IMPLAN) economic forecasting method, a straightforward input-output model. As described by the US Department of Agriculture, "IMPLAN provides quick estimates of staffing and program impacts to state and local economies for strategic planning."[25] The key component of the IMPLAN model is the multiplier that it generates (i.e., the number that is used to inflate the number of jobs that the researcher inputs to get the number of additional indirect and induced jobs).

46. The assumptions used in calculating this multiplier are crucial. As it turns out, besides State Department staffing, there is nothing in the FSEIS to suggest that the State Department's application of the IMPLAN model has anything to do with the Keystone pipeline per se. To state the obvious, the State Department's economic forecasting model should take into account the fact that the model is being used to assess the impacts of an oil pipeline and, as such, should consider the negative implications on socioeconomic activity that come with it.

B. The IMPLAN Model Does Not Allow for Negative Impacts

47. The economic impact analysis conducted by the State Department is seriously flawed because the IMPLAN model does not consider the possibility that the Keystone oil pipeline could have a negative impact on population and employment (numbers), housing (numbers), schools (numbers), and tax revenue. A serious economic analysis would, at a minimum, (1) acknowledge the possibility of negative impacts and (2) attempt to address them in the socioeconomic analysis. The State Department does Step 1, but then, mysteriously, ignores all of this information for the purposes of quantifying socioeconomic impacts.

48. In fact, the State Department's analysis contains what at first appears to be a fairly comprehensive list of potential social and economic impacts that they include in their analysis. Specifically, the following is a list of the impacts considered by the State Department: "[o]verburdening of the local housing stock because of demand generated by the temporary and permanent workforces; substantial burden on public service providers serving the proposed Project area, such that they would need to expand their service capacities to meet those

[25] US Department of Agriculture, National Resources Conservation Service, "IMPLAN Model/NRCS Economics," http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/alphabetical/econ/?&cid=nrcs143_009748.

demands; substantial changes to local social or economic activities, including changes in employment and income levels resulting from the proposed Project construction and operations; substantial changes in economic impacts, including output and spending; substantial effects to potential environmental justice populations; substantial changes in fiscal revenues, including tax receipts, of local jurisdictions; substantial changes in private property values; and substantial effects to transportation resources."[26]

49. Most glaringly, the list includes nothing about oil spills. As noted earlier the socioeconomic impacts of oil spills is not quantified and is not included among the State Department's impacts.

50. Regarding the State Department's assessment of the impact of "substantial changes in private property values," the State Department is apparently most concerned about the impacts associated with construction on "short-term visual, noise, and land disturbance effects."[27] Regarding operations, the State Department concludes that the impacts could even be *positive*: "Based on the literature search, the Final EIS stated that residential and agricultural properties located on or adjacent to pipeline easements could have property values worth more or less than comparable nearby properties that were not encumbered by pipeline easements."[28] One has to wonder why the Standing Rock Sioux Tribe–and numerous intervenors–would be opposed to something that has the potential to *increase* property values. The answer is obvious–it wouldn't. It is only through the State Department's omission of oils spills that they reach such a perverse conclusion.

51. The State Department concludes that, "The largest economic impacts of pipelines occur during construction rather than operations."[29] The construction process is a mere two years. The bulk of time is associated with operations, and here the State Department's refusal to examine the socioeconomic costs of a spill is paramount. Regarding operations, the State Department concludes: "[t]he 35 new permanent employees associated with the proposed Project would have a negligible impact on housing in the Project area;"[30] "Once in place, the labor requirements for

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[26] FSEIS, p. 4.10-10.

[27] FSEIS, p. 4.10-31.

[28] FSEIS, p. 4.10-35. The State Department concludes: "The Final EIS concluded it did not appear that operation of the proposed Project would have a major impact on residential and agricultural property values. The analysis in this Final SEIS does not change this conclusion." It is unclear what kind of "analysis" with respect to property values was done as part of the FSEIS.

[29] FSEIS, p. 4.10-32.

[30] FSEIS, p. 4.10-32.

pipeline operations are relatively small;"[31] "[t]he Final EIS … concluded that it was not likely that proposed Project operation would disproportionately adversely impact such populations during normal operation of the proposed Project;"[32] and "[t]he operational workforce … would result in negligible impacts on public services based on the law enforcement agencies, fire departments, and medical facilities in the proposed Project area."[33] In contrast, the State Department concludes that "The impact [of operations] to local property tax revenue receipts would be substantial for many counties."[34] If the benefits were so high relative to the costs, one has to wonder why so much effort has been undertaken by the intervenors to express concerns about the Keystone oil pipeline. The obvious answer is that the State Department's analysis is in no way an accurate assessment of the socioeconomic impact of the Keystone oil pipeline on the citizens of South Dakota.

52. The question that the State Department should have asked is: what is the *net impact* of the proposed Keystone oil pipeline on the socioeconomics of the community? How were businesses in these areas impacted? How were individuals in these areas impacted? How were property values impacted? Did individuals have to move out of the area as a result of the spill? How was wildlife affected? And, most importantly, what was the *dollar value* associated with each of these events? Only until such an assessment is done, can the true socioeconomic impact of the Keystone oil pipeline be understood.

V. THE CURRENT SOCIOECONOMIC ANALYSES ARE GROSSLY INSUFFICIENT FROM AN EMPIRICAL STANDPOINT

53. This section presents an assessment of the State Department's empirical analysis of the socioeconomic impact of the Keystone oil pipeline on four project area states–South Dakota, Montana, Nebraska, and Kansas–as well as the rest of the country.[35] The State Department socioeconomic analysis covers impacts associated with construction and operations of the Keystone oil pipeline. The socioeconomic categories included in the analysis are: population,

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[31] FSEIS, p. 4.10-32.

[32] FSEIS, p. 4.10-32.

[33] FSEIS, p. 4.10-32.

[34] FSEIS, p. 4.10-34.

[35] FSEIS, p. 4.10-2. As described in footnote one of the FSEIS, "The proposed Project pipeline would go through Montana, South Dakota, and Nebraska, with two additional pump stations in Kansas. There would also be a pipe yard and rail siding located in North Dakota."

housing, local economic activity, environmental justice, public services, tax revenue, property values, and traffic and transportation. The State Department's socioeconomic impact analysis with respect to these categories is based on the IMPLAN methodology discussed above. In doing so, the State Department starts with existing conditions (e.g., current population) and estimates the effect of adding people and jobs to the baseline condition. The impact on property values is considered independently from the other socioeconomic considerations, as is the risk associated with an oil spill. The result is that risk burden of an oil spill and the costs associated with any that occurs is not taken into account when estimating impacts on population, housing, the local economy, and public services.

A. The FSEIS Analysis Inexplicably Separates Oil Spills and Property Values from Other Socioeconomic Considerations

54. The State Department applies its IMPLAN model to estimate impacts to population, housing (number of units), and public services. The State Department then discusses, almost as an aside, the estimated number of residents impacted by the risk burden of a potential oil spill and the impact that a spill will have on property values, among other outcomes, including quality of life for those living and working in the affected area. The State Department's IMPLAN analysis, on the other hand, implies that an oil spill has no quantifiable negative socioeconomic impact on the local economy.

B. The FSEIS Analysis Ignores Impacts on Quality of Life

55. The State Department fails to conduct even the most rudimentary assessment of the impact on Quality of Life (QoL) and productivity – a survey of individuals who are currently subjected to the risk of an oil spill. The socioeconomic impact analysis presented in the State Department report is almost entirely hypothetical, as if real-world outcomes did not exist. In fact, not only do real-world examples exist, they are plentiful. Moreover, it is very easy to obtain data on quality of life – you simply ask people. Individual surveys are a very basic part of research. An entire industry focuses on surveys, as most anyone with a telephone can attest.

56. Examples of relevant questions to ask residents in areas that already experienced an oil spill are as follows. "Compared to your living situation prior to the oil spill, has your quality of life been enhanced, has it remained the same, or has it been adversely impacted?" "On a

scale of one to ten, where one is no impact and ten is extreme impact, how would you rate the impact of the oil spill on your quality of life?" "On a scale of one to ten, where one is not at all valuable and ten is extremely valuable, how valuable would it be to you to eliminate the oil spill that you were subjected to?" "In the last week, in what ways were you affected by the oil spill?" "[For those who responded at least once to the previous question] On a scale of one to ten, where one is none and ten is completely, to what extent did these episodes interrupt your daily life?" "Would you say that the oil spill had a negative impact on your quality of life? Yes or No."

57. An important note for a serious analysis is that these questions should be asked of all residents in the surrounding area, not just those who the State Department believes a priori are directly impacted by the oil spill. Such an approach would enable an assessment of the breadth of the socioeconomic impact of an oil spill.

58. If the State Department was serious about the impact of an oil spill on residents in the State of South Dakota, the State Department should simply ask people who would be most affected, such as members of the Standing Rock Sioux Tribe. One has to wonder why, as part of the FSEIS, the State Department has not presented the results of any interviews with those individuals who will, on a daily basis, bear the risk of a potential oil spill and then the costs if one occurs.

C. The FSEIS Analysis Ignores Impacts on Productivity

59. The State Department in its analysis of the impacts of operations on local economic activity claims that employment and earnings impacts of the Keystone oil pipeline will be "negligible."[36] While I agree that the potential positive impacts of the Keystone oil pipeline will be negligible, I strong disagree that this implies that the overall impact will be negligible. The economic costs of an oil spill on local economic activity can be near devastating.[37] The State Department considers none of these effects in their quantitative analysis.

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[36] FSEIS, p. 4.10-32.

[37] One notable example is the BP Gulf of Mexico spill. A report by Oxford Economics on the impact of the 2010 BP spill estimates the negative economic effect on solely the tourism sector of the coastal areas affected by the spill of $22.7 billion over the three years following the spill. *See:* Oxford Economics. Not dated. *Potential Impact of the Gulf Oil Spill on Tourism.* p.2

60. Even if no spill occurs in the near term, the risk of a spill is enough to influence local economic activity. To measure this potential impact, the survey described above could be easily supplemented to ask individuals about the impact of the risk of an oil spill. For example, "If the Keystone oil pipeline project moves forward, will that influence any of your decisions to live, work, and invest in your local community?" "[For those who responded yes to the previous question] On a scale of one to ten, where one is none and ten is a lot, what impact does the risk of a spill have on your plans to live, work, and invest in your local community?"
61. While there may be questions about the reliability of data concerning the magnitude of any impact on productivity and willingness to remain a productive citizen in one's local economy, one would certainly be able to ascertain from a survey if there was no impact. People would just say so.
62. Again, one has to wonder why, as part of the FSEIS, the State Department has not talked to anyone who has experienced the risk of an oil spill.

D. The FSEIS Analysis Erroneously Assumes No Harm for Living with the Risk of an Oil Spill

63. The State Department assumes that the socioeconomic impact on quality of life is zero for living with the risk of an oil spill. While the State Department identifies short and long-term health risks associated with exposure to an oil spill, it does nothing to attempt to determine if the risk of these health conditions—or even the presence of the conditions themselves—has any effect on economic productivity or quality of life. Just as it ignores the possibility of negative socioeconomic effects from the construction and operation of the proposed Keystone pipeline, the State Department ignores the possibility of negative impacts on productivity and quality of life associated with living with the risk of an oil spill.
64. If the State Department were serious about socioeconomic impact, the survey mentioned above would be asked of people who are subjected to potential oil spills. Only then can the State Department's assumptions about the risk of living with a potential oil spill be validated.

E. The FSEIS Analysis Fails to Conduct an Analysis of Relevant Real-World Benchmarks

65. The State Department fails to conduct any kind of real-world analysis of socioeconomic impacts to cities that have already been subjected to something like the proposed Keystone

oil pipeline. Such an analysis is common in economics and is fairly straightforward to conduct, mainly because the relevant data is widely available. The U.S. Census Bureau and the U.S. Bureau of Labor Statistics publish very detailed historical socioeconomic information about cities, counties, states, and regions. These data can be used to examine changes over time with respect to a variety of economic characteristics.

66. Further, an analysis of existing locations subject to potential oil spills can be done two ways, each of which would shed light on the possible impact to South Dakota. The first way is to examine socioeconomic data from cities that experienced a change such as the proposed Keystone oil pipeline and compare these data to analogous data from some other comparable city. A second way to conduct the analysis is to use information prior to the intervention as a benchmark. That is, for the city to serve as its own "control," obviously taking into account other changes over time using multivariate regression analysis. Each method is valuable and each method is common in the field of economics.

F. The FSEIS Analysis Shows Minimal Socioeconomic Benefits to South Dakota or the Standing Rock Sioux Tribe

67. While the FSEIS implicitly assumes a zero dollar value for negative socioeconomic impacts and ignores other well-known methods to quantify costs, the SEIS is very explicit about the miniscule positive socioeconomic benefits to the State of South Dakota or the Standing Rock Sioux Tribe. With respect to the construction of the Keystone oil pipeline, less than 10 percent (8.3%) of the direct and induced jobs would be held by residents of South Dakota, so more than 90 percent of the short-term (<2 years) job benefits associated with Keystone oil pipeline construction are outside of South Dakota. Further, according to the SEIS, "Because of the specialized nature of the work, Keystone estimates that only approximately 10 percent of the construction workforce would be hired from the four proposed Project area states."[38] Apparently South Dakota's own workers are not good enough for this work.

68. Operations of the proposed Keystone project are estimated to create 50 jobs across the entire country (35 on a permanent basis). In March 2015, total employment in South Dakota was 419,200. This means the proposed Keystone project will increase long-term total

[38] United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Section 4.10 (Socioeconomics), January 2014, p. 4.10-2.

employment in South Dakota by no more than 0.012 percent (0.000119 = 50 / 419,200).[39] Actual increases in employment in South Dakota will be even lower (zero for all practical purposes) because not all jobs created by the proposed Keystone project will be located in South Dakota. Further, neither the construction nor the operations of the Keystone oil pipeline will have any meaningful impact on the estimated 37.2 percent employment rate on the Standing Rock Reservation.[40]

69. Because of the shortcomings described above with respect to the socioeconomic analysis contained in the FEIS, Mr. Walsh is incorrect when he asserted in his pre-filed testimony that pursuant to "the recommendations in the FSEIS, risks to South Dakota's natural resources is minimized."[41] Simply put, the application in the FSEIS of the IMPLAN economic forecasting model contains no quantitative analysis of non-positive socioeconomic impacts of either construction or operation of the Keystone XL Pipeline. Minimized does not imply minimal and certainly does not imply zero, as the State Department assumes in its IMPLAN analysis.

VI. THE CURRENT SOCIOECONOMIC ANALYSES ARE INCONSISTENT WITH TRANSCANADA'S OWN RISK ANALYSIS

70. In June 2013 a group of researchers under contract from TransCanada Keystone Pipeline, LP published a risk analysis of the proposed Keystone oil pipeline.[42] This report spans a full 36 single-spaced pages and includes potentially-valuable information about the source of spills (corrosion, natural forces, excavation damage, other outside force damage, material and/or weld failures, equipment, and incorrect operation) and the costs associated with each cause. The authors use the term "total cost" to describe costs, however, the term "socioeconomic" is not mentioned once in the entire report neither is the word "jobs" (as in jobs lost), an

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[39] U.S. Bureau of Labor Statistics. 2015. "Total Nonfarm Employment." *State and Metro Area Employment, Hours, & Earnings.* < http://www.bls.gov/sae/data.htm>

[40] United States Department of the Interior. 2014. *2013 American Indian Population and Labor Force Report.* Washington, D.C. Available at: http://www.bia.gov/cs/groups/public/documents/text/idc1-024782.pdf.

[41] Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2015. 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 (April), p. 2.

[42] McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute.

interesting juxtaposition with the SEIS that touts socioeconomic benefits almost entirely in terms of jobs created.

71. Any decent economic analysis contains a summary of high-level findings. This risk assessment does not. The reader is promised at the beginning that, "an attempt is made to select reasonably conservative values for the incidence costs that make up the risk profile for these individual system elements;"[43] however, these results are scattered throughout the document and missing from the summary. In fact, the word "dollar" and the symbol "$" are completely absent from the summary. One has to wonder what the point of this study is if: 1) the entire methodology section is based on an expected cost risk equation, and 2) the main conclusion is silent about what these expected costs are.

72. One explanation for the lack of an answer is that, for whatever reason, the authors do not want the reader to know what it is. Another explanation is that the authors themselves are not capable of this level of analysis (as far as I can tell, none of the authors have a doctorate in economics). Either way, the authors wave their hands and report the following as one of their "key findings": "Given the tremendous uncertainty in incident costs, both the pipeline operator, TransCanada and the regulators have a great deal of incentive to make the special regulatory conditions imposed on the pipeline effective."[44] This statement is completely vacuous because the reader is left with no idea about the magnitude of the incentive. The magnitude of the incentive, or the expected cleanup cost, is absolutely critical to any worthwhile analysis because this is the foundation for the cost side of the cost-benefit analysis. Lest it gets overlooked, the cost to TransCanada to cleanup a spill is just a subset of the overall cost, including damage to private property, potential job loss, and of course, diminished quality of life for those living in the area.

73. The authors even acknowledge that their inability to identify costs in any meaningful way render them unable to conduct their own cost-benefit analysis, even with respect to the much smaller issue of risk-reduction strategies. "While total damage or incident cost can be a good consequence measure, the inability to model the component costs (e.g., damage to property, emergency response, environmental damage) and generate the total cost from them means

[43] McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 4.
[44] McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 35.

that risk reduction strategies that would lower the component costs cannot be valued."[45] It is concerning that those most knowledgeable about spills from TransCanada's perspective – TransCanada hired this particular researcher team to conduct the analysis – are unable to attempt a straightforward cost-benefit assessment.

74. Interestingly, John Stansbury from the University of Nebraska – Lincoln, conducted his own independent analysis of worst-case spills from the proposed Keystone oil pipeline. Professor Stansbury concludes: "According to TransCanada, significant spills … are expected to be very rare … However, TransCanada made several assumptions that are highly questionable in the calculation of these frequencies. The primary questionable assumptions are: (1) TransCanada ignored historical data that represents 23 percent of historical pipeline spills, and (2) TransCanada assumed that its pipeline would be constructed so well that it would have only half as many spills as the other pipelines in service, … even though they will operate the pipeline at higher temperatures and pressures and the crude oil that will be transported through the Keystone XL pipeline will be more corrosive than the conventional crude oil transported in existing pipelines."[46]
75. Economists are faced with this kind of sometimes-contradictory evidence from experts in other fields fairly frequently. The response of a well-trained economist is to conduct what is known as a sensitivity analysis. Simply put, you perform your calculations using different scenarios and show how the results change when the underlying assumptions change. Clearly there are differences of opinion among experts with respect to the consequences of an oil spill. But inexplicably, none of the socioeconomic impact analyses that I have seen take these differences of opinion into account. Further, not only do the socioeconomic analyses not take these differences of opinion into account, the SEIS analyses assert that no differences exist because the socioeconomic impact of a spill is assumed to be nonexistent.
76. Finally, in additional to the internal flaws of the SEIS and TransCanada's risk assessment, the two documents contradict each other. While the risk assessment is silent about what expected costs are in the summary section, the report does state that, "While [variation]

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[45] McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 36.
[46] Stansbury, J. Undated. Analysis of Frequency, Magnitude, and Consequence of Worst-Case Spills from the Proposed Keystone XL Pipeline. Research Report. Lincoln, Nebraska.

makes cost a difficult metric to quantify consequences, the average cost of an incident should be a viable measure, as it conveys risk in spite of the scatter."[47] The SEIS, in contrast, values the consequences of a spill at zero dollars as opposed to the average cost of an incident.

VII. MS. MCINTOSH'S TESTIMONY TRIVIALIZES THE POTENTIAL COSTS OF THE KEYSTONE OIL PIPELINE

77. Ms. McIntosh makes a number of generic statements regarding pipeline spills or spill cleanups that ignore the specific risks that residents, businesses and government entities would face from the Keystone pipeline and the tar sands oil that the pipeline would transport. For example, in response to the question, "What kind of remediation activities are conducted in response to a hydrocarbon spill in soil?"[48] Ms. McIntosh responds, "Evacuation and off-site disposal/treatment of impacted soil, excavation and onsite treatment of impacted soil and in-situ soil vapor extraction."[49] A generic response to a generic question trivializes the threat posed by the Keystone pipeline and spills of tar sands oil. For example, from an economics standpoint, a spill of tar sands oil in Michigan required a massive clean-up effort that cost over $1.2 *billion* dollars that still continues more than four years after the spill.[50]

78. The magnitude of the Michigan spill helps illustrates just how insufficient Ms. McIntosh's responses are. Ms. McIntosh states that the South Dakota Department of Environment and Natural Resources (DENR) has the resources 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. …"[51] In response to another question about the funds available for such efforts by the DENR, she replies that as of June 2009, a few months just prior to her testimony, the relevant fund contained approximately $2.8

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[47] McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 35.

[48] Pre-filed Testimony of Kimberly Lorrene McIntosh On Behalf of the Commission Staff. September 2009. Before the Public Utilities Commission State of South Dakota. Keystone XL Project Docket HP09-001. (McIntosh Testimony). Page 3.

[49] McIntosh Testimony, page 3.

[50] Ellison, G. 2014. "New price tag for Kalamazoo River oil spill cleanup: Engridge says $1.21 billion." *The Grand Rapids Press*.

[51] McIntosh Testimony, page 5.

million.[52] In the context of Ms. McIntosh's testimony, $2.8 million sounds like a sizable amount. In the context of the Michigan tar sands spill, however, the $2.8 million reported by Ms. McIntosh would cover *less than 1 percent* of the cost of the Michigan spill (0.2% = $2.8 million / $1,200 million).[53]

79. Further, Ms. McIntosh's response to a question about what happens if an oil spill contaminates a property owner's potable water well and cleanup efforts cannot remediate the contamination is also insufficient.[54] Ms. McIntosh provides no specific information regarding the extent to which such events have happened in the past or the risks of such an event posed by the Keystone pipeline or tar sands oil. Questions begged by Ms. McIntire's response include: "Why didn't the State Department's EIS consider analyses of such events?;" "How often have such events happened in South Dakota?;" How often have such events happened from spills of tar sands oil?;" "How do such events affect property values?;" "What if property owners and those responsible for the remediation disagree over the effectiveness of the cleanup; and, if so, what are the potential litigation costs, how much time does such litigation take, and what if a jury or court awards no damages?;" "What happens if none of the alternative water-supply options are feasible?" Answers to these questions are fundamental to any socioeconomic cost assessment, yet these considerations are not taken into account in any meaningful way by Ms. McIntosh or the FSEIS.

80. Ms. McIntosh's responses could have benefited from reference to the risk assessment of the Keystone pipeline and spills of tar sands oil. Unfortunately, Keystone released the results of their risk analysis in 2013, years after Ms. McIntosh's testimony. However, even if Ms. McIntosh had access to Keystone's risk analysis, the study has obvious deficiencies from an econometrics standpoint that limit its usefulness when considering the risk potential of the pipeline.

81. For example, the general approach to the risk assessment focused on a subset of available information on past spills. That is, the analysis considered a spill's data only if that data

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[52] McIntosh Testimony, page 6.

[53] Ellison, G. 2014. "New price tag for Kalamazoo River oil spill cleanup: Engridge says $1.21 billion." *The Grand Rapids Press*.

[54] "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." McIntosh Testimony, page 5.

included specific information on the exact source of the spill. Not all of the entries in the spill database include such details, which means that the data used in the risk assessment is not necessarily representative of spills. The problem with lack of representativeness is that the resulting analysis could be biased. In a standard economic analysis such limitations would be spelled out; here, no such effort was made.

82. Second the analysis appears to give equal weight to all spills, rather than focusing on pipeline and operator details most relevant to the Keystone pipeline and tar sands oil spills. For example, rather than looking exclusively at the history of pipeline spills for all operators, the analysis could have also considered TransCanada's history of pipeline spills. For example, the TransCanada Keystone pipeline in North Dakota and Kansas had 14 spills as of June 2010, the time of a report on the pipeline. The pipeline operator shut the pipeline down for two weeks to replace parts of the pipeline. This frequency of leaks on a relatively recent pipeline begs the question of how does the leak performance of the pipeline compare with the assumptions in the risk assessment of the pipeline?

83. Perhaps more importantly is how the authors address the extent to which the spills in their database are relevant to the proposed Keystone oil pipeline. The authors, interestingly, only comment on the extent to which the bias might be in favor of their client. As any thoughtful reader of the materials in this case can attest, biases also operate in the other direction. For example, the pressure under which the pipeline will operate and the caustic nature of the tar sands oil imply that the costs could be higher for the Keystone oil pipeline in the event of a spill relative to the spills in their dataset. The fact that the authors are silent about biases that go against their client's interests calls into question their entire analysis and makes one wonder what else they are not telling the reader.

VIII. CONCLUSION

84. Ms. McIntosh's testimony ignores the fundamental economic concept of scarcity and trivializes the potential cost of the Keystone oil pipeline. Ms. McIntosh also makes numerous meaningless generic statements about pipeline spills and cleanup costs that ignore the specific risks of the Keystone oil pipeline, and the economic consequences of such risks.

85. As I have attempted to explain in this rebuttal report, from an economics standpoint, the relevant issue is given *limited* resources and time, can petroleum spills, in particular those

that can be expected from the proposed Keystone oil pipeline, be remediated such that the expected benefits of the oil pipeline are greater than the expected costs to the residents and businesses in South Dakota and other jurisdictions along the route of the proposed pipeline. My opinion is that the socioeconomic analyses conducted to date are grotesquely insufficient in this regard.

86. If the State Department and TransCanada are serious about conducting an analysis of the socioeconomic impact of the Keystone oil pipeline, such an analysis, at a minimum, would include: (1) an IMPLAN model that takes into account the impact of potential oil spills; (2) an IMPLAN model that estimates net effects; (3) a survey of individuals currently living in areas that have experienced an oil spill; (4) a survey of individuals currently living in areas at risk of an oil spill; and (5) a comparative analysis of socioeconomic impact based on areas where an oil pipeline was introduced.
87. Without these changes, the socioeconomic analysis as it currently stands does not represent the *net* socioeconomic impact of the Keystone oil pipeline. Instead, the State Department's socioeconomic assessment represents potential economic benefits only. The elephant in the room–the risks and costs associated with pipeline spills–is simply ignored.
88. Given this fundamental shortcoming, and other severe flaws that I have identified in this report, the socioeconomic analyses conducted to date are in no way valid assessments of the net socioeconomic impact of the proposed Keystone oil pipeline. At a minimum the conclusions should be disregarded. More informatively, the expected benefits should be weighed against the expected costs – as opposed to the existing zero-risk, zero-cost method.

Respectfully Submitted,

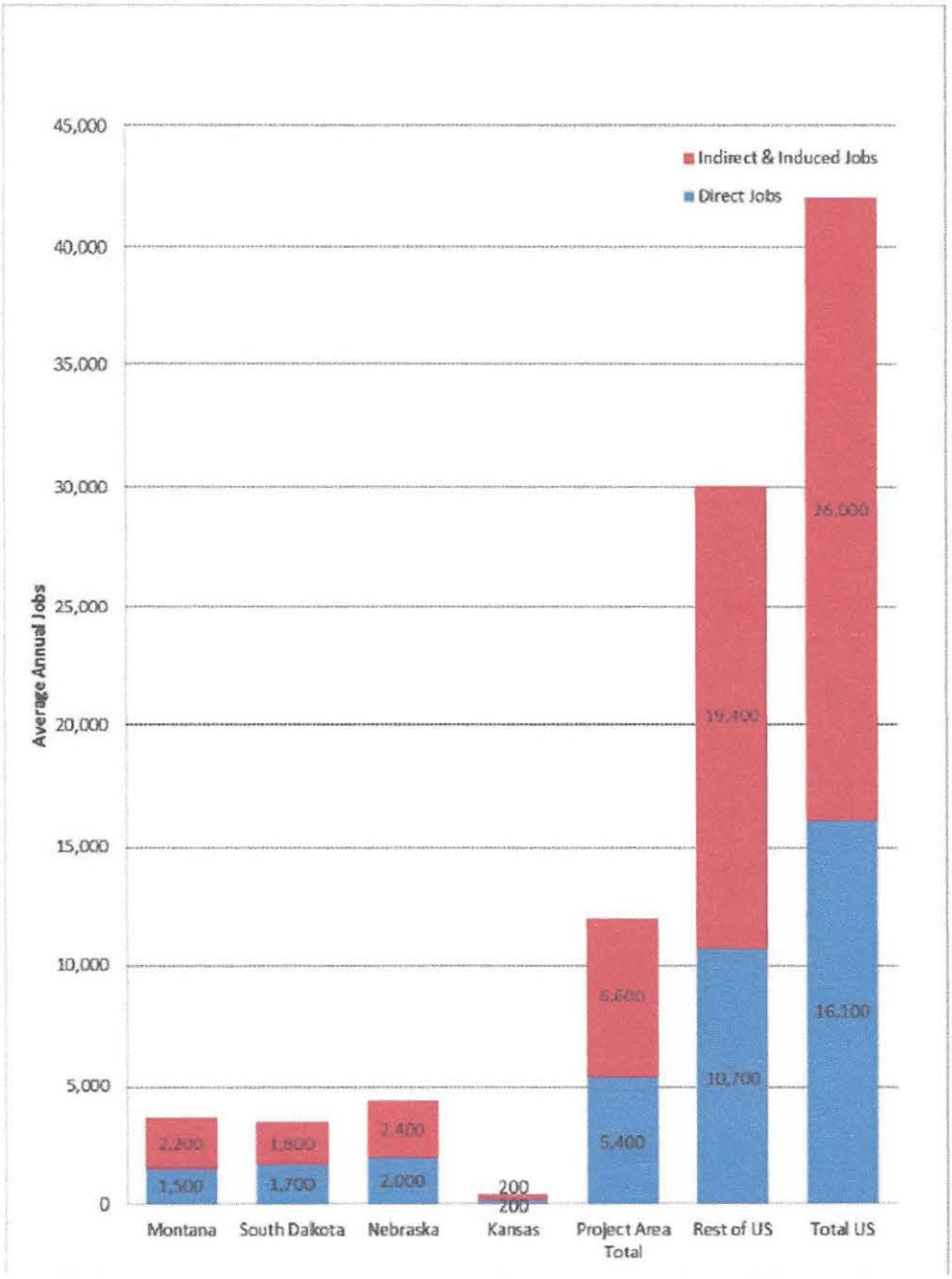
Kevin E. Cahill, PhD

Karen L. Patterson
Notary Public
County of Ada
04.05.19 exp.

KAREN L. PATTERSON
NOTARY PUBLIC
STATE OF IDAHO

IX. EXHIBITS

Exhibit 1: Total Employment Supported by Construction of the Keystone Oil Pipeline



Source: United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Section 4.10 (Socioeconomics), January 2014, p. 4.10-3.

X. APPENDIX A: Curriculum Vitae

CURRICULUM VITAE

KEVIN E. CAHILL

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Boise, Idaho 83703
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Education

Ph.D. Economics, Boston College, Chestnut Hill, MA, 2000
M.A. Economics, Boston College, Chestnut Hill, MA, 1997
B.A. Mathematics and Economics (with honors), Rutgers College, New Brunswick, NJ, 1993

Professional Experience

2012 – present	ECONorthwest: Project Director / Senior Economist
2005 – present	Sloan Center on Aging and Work at Boston College: Research Economist
2005 – 2010	Analysis Group, Inc.: Associate (2005 – 2008); Manager (2009 – 2010)
2004 – 2005	Tinari Economics Group: Economist and Expert Witness
2003	Center for Retirement Research at Boston College: Associate Director for Research
2000 – 2002	Abt Associates, Inc.: Associate

Academic Papers and Publications

Cahill, Kevin E., Jacquelyn B. James, and Marcie Pitt-Catsouphes. *forthcoming*. "The Impact of a Randomly-Assigned Time and Place Management Initiative on Work and Retirement Expectations." *Work, Aging and Retirement*.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. *forthcoming*. Evolving patterns of work and retirement. In L. George & K. Ferraro (Eds.), *The Handbook of Aging and the Social Sciences (8th Edition)*. New York, NY: Elsevier.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. *forthcoming*. "Retirement Patterns and the Macroeconomy, 1992 – 2010: The Prevalence and Determinants of Bridge Jobs, Phased Retirement, and Re-entry among Three Recent Cohorts of Older Americans." *The Gerontologist*; doi: 10.1093/geront/gnt146.

Cahill, Kevin E., Tay K. McNamara, Marcie Pitt-Catsouphes, and Monique Valcour. 2015. "Linking Shifts in the National Economy with Changes in Job Satisfaction, Employee Engagement, and Work-Life Balance." *Journal of Behavioral and Experimental Economics*, 56, 40-54; doi: 10.1016/j.socec.2015.03.002.

Pitt-Catsouphes, Marcie, Jacquelyn B. James, Kevin E. Cahill, and Tay K. McNamara. 2015. "Relationships between Team Performance and Managers Who Are Innovators and Early Adopters of Flexible Work Options." *Journal of Change Management*; doi: 10.1080/14697017.2015.1035665.

Cahill, Kevin E., and Joseph F. Quinn. 2014. "A Balanced Look at Self-Employment Transitions Later in Life." *Public Policy & Aging Report*. 24, 134-140; doi: 10.1093/ppar/pru40.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2014. "How Might the Affordable Care Act Impact Retirement Transitions?" Papers and Proceedings of the NAFE Sessions at the 89th Annual Conference of the Western Economics Association International (June).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2014. "The Impact of Hours Flexibility on Career Employment, Bridge Jobs, and the Timing of Retirement." U.S. Bureau of Labor Statistics Working Paper, 472 (March).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2013. "Are Gender Differences Emerging in the Retirement Patterns of the Early Boomers?" U.S. Bureau of Labor Statistics Working Paper, 468 (September).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2013. "New Evidence on Self-Employment Transitions among Older Americans with Career Jobs." U.S. Bureau of Labor Statistics Working Paper, 463 (April).

Pitt-Catsouphes, Marcie, Jacquelyn B. James, Stephen Sweet, Kevin E. Cahill, David Snow, Kim DeAngelis, Suzanne Lawler, Maureen O'Keeffe, and Danielle Hartmann. 2013. Schedule optimization at the local level. In R. Disselkamp (Ed.), *Workforce asset management book of knowledge*. Hoboken, NJ: Wiley.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2013. Bridge employment. In M. Wang (Ed.), *The Oxford Handbook of Retirement*. New York, NY: Oxford University Press.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2012. "The Relationship between Work Decisions and Location Later in Life." U.S. Bureau of Labor Statistics Working Paper, 458 (October).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2012. "Older Workers and Short-term Jobs: Employment Patterns and Determinants." *Monthly Labor Review*, 135(5), 19-32 (May).

Quinn, Joseph F., Kevin E. Cahill, and Michael D. Giandrea. 2011. "Early Retirement: The Dawn of a New Era?" TIAA-CREF Institute *Policy Brief* (July).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2011. "Reentering the Labor Force after Retirement." *Monthly Labor Review*, 134(6), 34-42 (June).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2011. "How Does Occupational Status Impact Bridge Job Prevalence?" U.S. Bureau of Labor Statistics Working Paper, 447 (July).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2010. "Employment Patterns and Determinants among Older Individuals with a History of Short-Duration Jobs." U.S. Bureau of Labor Statistics Working Paper, 440 (August).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2010. "The Role of Re-entry in the Retirement Process." U.S. Bureau of Labor Statistics Working Paper, 439 (June).

Jaff, Michael R., Kevin E. Cahill, Andrew P. Yu, Howard G. Birnbaum, and Luella M. Engelhart. 2010. "Clinical Outcomes and Medical Care Costs among Medicare Beneficiaries Receiving Therapy for Peripheral Arterial Disease." *Annals of Vascular Surgery*, 24(5), 577-587 (July).

Cahill, Kevin E., Michael D. Giandrea, and Melissa Brown. 2010. "Stepping Stones and Bridge Jobs: Determinants and Outcomes." Papers and Proceedings of the NAFE Sessions at the AEA/ASSA 2010 Annual Meetings.

Giandrea, Michael D., Kevin E. Cahill, and Joseph F. Quinn. 2009. "Bridge Jobs: A Comparison across Cohorts." *Research on Aging*, 31(5), 549-576.

Duh, Mei Sheng, Kevin E. Cahill, Pierre Emmanuel Paradis, Pierre Y. Cremieux, and Paul E. Greenberg. 2009. "The Economic Implications of Generic Substitution of Antiepileptic Drugs: A Review of Recent Evidence." *Expert Opinion on Pharmacotherapy*, 10(14), 2317-2328.

Wu, Eric Q., Pankaj A. Patel, Reema R. Mody, Andrew P. Yu, Kevin E. Cahill, Jackson Tang, and Eswar Krishnan. 2009. "Frequency, Risk, and Cost of Gout-related Episodes Among the Elderly: Does Serum Uric Acid Level Matter?" *The Journal of Rheumatology*, 36(5), 1032-1040.

Giandrea, Michael D., Kevin E. Cahill, and Joseph F. Quinn. 2008. "Self Employment as a Step in the Retirement Process." Sloan Center on Aging & Work *Issue Brief*, No. 15 (September).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2008. "A Micro-Level Analysis of Recent Increases in Labor Force Participation among Older Workers." Center for Retirement Research at Boston College Working Paper, 8 (February).

Giandrea, Michael D., Kevin E. Cahill, and Joseph F. Quinn. 2008. "Self Employment Transitions among Older Workers with Career Jobs." U.S. Bureau of Labor Statistics Working Paper, 418 (May).

Lee, Lauren J., Andrew P. Yu, Kevin E. Cahill, Alan K. Oglesby, Jackson Tang, Ying Qiu, and Howard G. Birnbaum. 2008. "Direct and Indirect Costs among Employees with Diabetic Retinopathy in the United States," *Current Medical Research and Opinion*, 24(5), 1549-1559.

Wu, Eric Q., Pankaj A. Patel, Andrew P. Yu, Reema R. Mody, Kevin E. Cahill, Jackson Tang, and Eswar Krishnan. 2008. "Disease-related and Total Health Care Costs of Elderly Patients with Gout," *Journal of Managed Care Pharmacy*, 14(2), 164-175.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2007. "Down Shifting: The Role of Bridge Jobs After Career Employment." Sloan Center on Aging & Work *Issue Brief*, No. 6 (April).

Giandrea, Michael D., Kevin E. Cahill, and Joseph F. Quinn. 2007. "An Update on Bridge Jobs: The HRS War Babies." U.S. Bureau of Labor Statistics Working Paper, 407 (May).

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2006. "Retirement Patterns from Career Employment." *The Gerontologist*, 46(4), 514-523.

Tinari, Frank D., Kevin E. Cahill, and Elias Grivoyannis. 2006. "Did the 9/11 Victim Compensation Fund Accurately Assess Economic Losses?" *Topics in Economic Analysis and Policy*, Vol. 6, Issue 1.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2005. "Are Traditional Retirements a Thing of the Past? Recent Evidence on Retirement Patterns and Bridge Jobs." U.S. Bureau of Labor Statistics Working Paper, 384 (September).

Tinari, Frank D., Kevin E. Cahill, and LeeAnn M. Pounds. 2005. "The Effects of a Gender-Neutral Life Expectancy Table in New Jersey Litigation." Tinari Economics Group Working Paper.

Tinari, Frank D., Kevin E. Cahill, and Elias Grivoyannis. 2005. "A Retrospective Examination of the 9/11 Victim Compensation Fund Awards." Papers and Proceedings of the NAFE Sessions at the Allied Social Science Associations 2005 Annual Meeting.

Tinari, Frank D., and Kevin E. Cahill. 2004. "A Note on a Perverse Result under New York State's Rule 50-B: The Case of Pensions." Tinari Economics Group Working Paper.

Cahill, Kevin E., and Robert L. Clark. 2004. Economics of Aging. In L.S. Noelker, K. Rockwood, and R.L. Sprott (Eds.), *The Encyclopedia of Aging*, 4th Edition. New York, NY: Springer Publishing Company.

Cahill, Kevin E., and Alicia H. Munnell. 2004. "The Impact of Raising the Earliest Eligibility Age on Social Security-Dependent Americans." Research funded by the Russell Sage Foundation (unpublished manuscript).

Munnell, Alicia H., Kevin E. Cahill, Andrew D. Eschtruth, and Steven A. Sass. 2004. "The Graying of Massachusetts: Aging, the New Rules of Retirement, and the Changing Workforce." The Massachusetts Institute for a New Commonwealth (MassINC).

Munnell, Alicia H., Kevin B. Meme, Natalia A. Jivan, and Kevin E. Cahill. 2004. "Should We Raise Social Security's Earliest Eligibility Age?" Center for Retirement Research *Issue in Brief*, No. 18 (June).

Cahill, Kevin E., and Sheila Campbell. 2004. "Basic Investment Theory Explained." Center for Retirement Research *Just the Facts*, No. 9 (January).

Cahill, Kevin E., and Mauricio Soto. 2003. "How Do Cash Balance Plans Affect the Pension Landscape?" Center for Retirement Research *Issue in Brief*, No. 14 (December).

Munnell, Alicia H., Kevin E. Cahill, and Natalia A. Jivan. 2003. "How Has the Shift to 401(k)s Affected the Retirement Age?" Center for Retirement Research *Issue in Brief*, No. 13 (September).

Marshall, Nancy L., Cindy L. Creps, Nancy R. Burstein, Kevin E. Cahill, Wendy W. Robeson, Sue Y. Wang, Nancy Keefe, Jennifer Schimmenti, and Frederic B. Glantz. 2003. "Massachusetts Family Child Care Today: A Report on the Findings from the Massachusetts Cost and Quality Study." Wellesley Centers for Women, Wellesley, MA.

"401(k) Plans and Retirement Saving: Lessons for Personal Accounts." 2002. Summary document of a presentation by William G. Gale and James M. Poterba prepared for the Social Security Administration (November).

Beecroft, Erik, Kevin E. Cahill and Barbara D. Goodson, 2002. "The Impacts of Welfare Reform on Children: The Indiana Welfare Reform Evaluation." Abt Associates Inc. (December).

Burstein, Nancy, Jean I. Layzer, and Kevin E. Cahill. 2001. "National Study of Child Care for Low-Income Families: Patterns of Child Care Use Among Low-Income Families." Abt Associates Inc. (August).

Wrobel, Marian V., and Kevin E. Cahill. 2001. "An Evaluation of the Choosing Health Program." Abt Associates Inc. (April).

Cahill, Kevin E., 2000. "Heterogeneity in the Retirement Process: Patterns and Determinants of Labor Force Withdrawal among Individuals with Low-Wage and Short-Duration Jobs." Boston College Doctoral Dissertation.

Quinn, Joseph F., Richard V. Burkhauser, Kevin E. Cahill, and Robert Weathers. 1998. "Microeconomic Analysis of the Retirement Decision: United States." The OECD Economics Department Working Paper No. 203, Paris.

Professional Activities, Honors and Awards

2011 Lawrence R. Klein Award for best *Monthly Labor Review* article by joint BLS and non-BLS authors.

Ad hoc referee, *The Gerontologist, Journal of Gerontology: Social Sciences, Journal of Applied Gerontology, Industrial and Labor Relations Review, Population Research and Policy Review, Journal of Population Economics, Research on Aging, Applied Health Economics and Health Policy, Sociology Quarterly, Journal of Aging and Social Policy, Ageing & Society, Atlantic Economic Journal, Social Problems, The Journal of Forensic Economics, Alfred P. Sloan Foundation, Oxford University Press*

Member, Founding Editorial Board of *Work, Aging, and Retirement*, 2014 – present.

At-Large Vice President, Board of Directors, National Association of Forensic Economics, 2013 – present.

American Economics Association, member, 2002 – present.

Gerontological Society of America, member, 2012 – present.

Western Economics Association, member, 2004 – 2008, 2012 – present.

National Association of Forensic Economics, member, 2004 – present.

Eastern Economics Association, member, 2005 – 2010, 2014

Reviewer of grant proposals, Sandell Grant Program, 2002 – 2003.

Doctoral Fellowship, Social Security Administration, Center for Retirement Research, 1999.

Teaching Excellence Award, Boston College Graduate School of Arts and Sciences, 1998.

Michael Mann Summer Dissertation Award, Boston College Department of Economics, 1997.

Graduate Student Fellowship, Boston College Department of Economics, 1995 – 1998.

Henry Rutgers Scholar, Rutgers College, Department of Economics, 1993.

Presentations and Conferences Attended

"Boomers and the Future of Oregon's Economy." Speaker at a jointly-sponsored ECONorthwest–AARP event on leveraging Oregon's 50-plus population, Portland, OR, March 17, 2015.

"The Impact of a Randomly-Assigned Time & Place Management Initiative on Work and Retirement Expectations." Presentation at the 2015 Annual Meeting of the Allied Social Science Associations, Boston, MA, January 4, 2015.

"A Balanced Look at Self-Employment Transitions Later in Life." Presentation at the 67th Annual Scientific Meeting of the Gerontological Society of America (GSA), Policy Series: Self-Employment and Entrepreneurship: The Aging Workforce's 'Encore'?, Washington, DC, November 8, 2014.

"How Might the Affordable Care Act Impact Retirement Transitions?" Presentation at the 89th Annual Conference of the Western Economic Association International, Denver, CO, June 28, 2014.

"Hours Flexibility Preferences and Work/Retirement Decisions." Presentation at the Work and Family Researchers Network (WFRN) 2014 Conference, New York, NY, June 19, 2014.

"Bridge Jobs and the New Era of Retirement." Invited speaker at the Sloan Foundation's Workshop on Measuring, Modeling, and Modifying Late in Life Workplace Dynamics, New York, NY, June 5, 2014.

"The Impact of Hours Flexibility on Retirement Transitions." Presentation at the Pacific Northwest Regional Economics Conference (PNREC) 2014, Portland, OR, May 8, 2014.

"Job Transitions among Today's Older Americans: Challenges and Opportunities." Keynote speaker at AARP's Finding Work at 50+ Event, Beaverton, OR, April 22, 2014.

"Retirement Communities – the Golden Age of Real Estate." Invited panelist at a forum sponsored by the Idaho Business Review, Boise, ID, April 1, 2014.

"Transitions into Self-Employment at Older Ages: 1992 to 2012." Presentation at the 40th Annual Conference of the Eastern Economics Association, Boston, MA, March 8, 2014.

"What Forensic Economists Need to Know about Societal Aging." Presentation at the NAFE Sessions of the 40th Annual Conference of the Eastern Economics Association, Boston, MA, March 8, 2014.

"Preparing for the Aging Boom: Best Practices for Employers." Invited panelist at a forum sponsored by the Vision Action Network and the Washington County Chamber of Commerce Partnership, Portland, OR, January 29, 2014.

"The New Era of Retirement." Presentation at the Osher Lifelong Learning Institute at Boise State University, Boise, ID, January 9, 2014.

"The Impact of Hours Flexibility on Career Employment, Bridge Jobs, and the Timing of Retirement." Presentation at the 2014 Annual Meeting of the Allied Social Science Associations, Philadelphia, PA, January 4, 2014.

"Schedule Matches and Work-life Fit among Older Healthcare Workers." Presentation at the 66th Annual Scientific Meeting of the Gerontological Society of America (GSA), New Orleans, LA, November 21, 2013.

"Self-Employment Transitions among Older Americans." Invited speaker at the AARP Public Policy Institute Roundtable on Crafting a Workforce Development System that Better Meets the Needs of Older Jobseekers and Workers, Washington, DC, November 7, 2013.

"The Uncertainty of Planning for Retirement." Invited guest on Chicago Public Radio, WBEZ's "Morning Shift," Chicago, IL, November 4, 2013.

"The Role of Gender in the Retirement Patterns of Older Americans." Invited speaker at the U.S. Department of Labor's Older Women Workers Roundtable, Washington, DC, September 27, 2013.

"Are Gender Differences Emerging in the Retirement Patterns of the Early Boomers?" Presentation at the 88th Annual Conference of the Western Economic Association International, Seattle, WA, June 30, 2013.

"Getting Older, Getting Hired." Invited guest on WGBH's "Boston Public Radio," Boston, MA, January 22, 2013.

"Employment Experiences of Older Workers in the Context of Shifts in the National Economy." Presentation at the 65th Annual Scientific Meeting of the Gerontological Society of America (GSA), San Diego, CA, November 17, 2012.

"Retirement Patterns and the Macroeconomy, 1992 to 2010: The Prevalence and Determinants of Bridge Jobs, Phased Retirement, and Reentry among Different Cohorts of Older Americans." Presentation at the 2012 Fall Research Conference of the Association for Public Policy Analysis and Management (APPAM), Baltimore, MD, November 9, 2012.

"New Evidence on Self-Employment Transitions among Older Americans with Career Jobs." Presentation at the 87th Annual Conference of the Western Economic Association International, San Francisco, CA, June 30, 2012.

"Work after Retirement: Lessons for Employers and Policymakers from the United States." Invited speaker at Eurofound's "Income from Work after Retirement" Expert Workshop, European Foundation for the Improvement of Living and Work Conditions, Brussels, Belgium, June 15, 2012.

"The Relationship between Work Decisions and Location Later in Life." Presentation at the 2012 Annual Meeting of the Allied Social Science Associations, Chicago, IL, January 7, 2012.

"Building Your Bridge to Retirement'?" Invited guest on AARP's "Inside E Street" for Public Television, Washington, DC, December 7, 2011.

"How Does Occupational Status Impact Bridge Job Prevalence." Presentation at the 2011 Annual Meeting of the Allied Social Science Associations, Denver, CO, January 8, 2011.

"Stepping Stones and Bridge Jobs: Determinants and Outcomes." Presentation at the 2010 Annual Meeting of the Allied Social Science Associations, Atlanta, GA, January 4, 2010.

"Adapting U.S. Retirement Behavior." Discussant at the 2009 Annual Meeting of the Eastern Economic Association, New York, NY, February 27, 2009.

"Retirement Patterns and Determinants among Individuals with a History of Short-Duration Jobs." Presentation at the 2009 Annual Meeting of the Allied Social Science Associations, San Francisco, CA, January 4, 2009.

"The Role of Bridge Jobs in the Retirement Process." Presentation at The Ann Richards Invitational Roundtable on Gender and the Media, Older Workers: Benefits and Obstacles for Women's and Men's Continued Employment, Brandeis University, Waltham, MA, October 24, 2008.

"The Role of Re-entry in the Retirement Process." Presentation at the 2008 Annual Meeting of the Allied Social Science Associations, New Orleans, LA, January 4, 2008.

"A Micro-level Analysis of Recent Increases in Labor Force Participation among Older Workers." Presentation at the Korea Labor Institute Conference on Panel Data, Seoul, Korea, October 25, 2007.

"Bridge Jobs and Retiree Well-being." Presentation at the 2007 Annual Meeting of the Western Economic Association, Seattle, WA, July 2, 2007.

"Self Employment Transitions among Older Workers with Career Jobs," Presentation at the 2007 Annual Meeting of the Eastern Economic Association, New York, NY, February 24, 2007.

"A Micro-level Analysis of Recent Increases in Labor Force Participation among Older Workers." Presentation at the 2006 Annual Meeting of the Western Economic Association, San Diego, CA, July 2, 2006.

"Retirement Patterns and Bridge Jobs among the HRS War Babies." Presentation at the 2005 Annual Meeting of the Western Economic Association, San Francisco, CA, July 7, 2005.

SEAK Annual National Expert Witness Conference, Hyannis, MA, June 16-17, 2005.

"The Social Security Debate: Why Should I Care about Reforms?" Invited guest for a panel discussion on Social Security Personal Accounts, Drew University Economics Department, Madison, NJ, April 12, 2005.

"The Role of the Economist in Assessing Damages for Defendants." Presentation at Liberty Mutual Group, Marlton, NJ, March 18, 2005.

"Was the 9/11 Victim Compensation Fund a Success? A Forensic Economist's View." Presentation at the 2005 Annual Meeting of the Eastern Economic Association, New York, NY, March 5, 2005.

"Recent Evidence on Retirement Patterns and Bridge Jobs." Presentation at the 2005 Annual Meeting of the Eastern Economic Association, New York, NY, March 4, 2005.

"A Retrospective Examination of the 9/11 Victim Compensation Fund Awards: Calculated vs. Actual Economic Loss Awards." Presentation at the 2005 Annual Meeting of the Allied Social Science Associations: Expanding the Frontiers of Economics, Philadelphia, PA, January 8, 2005.

"Are Traditional Retirements a Thing of the Past?" Presentation at the U.S. Bureau of Labor Statistics, Washington, DC, December 16, 2004.

"How Well Prepared Are Massachusetts Families for Retirement?" Presentation at the New England Study Group, Federal Reserve Bank of Boston, Boston, MA, October 12, 2004.

Annual Meeting of the Allied Social Science Associations, San Diego, CA, January 3-5, 2004.

"Securing Retirement Income for Tomorrow's Retirees." Session Chair for the Sandell Grant Program Presentations at the Fifth Annual Conference of the Social Security Retirement Research Consortium, Washington, DC, May 15-16, 2003.

"Retirees Back at Work." Invited guest for "On Point," *National Public Radio*, Boston, MA, March 12, 2003.

"The Changing Retirement Income Landscape." Presentation at the Ethics and Aging Seminar Series at Boston College, Chestnut Hill, MA, February 3, 2003.

"Social Security Reform: The Relationship between Today's Program and Tomorrow's." Discussant at the 55th Annual Scientific Meeting of the Gerontological Society of America, Boston, MA, November 26th, 2002.

"Patterns of Child Care Use among Low-Income Families." Presentation at the National Association for Welfare Research and Statistics (NAWRS) 42nd Annual Workshop: Research, Reauthorization, and Beyond, Albuquerque, NM, August 25-28, 2002.

Annual Meeting of the Allied Social Science Associations, Boston, MA, January 7-9, 2000.

"The Outlook for Retirement Income." Second Annual Conference of the Social Security Retirement Research Consortium, Washington, DC, May 17-18, 2000.

"New Developments in Retirement Research." First Annual Joint Conference of the Social Security Retirement Research Consortium, Washington, DC, May 20-21, 1999.

"AHEAD (Asset and Health Dynamics Among the Oldest Old) Summer Workshop." Survey Research Center, The University of Michigan, Ann Arbor, MI, Summer 1997.

"GSOEP-PSID Summer Workshop." Center for Policy Research, Syracuse University, Syracuse, NY, Summer 1997.

Conference Posters

Cahill KE, James JB, Pitt-Catsouphes M, "How Do Older Healthcare Workers' Preferences for Flexibility Affect Work and Retirement Decisions?" Gerontological Society of America (GSA) 66th Annual Scientific Meeting, November 20-24, 2013.

Wu E, Cahill KE, Bieri C, Ben-Hamadi R, Yu AP, Erder MH, "Comparison of Hospitalization Use and Health Care Costs of Elderly Major Depressive Disorder (MDD) Patients Treated with Escitalopram, Generic SSRIs, and SNRIs," International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 14th Annual International Meeting, May 16-20, 2009.

Cahill, KE, Giandrea MD, Quinn JF, "Retirement Behavior among Individuals with Erratic Work Histories," Gerontological Society of America (GSA) 61st Annual Scientific Meeting, November 21-25, 2008.

Jaff MR, Engelhart L, Rosen E, Yu AP, Cahill KE, "Clinical and Economic Outcomes among U.S. Medicare Beneficiaries with Lower Extremity Peripheral Arterial Disease (PAD)," International Symposium on Endovascular Therapy (ISET), January 20-24, 2008.

Giandrea MD, Cahill KE, Quinn JF, "Self Employment Transitions among Older Workers with Career Jobs," Gerontological Society of America (GSA) 60th Annual Scientific Meeting, November 16-20, 2007.

Lee LJ, Yu AP, Cahill KE, Birnbaum HG, Oglesby AK, Tang J, Qiu Y, "Direct and Indirect Costs among Employees with Diabetic Retinopathy," American Diabetes Association (ADA) 67th Scientific Sessions, June 22-26, 2007.

Yu AP, Cahill KE, Birnbaum HG, Lee LJ, Oglesby AK, Tang J, Qiu, Y, "Direct and Indirect Costs Associated with Photocoagulation and Vitrectomy among Employees with Diabetic Retinopathy," International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 12th International Meeting, May 19-23, 2007.

Wu E, Patel P, Krishnan E, Yu AP, Cahill KE, Tang J, Mody R, "Healthcare Cost of Gout in an Elderly Population: A Claims Database Analysis," American Geriatrics Society (AGS) 2007 Annual Scientific Meeting, May 2-6, 2007.

Wu E, Mody R, Krishnan E, Yu AP, Cahill KE, Tang J, Patel P, "Tighter Control of Serum Uric Acid in Gout is Associated with Lower Morbidity and Health Care Costs," American College of Rheumatology (ACR) Annual Scientific Meeting, November 10-15, 2006.

Expert Reports, Trial and Deposition Testimony

Multnomah County vs. Conway Construction Company, et al., bridge construction damages proceeding, Multnomah County Circuit Court, Oregon, opinion as to plaintiff's economic damages due to the installation of defective bridge decking, testimony taken in trial, February 25, 2015.

KForce vs. Brett Oxenhandler, et al., business damages proceeding, United States District Court, Western District of Washington at Seattle, opinion as to plaintiff's calculation of economic damages, testimony taken in deposition, February 5, 2015.

State of Oregon, ex rel. John Kroger, Attorney General vs. AU Optronics Corporation, et al., TFT-LCD antitrust litigation, United States District Court, Northern District of California at San Francisco, opinion as to the apportionment of damages across purchaser and product groups, testimony taken in deposition, August 11, 2014.

David Sawyer and Joan Sawyer vs. Metropolitan Life Insurance Company, et al., personal injury proceeding, Middlesex County Superior Court, Massachusetts, opinion as to plaintiff's lost earning capacity, testimony taken in deposition, April 16, 2013.

Expert Economic Assessment of the USAF Socioeconomic Impact Analysis for Boise AGS, report submitted to the United States Air Force, March 3, 2012.

Council on American Islamic Relations – New Jersey, Inc., et al. vs. Bergman Real Estate Group, et al., business damages proceeding, Essex County Superior Court, New Jersey, opinion as to plaintiff's lost fundraising revenue, testimony taken in deposition, September 21, 2005.

Garfinkel vs. Morristown Obstetrics and Gynecology Associates, et al., Hon. Stephen F. Smith, Morris County Superior Court, New Jersey, opinion as to defendants' lost profits, testimony taken in trial, June 23, 2005.

Edwards vs. City of New York, wrongful termination proceeding, Hon. Fernando Tapia, New York City Civil Court, Bronx County, New York, opinion as to the loss of earnings, fringe benefits, and pension benefits, testimony taken in trial, June 1, 2005.

Allen vs. Euromarket Designs, Inc., wrongful termination proceeding, Hon. Stephen J. Burnstein, Essex County Superior Court, New Jersey, opinion as to the loss of earnings, testimony taken in trial, April 20, 2005.

Ali vs. Cervelli, personal injury proceeding, Hon. Robert P. Contillo, Bergen County Superior Court, New Jersey, opinion as to the loss of income from the family business and the loss of household services, testimony taken in trial, April 13-14, 2005.

Peskin vs. AT&T Corporation, wrongful termination proceeding, Somerset County Superior Court, New Jersey, opinion as to the loss of earnings, testimony taken in deposition, April 8, 2005.

Garfinkel vs. Morristown Obstetrics and Gynecology Associates, et al., wrongful termination proceeding, Morris County Superior Court, New Jersey, opinion as to defendants' lost profits, testimony taken in deposition, March 16, 2005.

Packard vs. The Bessemer Group, wrongful termination proceeding, Middlesex County Superior Court, New Jersey, opinion as to the loss of earnings and pension benefits, testimony taken in deposition, February 17, 2005.

Durant vs. The Associates, business damages proceeding, Hon. Nicholas J. Stroumtsos, Jr., Middlesex County Superior Court, New Jersey, opinion as to the loss of incremental profit, testimony taken in trial, December 15, 2004.

Durant vs. The Associates, business damages proceeding, Middlesex County Superior Court, New Jersey, opinion as to the loss of incremental profit, testimony taken in deposition, November 22, 2004.

Luisi vs. Luisi, divorce proceeding, Hon. Rachel A. Adams, Richmond County Supreme Court, New York, opinion as to the value of enhanced earning capacity, testimony taken in trial, November 11, 2004.

Newspaper, Periodicals, Blogs and Other Publications

Cahill, Kevin E. 2014. "A New Perspective on Older Workers." *Idaho Business Review* (June).

Cahill, Kevin E., John Tapogna, and Jay Bloom. 2014. "Societal Aging Need Not Mean Slower Growth for Oregon." *The Oregonian* (May).

Cahill, Kevin E., Michael D. Giandrea, and Gene J. Kovacs. 2014. "Self-Employment: The Answer for an Aging Workforce and a Sluggish Economy?" Sloan Center on Aging & Work, AG*Enda* (March).

Cahill, Kevin E., and Jacquelyn B. James. 2013. "A Cost/Benefit View of Occasional Flexibility." Sloan Center on Aging & Work, AG*Enda* (December).

Cahill, Kevin E. and Jacquelyn B. James. 2013. "Small Request, Big Impact: The Importance of Occasional Flexibility in a Healthcare Setting." Sloan Center on Aging & Work at Boston College *Issue Brief* (November).

Cahill, Kevin E., John Tapogna, Rod Gramer, and Diana Lachiondo. 2013. "To What Extent Will Demographic Changes Help Idaho Reach Its Educational Attainment Goals for 2020?" ECONorthwest *Issue Brief* (October).

Cahill, Kevin E., and Gene J. Kovacs. 2013. "Santa Claus, the Easter Bunny, and Traditional Retirement." Sloan Center on Aging & Work, AG*Enda* (May).

Cahill, Kevin E., Jacquelyn James, Marcie Pitt-Catsouphes, and Maureen O'Keeffe. 2012. "Late-Career Flexibility: Beyond Phased Retirement." *HR Pulse Magazine* (December).

Cahill, Kevin E. and Paul Thoma. 2012. "What Does the Aging of Idaho Mean for its Citizens, Employers, and Policymakers?" ECONorthwest *Issue Brief* (September).

Cahill, Kevin E., and Gene J. Kovacs. 2012. "Should You Be Counting on the Social Security Trust Fund?" Sloan Center on Aging & Work, AG*Enda* (September).

Cahill, Kevin E., John Tapogna, Paul Thoma, and Bryce Ward. 2012. "Is Boise Over- or Underperforming Economically?" ECONorthwest *Issue Brief* (August).

Cahill, Kevin E. 2012. "What Ichiro's Departure Says About Loyalty and the Employer-Employee Relationship." *The Seattle Times* (July).

Cahill, Kevin E. 2012. "Thinking about Phased Retirement?" Sloan Center on Aging & Work, AG*Enda* (June).

Sweet, Stephen and Kevin E. Cahill. 2012. "How the Health Care Sector Can Prepare for the Aging of Its Workforce?" Sloan Center on Aging & Work, AG*Enda* (April).

Cahill, Kevin E. and Stephen Sweet. 2012. "Should Older Americans Feel Gloomy About Their Job Prospects?" Sloan Center on Aging & Work, AG*Enda* (March).

Cahill, Kevin E. 2012. "F-35 Opponent Questions Air Force Report." *The Boise Guardian* (February).

Cahill, Kevin E. 2012. "Five Reasons Why Flexible Work Options Are Good Business in a Bad Economy." Sloan Center on Aging & Work, AG*Enda* (February).

Cahill, Kevin E. 2011. "Should Older Workers Step Aside?" *Huffington Post Blog* (featured article) (August) and Sloan Center on Aging & Work, AGE*nda* (December).

Letters to the Editor, *The Wall Street Journal*, 2014 (March), 2013 (November), 2012 (May), 2011 (March), 2006 (November), 2005 (May); *The Idaho Statesman*, 2012 (April).

Quoted and/or cited by: *The Wall Street Journal, The New York Times, U.S. News and World Report, Time, National Public Radio, Reuters, NBC News, The Washington Post, Business Week, Bloomberg, AARP, Investor's Business Daily, The Boston Globe, WBEZ, WRKO Radio, The Seattle Times, Business Insider, The Idaho Statesman, The Boise Guardian, Arbiter Online.*

XI. APPENDIX B: Materials Considered

All Risk No Reward Coalition. Undated. The Keystone XL Tar Sands Pipeline: All Risk and No Reward. www.allrisknoreward.com

Amended Final Decision and Order, Notice of Entry. 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 before the Public Utilities Commission of the State of South Dakota, HP09-001, June 29, 2010.

ConocoPhillips and TransCanada. 2008. Keystone XL Project – Construction, Mitigation, and Reclamation Plan, Rev. 1 (November).

Direct Testimony of Daniel Flo on Behalf of the Staff of the South Dakota Public Utilities Commission. 2015. Before the South Dakota Public Utilities Commission, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket 14-001 (April).

Direct Testimony of Heidi Tillquist. 2015. 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, Docket 14-001 (March).

Ellison, G. 2014. "New price tag for Kalamazoo River oil spill cleanup: Engridge says $1.21 billion." *The Grand Rapids Press*.

Final Decision and Order, Notice of Entry. 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 before the Public Utilities Commission of the State of South Dakota, HP09-001, March 12, 2010.

Letter from James E. Moore to Patricia Van Gerpen, Executive Director, South Dakota Public Utilities Commission Re: TransCanada Keystone Pipeline LP, dated September 15, 2014.

Letter from John Smith to Commissioners Johnson, Kolbeck, and Hanson re Draft Permit Conditions dated February 17, 2010.

McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. 2013. Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute.

Oxford Economics. Not dated. *Potential Impact of the Gulf Oil Spill on Tourism.* p.2 < https://www.ustravel.org/sites/default/files/page/2009/11/Gulf_Oil_Spill_Analysis_Oxford_Economics_710.pdf>

Petition for Order Accepting Certification under SDCL §49-41B-27. In re: 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 before the Public Utilities Commission of the State of South Dakota, September 15, 2014 (TransCanada Keystone Oil Pipeline Petition).

Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September).

Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2015. 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 (April).

Pre-filed Testimony of Darren Kearney on Behalf of the Commission Staff. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April).

Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September).

Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2015. 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 (April).

South Dakota Codified Law §49-41B-27(Source: South Dakota Legislature, Legislative Research Council, http://legis.sd.gov/Statutes/Codified_Laws/DisplayStatute.aspx?Type=Statute&Statute=49-41B-27, accessed April 13, 2015.)

South Dakota Public Utilities Commission. 2014. "Amended Final Decision and Order: Appendix C: Tracking Table of Changes."

Stansbury, J. Undated. Analysis of Frequency, Magnitude, and Consequence of Worst-Case Spills from the Proposed Keystone XL Pipeline. Research Report. Lincoln, Nebraska.

Statutory Declaration of Corey Goulet. In re: 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 before the Public Utilities Commission of the State of South Dakota, September 12, 2014.

TransCanada. 2012. Keystone XL Project – Construction, Mitigation, and Reclamation Plan (redlined version of document dated November 2008) (Rev. 4) (April).

TransCanada Keystone LP. Keystone XL Project: Application to the South Dakota Public Utilities Commission for a Permit for the Keystone XL Pipeline Under the Energy Conversion and Transmission Facility Act, March 2009.

United States Department of Agriculture, National Resources Conservation Service, "IMPLAN Model/NRCS Economics," http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/alphabetical/econ/?&cid=nrcs143_009748.

United States Department of the Interior. 2014. 2013 American Indian Population and Labor Force Report. Washington, D.C. Available at: http://www.bia.gov/cs/groups/public/documents/text/idc1-024782.pdf

United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Executive Summary, January 2014, p. ES-1 (SEIS).

United States Bureau of Labor Statistics. 2015. "Total Nonfarm Employment." *State and Metro Area Employment, Hours, & Earnings*. < http://www.bls.gov/sae/data.htm>

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The undersigned hereby certifies that, on this day, I served Standing Rock Exhibits 8001-8029 via electronic mail to –

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