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MEMO

To:
Kendall Kliewer

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William Thompson

From:
Thomas J. Fischer, PE

Date:
November 16, 2010

ARCADIS Project No.:
B0014505.0000

Subject:
Aberdeen MGP Site: 5-year Projected Cash Flow

Per your request, ARCADIS has evaluated projected remediation expenditures associated with the Aberdeen former manufactured gas plant (MGP) site in South Dakota. These projected expenditures were determined from the "Remedial Alternative 2" cost estimate provided in the April 2010 Remedial Alternatives Evaluation. This remedial alternative, approved by the South Dakota Department of Environment and Natural Resources in their correspondence dated June 14, 2010, consists of institutional control execution, free product recovery, long-term groundwater monitoring, and ongoing operational maintenance on current and future groundwater/free product remediation systems.

Following is a summary of estimated expenditures for the next five years, along with assumptions that have been used to develop this projection. Additional backup regarding the cost estimate is also attached for your convenience.

Year	Projected Expenditures (includes 25% contingency)	Anticipated Project Activities and Related Assumptions
2011	$3,800,000	Stage 1 Remedial Construction (30% of trench length), 50% of institutional controls execution (includes $1MM for property owner compensation), operation and maintenance costs for existing Booster Station remediation system and annual groundwater monitoring.
2012	$4,200,000	Stage 2 Remedial Construction (35% of trench length), 50% of institutional controls execution, operation and maintenance costs for existing Booster Station remediation system and annual groundwater monitoring. Initial O&M on recovery trench remediation systems assumed to be covered within contingency.
2013	$3,300,000	Stage 3 Remedial Construction (35% of trench length), operation and maintenance costs for existing Booster Station remediation system and annual groundwater monitoring. Initial O&M on recovery trench remediation systems assumed to be covered within contingency.
2014	$300,000	Includes operation and maintenance of Booster Station remediation system and recovery trench remediation systems, and annual groundwater monitoring.
2015	$300,000	Includes operational maintenance of Booster Station remediation system and recovery trench remediation systems, and annual groundwater monitoring.

Note: Inflation/discounting (net present value determination) has not been applied.

NORTHWESTERN ENERGY
ABERDEEN FORMER MANUFACTURED GAS PLANT
ABERDEEN, SOUTH DAKOTA

ALTERNATIVE 2 - COST ESTIMATE
Institutional Controls with Passive NAPL Recovery and Long-Term Groundwater Monitoring

Alt.	Item #	Description	Quantity	Unit	Unit Price	Amount
Institutional Controls with Long-Term Groundwater Monitoring						
	Capital Costs					
	1	Legal/Administrative/Institutional Controls	1	LS	$1,100,000	$1,100,000
	2	Site Management Plan	1	LS	$25,000	$25,000
	3	Groundwater Monitoring Well Installation	6	each	$3,000	$18,000
					Subtotal Capital Cost	$1,143,000
					Engineering (15%)	$171,450
					Contingency (25%)	$285,750
					Project Management / Construction Management (10%)	$114,300
					Total Capital Cost	$1,714,500
	Annual Operation and Maintenance (O&M) Costs					
1,2	4	Existing Wastewater Treatment System	1	LS	$53,000	$53,000
	5	Groundwater Sampling Labor & Expenses (Annual)	1	event	$16,800	$16,800
	6	Laboratory Analytical	1	event	$6,000	$6,000
	7	Reporting	1	LS	$10,000	$10,000
	8	Verification of Institutional Controls	1	LS	$10,000	$10,000
					Subtotal O&M Costs	$95,800
					Contingency (25%)	$23,950
					Total Annual O&M Costs	$119,750
					Present Worth Factor (30 years at 7%)	12.41
					Present Worth O&M Cost	$1,485,978
					Alternative 1 - Total Estimated Cost:	**$3,200,478**
					Rounded to:	**$3,210,000**
Passive NAPL Recovery and Off-site Disposal						
	Capital Costs					
	9 (i)	Mobilization/Demobilization - One-Pass Trenching	1	LS	$100,000	$100,000
	(ii)	Mobilization/Demobilization/Permitting - LTTD	1	LS	$125,000	$125,000
	10	Construction Permits and Erosion and Sedimentation Plans	1	LS	$10,000	$10,000
	11	Brown County Landfill - Temporary Land-Use Lease	1	LS	$50,000	$50,000
	12	Health and Safety Program	1	LS	$25,000	$25,000
	13	Surveying	1	LS	$12,000	$12,000
	14	Pre-Design Investigation	1	LS	$75,000	$75,000
	15	Construction and Maintenance of Decontamination Pad	1	LS	$15,000	$15,000
	16	Construction and Maintenance of Soil Staging Areas	1	LS	$40,000	$40,000
	17	Silt Fence	6,200	LF	$5	$31,000
	18	Install Temporary Fencing	2,650	LF	$25	$66,250
2	19	Passive Wall Pre-Excavation	670	CY	$50	$33,500
	20	Passive NAPL Recovery Wall Installation - One Pass Trenching	105,000	SF	$40	$4,200,000
	21	Well Vault and Trench NAPL Recovery Well/Sump	13	each	$17,250	$224,250
	22	NAPL Recovery Wells	3	each	$4,000	$12,000
	23	20' x 20' Equipment/Pumping Shed	5	each	$8,000	$40,000
	24	Piping (2" HDPE Line)	1,700	LF	$3	$5,100
	25	Piping (1/2" PVC Line)	1,700	LF	$1.50	$2,550
	26	Electrical Conduit	1,000	LF	$12	$12,000
	27	Pipe Trenching	2,700	LF	$20	$54,000
	28	Pipe Bedding and Backfilling Material	400	CY	$25	$10,000
	29	Electrical Drop to Building	3	each	$15,000	$45,000
	30	Air Compressor	5	each	$10,500	$52,500
	31	1,000 Gallon Cone Bottomed NAPL Storage Tank	5	each	$1,500	$7,500
	32	200 Gallon Cone Bottomed Water Decant Tank	5	each	$500	$2,500

NORTHWESTERN ENERGY
ABERDEEN FORMER MANUFACTURED GAS PLANT
ABERDEEN, SOUTH DAKOTA

ALTERNATIVE 2 - COST ESTIMATE
Institutional Controls with Passive NAPL Recovery and Long-Term Groundwater Monitoring

Alt.	Item #	Description	Quantity	Unit	Unit Price	Amount
Passive NAPL Recovery and Off-site Disposal (con't)						
2	33	System Installation	1	LS	$25,000	$25,000
	34	Miscellaneous Mechanical	1	LS	$5,000	$5,000
	35 (i)	Excavated Soil Amendment/Stabilization	1,750	ton	$125	$218,750
	35 (ii)	Low Temperature Thermal Desorption (LTTD) Soil Treatment	8,800	ton	$45	$396,000
	36 (i)	Amended/Stabilized - Solid Waste Transportation and Disposal (T&D) - Nonhaz	9,400	ton	$55	$517,000
	36 (ii)	LTTD - Solid Waste T&D - Nonhaz	9,400	ton	$45	$423,000
	37	Waste Characterization	1	LS	$3,000	$3,000
	38	Miscellaneous Waste Disposal	1	LS	$10,000	$10,000
	39	Air Monitoring	48	day	$1,600	$76,800
	40	Dust/Vapor/Odor Control	8	week	$3,000	$24,000
	41	Street Surface Washing	8	week	$1,500	$12,000
	42	Surface Restoration - Grassed Areas	1	LS	$25,000	$25,000
	43	Weekly Monitoring/Inspection (1st Month)	4	each	$2,900	$11,600
					Stabilized (i)	**LTTD (ii)**
		Subtotal Capital Cost			$6,053,300	$6,261,550
		Engineering (15%)			$907,995	$939,233
		Contingency (25%)			$1,513,325	$1,565,388
		Project Management / Construction Management (10%)			$605,330	$626,155
		Total Capital Cost			$9,079,950	$9,392,325
	Additional Annual O&M Costs					
	44	Treatment Equipment/Materials Replacement	1	LS	$40,000	$40,000
	45	Monthly Monitoring/Inspection	8	each	$2,900	$23,200
	46	Reporting	1	LS	$5,000	$5,000
	47	Water, NAPL and Waste Disposal	1	LS	$61,000	$61,000
	48	Electricity/Heating for Sheds/Pumps	1	LS	$18,000	$18,000
		Subtotal O&M Costs				$147,200
		Contingency (25%)				$36,800
		Present Worth Factor (15 years at 7%)				9.11
		Total O&M Costs				$1,675,854
					Stabilized (i)	**LTTD (ii)**
		Alternative 2 - Total Estimated Cost			**$13,956,281**	**$14,268,656**
		Rounded to			**$13,960,000**	**$14,270,000**

General Notes:

1. Cost estimate is based on ARCADIS U.S., Inc.'s (ARCADIS') past experience and vendor estimates using 2010 dollars.
2. This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. ARCADIS is not licensed to provide financial or legal consulting services; as such; this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability services.
3. Present worth is estimated based on a 7% beginning-of-year discount rate (adjusted for inflation) in accordance with United States Environmental Protection Agency (USEPA) Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-20 "Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis" (USEPA, 1993). It is assumed that "year zero" is 2011.
4. Costs do not include legal fees, negotiations or agency oversight.

NORTHWESTERN ENERGY
ABERDEEN FORMER MANUFACTURED GAS PLANT
ABERDEEN, SOUTH DAKOTA

ALTERNATIVE 2 - COST ESTIMATE
Institutional Controls with Passive NAPL Recovery and Long-Term Groundwater Monitoring

Notes:

1. Legal/administrative/institutional controls cost estimate includes labor and materials necessary to institute deed restrictions to:
   (a) restrict future use of the Site to commercial/industrial activities;
   (b) restrict future use of site groundwater. The use restriction would apply to groundwater beneath the Site and, if acceptable to land parcels adjacent to the site;
   (c) notify future property owners of the presence of manufactured gas plant- (MGP-) related constituents in soil and groundwater at the Site;
   (d) notify future property owners of the applicability of the Site Management Plan; and
   (e) purchasing and compensation to adjacent property owners.
2. Site management plan cost estimate includes labor and materials necessary to prepare a site management plan for the Site that will:
   (a) identify known locations of MGP-impacts at the Site;
   (b) address possible future intrusive activities that would result in the potential for contact with MGP-impacts; and
   (c) set forth the inspection and maintenance activities for the fencing and vegetation/cover materials.
3. Groundwater monitoring well installation cost estimate includes labor, equipment, and materials necessary to install new groundwater monitoring wells. Cost estimate includes oversight by a geologist, and drill rig and crew. Cost estimate assumes polyvinyl chloride (PVC) well construction to a depth of approximately 25 feet bgs.
4. Existing wastewater treatment system cost estimate includes labor, equipment, and materials necessary to continue operation of the existing wastewater treatment system installed in 2006 and includes quarterly sampling, semiannual carbon change-outs, and annual sump cleaning.

5-7. Groundwater sampling labor and expenses (annual) cost estimate includes labor, equipment, and materials necessary to conduct annual sampling events for 22 monitoring wells, analyze groundwater samples, and prepare an annual groundwater monitoring report to summarize the results of the groundwater monitoring activities. This cost estimate also includes containerizing groundwater and NAPL (if present) waste materials generated during the sampling activities. This cost estimate also includes transportation of the containerized liquid waste for disposal as a non-hazardous waste at an appropriate treatment/disposal facility.

8. Annual costs associated with institutional controls include verifying the status of institutional controls and preparing/submitting notification to the South Dakota Department of Environmental and Natural Resources (SD DENR) to demonstrate that the institutional controls are being maintained and remain effective.
9. Mobilization/demobilization cost estimate includes:
   (i) Mobilization and demobilization of labor, equipment, and material necessary to install the passive NAPL recovery system. Assumes the mobilization will take place from DeWind's Holland, Michigan office to the Aberdeen site. Also includes equipment necessary to handle spoils at the Brown County Landfill for either soil amendment/stabilization or LTTD.
   (ii) Mobilization and demobilization of labor, equipment, and material necessary to thermally treat the spoils at the Brown County Landfill via a mobile low temperature thermal desorption (LTTD) unit; includes permitting.
10. Construction permits and erosion and sedimentation plans cost estimate includes costs to obtain appropriate permits necessary for the full-scale construction activities and prepare erosion and sedimentation plans.
11. Brown County Landfill, temporary land-use lease costs includes compensation to Brown County for temporary use of the landfill property to manage material during the amendment/solidifying or thermal treatment processes.
12. Health and safety program cost estimate includes labor for the development of a site-specific health and safety plan and assumes onsite workers within the exclusion zone will be in Level B for 30% of the duration that source material is handled.
13. Surveying cost estimate includes labor, equipment, and materials necessary to locate and identify underground utilities at the site. Cost assumes that utility location and markout would be conducted by a private utility locating company over a period of 5 days at a daily rate of $1,000 per day. Surveying cost estimate includes approximately $7,000 for establishing control points, base mapping, as-builts, etc.
14. Pre-design investigation cost estimate includes labor, equipment, and materials necessary to collect additional information to facilitate completion of the remedial design for this alternative, including a test boring/geotechnical program.

NORTHWESTERN ENERGY
ABERDEEN FORMER MANUFACTURED GAS PLANT
ABERDEEN, SOUTH DAKOTA

ALTERNATIVE 2 - COST ESTIMATE
Institutional Controls with Passive NAPL Recovery and Long-Term Groundwater Monitoring

15. Construction and maintenance of decontamination pad cost estimate includes labor, equipment, and materials necessary to construct and remove a 60-foot by 30-foot decontamination pad and appurtenances. The decontamination pad would consist of 40-mil high-density polyethylene (HDPE) with a 6-inch gravel drainage layer placed over the HDPE liner, surrounded by a one-foot high berm and sloped to a collection sump for the collection of decontamination water.
16. Construction and maintenance of soil staging areas cost estimate includes labor, equipment, and materials to construct an approximate 75-foot by 75-foot material staging area consisting of a 40-mil HDPE liner below a 12-inch sacrificial gravel fill layer with bermed sidewalls and sloped to a lined collection sump. Maintenance costs include inspecting and repairing staging area as necessary and covering staged soil with polyethylene sheeting or odor suppressing foam, as necessary.
17. Silt fence cost estimate includes installation of silt fence for erosion control along the perimeter of the trenching area.
18. Install temporary fencing cost estimate includes labor, equipment, and materials necessary to install and remove temporary fencing around the working area.
19. Passive wall pre-excavation cost estimate includes labor, equipment, and materials necessary to pre-excavate a trench along the passive wall alignments to verify presence/absence and location of underground utilities prior to installation of passive walls. Cost estimate assumes excavation activities to be completed using a backhoe and hand digging. Cost estimate assumes pre-excavation activities completed to a depth of 4 feet below grade for length of the passive barrier wall (approximately 3,000 feet).
20. Passive NAPL recovery wall installation - one pass trenching cost estimate includes labor, equipment, and materials necessary to install a passive barrier wall. Cost estimate includes site-preparation for trenching equipment along the trench alignment, excavating, placing pea-gravel stone backfill, and placing PVC sump, and assumes activities to be completed using a one-pass trencher. Cost estimate assumes approximately 3,000 linear-feet of wall at an average installation depth of 35 feet below ground surface (bgs), keyed one foot into till, with a width of 1.5 feet. Assumes the cost includes importation and placement of backfill. Assumes no dewatering will be required for trenching.
21. Well vault and trench NAPL recovery well/sump cost estimate includes labor, equipment, and materials necessary to install well vaults, 14-inch diameter stainless steel recovery wells to 35 feet bgs, and 10-inch diameter stainless steel sump extensions from 35- to 40-feet bgs following completion of site remedial activities.
22. NAPL recovery wells cost estimate includes labor, equipment, and materials necessary to install NAPL recovery wells following completion of site remedial activities. Cost estimate includes oversight by a geologist, and drill rig and crew. Cost estimate assumes PVC well construction to a depth of 25 feet bgs.
23. 20' X 20' equipment/pumping shed cost includes the cost to furnish and construct a 20-foot by 20-foot shed and associated slab where the pump and equipment will be stored.
24. Piping (2" HDPE line) cost estimate includes cost to furnish piping for product recovery from trench NAPL recovery wells to the equipment/pumping shed.
25. Piping (1/2" PVC line) cost estimate includes cost to furnish piping for air compressor supply lines from trench NAPL recovery well pumps to the equipment/pumping shed.
26. Electrical conduit cost estimate includes cost to furnish electrical conduit between nearby equipment/pumping shed onsite and south of the site.
27. Pipe trenching cost estimate includes labor, equipment, and materials necessary to excavate trenching associated with the NAPL collection piping and air lines from the NAPL wells to the equipment shed and the trenching associated with the electrical conduit. Trench assumes a depth of approximately 48-inches and a width of approximately 12-inches.
28. Pipe bedding and backfilling material cost estimate includes labor and equipment to furnish and place bedding and backfill material for the pipe trench excavation. Assumes excavated trench material will be disposed of offsite and not re-used.
29. Electrical drop to building cost estimate includes cost to furnish electric power to a treatment building on-site, south of the Site, and southeast of the Site (between the convergence of the two railroads).
30. Air compressor cost estimate includes cost to furnish a 20 horse power reciprocating compressor capable of producing approximately 70 cubic feet per minute of air.
31. 1,000 gallon cone bottomed NAPL storage tank cost estimate includes cost to furnish a cone bottomed HDPE storage tank for NAPL.

NORTHWESTERN ENERGY
ABERDEEN FORMER MANUFACTURED GAS PLANT
ABERDEEN, SOUTH DAKOTA

ALTERNATIVE 2 - COST ESTIMATE
Institutional Controls with Passive NAPL Recovery and Long-Term Groundwater Monitoring

32. 200 gallon cone bottomed water decant tank cost estimate includes cost to furnish a cone bottomed HDPE storage tank for decanting water.
33. System installation cost estimate includes labor, equipment and materials necessary to install the pumping systems, which includes, but is not limited to, installation of 2" HDPE piping and electrical conduit within the trench to each trench NAPL recovery well/sump; backfilling the trench; installation of pumping system components; and site restoration.
34. Miscellaneous mechanical cost estimate includes labor, equipment and materials necessary to complete system installation, label equipment, piping, and the sheds.
35. Soil removed from the passive NAPL recovery trench will either be:
    (i) Excavated soil amendment/stabilization cost estimate includes labor, equipment, and materials necessary to purchase and import stabilizing agent (e.g., Portland cement) to amend excavated soil. Estimated quantity based on an assumed 15% addition of amendment (by weight) to be amended at 2.0 tons per cubic-yard; or
    (ii) Treated via low temperature thermal desorption.
36. Solid waste transportation and disposal - non-hazardous cost estimate includes all labor, equipment, and materials necessary to transport non-hazardous excavated material off-site for disposal at a solid waste landfill. Estimated quantity based on soil excavated to facilitate installation of passive NAPL collection walls and pipe trenching. Cost estimate assumes a material density of 1.5 tons per cubic-yard. Cost estimate assumes soil would be managed at Brown County Landfill located in Aberdeen, South Dakota. Cost estimate includes transportation fuel charge and applicable taxes.
    (i) T&D costs includes the handling of material once it arrives at the landfill for amendment/stabilization.
    (ii) T&D does not include the handling of material for LTTD once it arrives at the landfill - costs for LTTD handling included in the treatment unit cost.
37. Waste characterization cost estimate includes costs for the analysis of soil samples for soil destined for off-site disposal at the Brown County Landfill. Costs assumes that existing analytical data will be the primary source of characterization data.
38. Miscellaneous waste disposal cost estimate includes disposal of personal protective equipment (PPE), staging area and decontamination pad materials, and disposable equipment and materials at a facility permitted to accept the waste.
39. Air monitoring cost estimate includes air sampling per TO-13 and TO-15 (4 samples per day) during trenching activities - cost per day from AirToxics quote.
40. Dust/vapor/odor control cost estimate includes equipment, labor, and materials necessary to monitor dust/vapor/odor emission during intrusive site activities. Cost estimate includes application of vapor/odor suppressing foam to excavated materials staged on-site.
41. Street surface washing cost estimate includes the equipment, labor, and materials necessary to wash the first two blocks adjacent to the site (approximately 750' by 70').
42. Surface restoration of grassed areas includes labor, equipment, and materials necessary to return approximately 60,000 square feet to original condition (i.e., topsoil, sod, or seed vegetated areas).
43. Weekly monitoring/inspection (1st month) cost estimate include costs for monitoring/inspection of the passive NAPL pumping system during the initial startup and operation of the system once a week for the first month of operation.
44. Treatment equipment/materials replacement cost estimate includes labor, equipment, and materials necessary for treatment of separated water including a bag filtration and carbon adsorption unit. Costs provided from H2K Technologies and includes piping and headers. Costs also include maintenance/replacement of pumps, carbon filters, etc.
45. Monthly monitoring/inspection cost estimate include costs for monthly monitoring/inspection and maintenance of the passive NAPL pumping system. Assumes monthly events will only be performed during the months of pumping operation when temperatures are above freezing. Assumed duration of operation is 15 years, after which it is assumed recovery reaches point of diminishing returns.
46. Reporting cost estimate includes the additional cost to summarize the passive NAPL recovery wall monitoring activities.
47. Water, NAPL, and waste disposal cost estimate includes off-site disposal of water to the POTW (approx. 100,000 per year at $0.01/gallon), disposal of NAPL (20,000 gallons per year at $3.00/gallon).

NORTHWESTERN ENERGY
ABERDEEN FORMER MANUFACTURED GAS PLANT
ABERDEEN, SOUTH DAKOTA

ALTERNATIVE 2 - COST ESTIMATE
Institutional Controls with Passive NAPL Recovery and Long-Term Groundwater Monitoring

48. Electricity/heating for sheds/pumps cost estimates includes the cost to provide utilities for the sheds. Cost assumes eight months will require only electricity for pumping at $200 per shed per month. The remaining four months will require only heating at $500 per shed per month.

FIVE-YEAR PROJECTED EXPENDITURES

YEAR		$$	ASSUMPTIONS AND NOTES
		$857,250	- 50% IC CAP COSTS (ITEMS 1,2,3)
		$119,750	- YR 1 OF O&M (ITEMS 4-8)
		$2,269,988	- 30% CAP COSTS (ITEMS 9-43)
1	2011	$0	- NO ADDITIONAL O&M (ITEMS 44-48)
		$529,664	-35% ENGINEERING AND PMCM COSTS
	Subtotal	**$3,776,651**	
	ROUNDED TO:	$3,800,000	
		$857,250	- 50% IC CAP COSTS (ITEMS 1,2,3) - LAST YEAR
		$119,750	- YR 2 OF O&M (ITEMS 4-8)
		$2,648,319	- 35% CAP COSTS (ITEMS 9-43)
2	2012	$0	- NO ADDITIONAL O&M (ITEMS 44-48)
		$529,664	-35% ENGINEERING AND PMCM COSTS
	Subtotal	**$4,154,983**	
	ROUNDED TO:	$4,200,000	
		$0	- IC CAP COSTS COMPLETE
		$119,750	- YR 3 OF O&M (ITEMS 4-8)
		$2,648,319	- 35% CAP COSTS (ITEMS 9-43) - LAST YEAR
3	2013	$0	- NO ADDITIONAL O&M (ITEMS 44-48)
		$75,000	Project management and agency meetings
		$453,998	-30% ENGINEERING AND PMCM COSTS
	Subtotal	**$3,297,066**	
	ROUNDED TO:	$3,300,000	
4	2014	**$303,750**	- YR 4 OF O&M (ITEMS 4-8) - YR 1 ADDITIONAL O&M (ITEMS 44-48)
5 - 18	2015-2028	**$303,750**	- YR 5-18 OF O&M (ITEMS 4-8) - YR 2-15 ADDITIONAL O&M (ITEMS 44-48)
19 - 30	2019-2040	**$119,750**	- YR 19-30 OF O&M (ITEMS 4-8)

Note: NR expenditures likely to be moved up in to 2011 from future years to account for pre-construction deliverables. Approx 30% of trench length assumed in year one, though 35% of PMCM costs to account for construction documents and plans up front.