Appendices

O - Q

Appendix O
Swift Fox Survey Protocol

The following protocol is a modification of a swift fox protocol included in Mineral Exploration Permit Number NE0210824 (dated August 19, 2009) issued by the Department of Environmental Quality (NDEQ) to Crow Butte Resources, Inc (NDEQ 2009). This permit primarily addresses impacts associated with drilling of boreholes for purposes of mineral exploration. The primary modification of the Appendix 10 protocol is expanding the type of activities potentially impacting the swift fox to include, in addition to drilling of boreholes, uranium in situ satellite project development activities. Satellite "project development" includes construction of satellite facilities (process building and associated storage structures, evaporation ponds, wellfield development (surface preparation, monitor and injection/recovery wells, wellhouses, and trunklines/piping), well workover, boreholes outside of wellfields, and project roadways. Reference to "project development" in this protocol refers to these activities. Project development activities apply to initial construction/wellfield development, operations and decommissioning. Decommissioning includes decontaminating, dismantling, and removing satellite facilities and associated wellfield buildings/equipment/wells and, site reclamation and groundwater restoration.

Swift fox are typically found in topographically flat (slopes <20%) arid regions. In Nebraska, suitable habitat is in the short-grass prairie ecoregion where vegetation is less than 40 cm tall. They can be found in large expanses of prairie as well as prairie intermixed with agriculture. Dens are also found in anthropogenic areas such as near roads and trails, and in agricultural fields, culverts pipes and buildings (Tannerfeldt et al 2003). Swift fox are highly mobile and will use a variety of dens throughout the year. However, a female swift fox with young pups will typically be tied to one den until the pups are old enough to disperse from the den. Swift fox den entrances have a diameter of 17 to 23 cm.

Required Surveys:

CBR will avoid impacting the swift fox species by avoiding certain locations during specific times of the year. Surveys shall be conducted that are <u>consistent</u> with the Nebraska Game and Parks Commission (NG&PC) standard protocol included in CBR's Mineral Exploration Permit Number NE0210824 as Attachment 1.

The survey form to be used for swift fox surveys is attached to this protocol.

Project development activities will occur within a designated permit boundary. If project development activities within this permit boundary are such that specific protocol requirements (e.g., designated distances from swift fox dens) cannot be avoided as stated in this protocol, CBR will consult with the NDEQ and NG&PC as to the feasibility of alternate actions. No work will be conducted until any such issue has been resolved with the NDEQ and NG&PC.

Surveyors:

Surveys shall be conducted by a qualified individual who has experience working with the species or has been trained to identify swift fox burrows, dens and sign (scat, tracks, etc.).

Location:

Surveys shall be conducted at project development sites discussed above where suitable habitat is present within the range of the species.

Season:

Surveys shall be conducted year-around in areas of suitable habitat where project development activities are planned.

Timing:

Surveys shall be conducted within one week of initiating project development activities described above under Location.

Survey Technique:

The "denning season" is defined as the period of time when adult swift fox give birth and raise pups. In Nebraska, the swift fox denning season is from April 1 through August 31.

During the denning season, the area that must be surveyed for dens includes project development activities plus an additional 230 meters around the affected areas. When developing wellfields, numerous boreholes will initially be drilled. In this situation, the "affected area" will be the perimeter of the wellfield for the addition of 230 meters to the survey area, as opposed to each drill site. Under such conditions (i.e. work over multiple days or months), only one survey shall be submitted for that period indicating the duration of planned activities in the survey area. During other periods of time (e.g., operations), when individual boreholes are drilled at one time or a workover rig is used for well maintenance, then the additional 230 meters will be applied to the drill site. The above procedures will allow the operator the option of the most effective type of survey to use - wellfield boundary or individual drill site. The satellite facilities will be located within a 1.8-acre fenced-in site. The swift fox survey will be conducted prior to construction using an additional 230 meters around the fence boundary.

During the non-denning season (September 1 through March 31), the area that must be surveyed for dens includes the project development activities plus an additional 100 meters around the affected areas. When developing wellfields, numerous boreholes will initially be drilled. In this situation, the "affected area" will be the perimeter of the wellfield for the addition of 100 meters to the survey area, as opposed to each drill site. Under such conditions (i.e. work over multiple days or months), only one survey shall be submitted for that period indicating the duration of planned activities in the survey area. During other periods of time (e.g., operations), when individual boreholes are drilled at one time or a workover rig is used for well maintenance, then the additional 100 meters will be applied to the drill site. The above procedures will allow the operator the option of the most effective type of survey to use - wellfield boundary or individual drill site. The satellite facilities will be located within a 1.8-acre fenced-in site. The swift fox survey will be conducted using an additional 100 meters around the fence boundary.

The survey will consist of walking transects and searching for dens within the survey area. Transects will be no more that 50 meters apart in order to thoroughly cover the area.

An active den may have fresh digging at the entrance, although this is not always the case (Jackson and Choate 2000). Sign, such as scat or tracks, can also be indicate an active den. Swift fox tracks are approximately 2.54 cm wide and 3.8 cm long. Although this is the smallest canid species, tracks can be confused with other species, especially young coyotes. Inactive dens may be overgrown with vegetation, have spider webs over the entrance, or be caving in.

Conservative Measures:

If a potentially active swift fox den is identified, one of two conservation measures should be implemented:

1. The area of project development activities shall be done so activities are at least 230 meters from the den during the denning season, or 100 meters from the den during the non-denning season. For drilling sites, these can be moved to an appropriate distance from the den. A survey around any of these new activities must be conducted.

2. A track or scent station can be set up to determine if the den is being used by swift fox. If track or scent stations indicate swift fox are using the den, then project development activities within a minimum of 100 meters or 230 meters (whichever is appropriate for the season) of the den would be postponed until the den is abandoned. For drilling sites, they can be moved as outlined in #1 above. If track or scent stations indicate swift fox are not using the den, then drilling activities may proceed if there are not any other dens or swift fox within the survey area.

Track Station: Den use can be determined by clearing vegetation around the den and sifting a mixture of fine dry sand and unscented glycerin in a circular patter (~1 m in diameter) around the den hole, approximately 0.5 inches thick. Tracks of the animal using the den can then be identified the following morning as most animals using underground dens are nocturnal and will exit the den at night. Track stations are only good for one night. If the track station cannot be checked the following morning, a new sand and glycerin mixture should be applied to the area around the den hole and surveyed the next morning.

Scent Station: Swift fox scent station surveys can be conducted any time of the year, although tracks will not show on bare, frozen ground. However, snow can be used as a tracking medium in winter. Scent stations are created by clearing any vegetation in an area and sifting a mixture of fine dry sand and unscented glycerin in a circular patter (~1 m in diameter) approximately 0.5 inches thick. A plaster tablet soaked in cod/salmon oil mixture (or either) is placed in the center of the station. Scent stations are then placed at locations selected based on the suitability of the surrounding habitat and the presence of certain structures (fence rows, gates, intersections, trails, etc.) that facilitate movement. Weather permitting, they are reset for 3 consecutive days or until at least one station shows sign of swift fox visitation (tracks, feces). Scent stations should not be used within 300 meters of a known or suspected active den as these methods may attract predators.

Survey Reports

A monthly survey report shall be submitted to Nebraska Game and Parks Commission (NG&PC) and Nebraska Department of Environmental Quality (NDEQ) describing all surveys for the swift fox that were conducted during the previous month in connection with project development activities. The survey report shall include the names of the surveyors and their credentials, date and time of the survey, weather conditions, locations surveyed, methods, results, and a discussion of applicable conservation measures implemented. If the swift fox is not identified, the above information must be recorded and included in the report to be submitted at the end of the month. If a swift fox is identified within the survey area, NG&PC must be notified by telephone within twenty-four (24) hours of identification. Written documentation of identification and the survey report shall be submitted with five (5) days of species identification, along with indication of conservation measures. All survey reports shall be submitted no later than the 28th day of the month following the end of the reporting period, even if the species being surveyed are not detected at a particular site. Copies of the reports shall be kept on site for inspection by the NDEQ.

References:

Jackson, V.I. and J.R. Chaote. 2000. *Dens and den sites of the swift fox, Vulpes velox*. The Southwestern Naturalist 45(2):212:220).

Nebraska Department of Environmental Quality (NDEQ). 2009. *Mineral Exploration Permit Number NE0210824*. August 19, 2009.

Tannerfeldt, M., A. Moehrenschlager and A. Angerbjorn. 2003. *Den ecology of swift, kit, and arctic foxes. A review. In the Swift Fox: Ecology and conservation of swift foxes in a changing world*, M. Sovada and L. Carbyn editors. Canadian Plains Research Center, University of Regima.

August 2009

Nebraska Department of Environmental Quality

Threatened and Endangered Species Survey Report

Surveyor' Name(s)____

Credentials: (e.g., who certified the surveyor and date of certification or surveyor's knowledge of surveyed species)
____
____

Date of Survey: ____________________ Time of Survey: ____________________

Weather Condition:
Temperature: _______ ^{o}F Wind Speed & Direction: ___________________

Other

Sunny Partly Cloudy Cloudy Snowing Raining ____________

Legal Location or GPS coordinates (Lat/Long or UTM) of survey area (include datum, i.e., NAD83, WGS84:____

County: _____________________

Vegetative Cover (i.e. corn stubble, plowed field, wetland, short grass prairie 10-20 cm tall

Methods used to survey affected area (.i.e. Mountain Plover Survey Protocol, 5 transects 50 ft apart)
____
____

Were any of the following species identified in the area?

Mountain Plover	Yes/No
River Otter	Yes/No
Swift Fox	Yes/No

If so, what conservation measures were taken? (Attach if necessary)
____
____

If species is identified, record the location of the species in GPS coordinates. Also indicate locational certainty (i.e. 3 birds were flushed 50 yards NW from this point). Photographs may be sent with survey reports to aid in site description and species identification.

Submit survey reports <u>monthly</u> to:

Nebraska Game & Parks Commission
Attn: Env. Analyst Supervisor
Nebraska Natural Heritage Program
2200 N 33rd Street
Lincoln, NE 68503

Nebraska Dept. of Env. Quality
Attn: Mineral Exploration Program
P.O. Box 98922
Lincoln, NE 68509

Table P.1-1 Primary Assumptions Serving as the basis for Surety Cost Estimates Associated with Restoration and Reclamation of One (1) Mine Unit

Assumptions	Quantity
Total number of production wells	120*
Total number of injection wells	2000*
Total number of shallow monitor wells	4
Total number of perimeter wells	11
Total number of restoration wells	10
Wellfield Area (ft^2)	588,000
Wellfield Area (acres)	13.5
Affected Ore Zone Area (ft^2)	588,000
Average Completed Thickness (ft)	19.6
Porosity	0.29
Affected Volume (ft^3)	11,524,800
Flare Factor	1.2
K gallons per Pore Volume	30,000
Number of Patterns in Unit(s)	120
Estimated Number of Pore Volumes for Restoration	11
Number of Wells per Wellfield	345
Total Number of Wells	345
Average Well Depth (ft) – Deep Wells	1,100
Average Well Depth (ft) – Shallow Depth	400

Revised 6/11/2013

Estimated costs are summarized in Table P.1-2

*Number of wells per wellhouse typically 4 wellhouses per wellfield

Table P.1-2 Marsland Total Restoration and Reclamation Cost Estimate - 2013 Surety Estimate

	Task			Cost $
I.	Groundwater Restoration (Sheets 3 to 6)			$233,160
II.	Wellfield Reclamation (Sheets 7 to 10)			$628,175
III.	Commercial Plant Reclamation/Decommissioning (Sheets 11 to 14)			$757,896
IV.	Miscellaneous Site Reclamation (Sheets 19 to 21)			$142,493
V.	Deep Disposal Well Reclamation (Sheet 22)			$67,593
Subtotal Reclamation and Restoration Cost Estimate				**$1,829,317**
		Contract Administratioı	**10%**	**$182,932**
		Contingency	**15%**	**$274,398**
	TOTAL RECLAMATION AND RESTORATION COST ESTIMATE			**$2,286,647**

Revised 6/11/2013

Table P.1-3 Marsland Ground Water Restoration - 2013 Surety Estimate

Task		MU1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11	Total
I. IX Treatment Costs													
PV's Required		3	3	3	3	3	3	3	3	3	3	3	
Total Kgals for Treatment		90000	0	0	0	0	0	0	0	0	0	0	0
IX Treatment Unit Cost ($/Kgal)	(Sheet 25)	$0.40	$0.40	$0.40	$0.40	$0.40	$0.40	$0.40	$0.40	$0.40	$0.40	$0.40	
Subtotal IX Treatment Costs per Wellfield		**$36,000.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Total IX Treatment Costs		**$36,000.00**	**$0.00**										
II. Reverse Osmosis Costs													
PV's Required		6	6	6	6	6	6	6	6	6	6	6	
Total Kgals for Treatment		180000	0	0	0	0	0	0	0	0	0	0	0
Reverse Osmosis Unit Cost ($/Kgal)	(Sheet 26)	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48
Subtotal Reverse Osmosis Costs per Wellfield		**$266,400.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Total Reverse Osmosis Costs		**$266,400.00**	**$0.00**										
III. Recirculation Costs													
PV's Required		2	2	2	2	2	2	2	2	2	2	2	
Total Kgals for Treatment		60000	0	0	0	0	0	0	0	0	0	0	0
Recirculation Unit Cost ($/Kgal)	(Sheet 27)	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31	$0.31
Subtotal Recirculation Costs per Wellfield		**$18,600.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Total Recirculation Costs		**$18,600.00**	**$0.00**										
IV. Consumables													
Spare parts, filters and consumables =	$52,629.75 year												
Active restoration period (months)		7.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumable usage (months restoration x annual rate estimate)		$32,235.72	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Subtotal Consumables per Mine Unit		**$32,235.72**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Total Consumables Costs		**$32,235.72**	**$0.00**										

Table P.1-3 Marsland Ground Water Restoration -2013 Surety Estimate, Continued

Task		MU1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11	Total
V. Monitoring and Sampling Costs													
Guideline 8 analysis =	$248 00 analysis												
6 parameter in-house analysis =	$50.85 analysis												
Total restoration wells		10	0	0	0	0	0	0	0	0	0	0	0
Total monitor wells		25	0	0	0	0	0	0	0	0	0	0	0
IX Treatment duration (months)		2.05	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0.00	0 00
Reverse Osmosis duration (months)		4.11	0.00	0.00	0.00	0.00	0 00	0.00	0.00	0 00	0.00	0.00	0 00
Recirculation duration (months)		1.19	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stabilization duration (months)		12	12	12	12	12	12	12	12	12	12	12	
A. Restoration Well Sampling													
1. Well Sampling prior to restoration start													
# of Wells		10	0	0	0	0	0	0	0	0	0	0	0
$/sample		$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	
2. IX Treatment Sampling													
# of Wells		10	0	0	0	0	0	0	0	0	0	0	
Total # samples		30	0	0	0	0	0	0	0	0	0	0	0
$/sample		$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	
3. RO Sampling													
# of Wells		10	0	0	0	0	0	0	0	0	0	0	
Total # samples		40	0	0	0	0	0	0	0	0	0	0	0
$/sample		$50 85	$50 85	$50 85	$50 85	$50.85	$50 85	$50.85	$50.85	$50.85	$50.85	$50.85	
4. Recirculation Sampling													
# of Wells		10	0	0	0	0	0	0	0	0	0	0	
Total # samples		20	0	0	0	0	0	0	0	0	0	0	0
$/sample		$248.00	$248.00	$248 00	$248.00	$248.00	$248.00	$248.00	$248.00	$248 00	$248.00	$248.00	
5. Stabilization Sampling (Guideline 8)													
# of Wells		10	0	0	0	0	0	0	0	0	0	0	
Total # samples		120	0	0	0	0	0	0	0	0	0	0	0
$/sample		$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	$248.00	
6 Stabilization Sampling (6 parameter in-house)													
# of Wells		10	0	0	0	0	0	0	0	0	0	0	
Total # samples		120	0	0	0	0	0	0	0	0	0	0	0
$/sample		$50.85	$50 85	$50.85	$50.85	$50.85	$50 85	$50.85	$50.85	$50.85	$50 85	$50 85	
7. Monitor Well Sampling													
# of Wells		25	0	0	0	0	0	0	0	0	0	0	
$/sample		$50.85	$50 85	$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	$50.85	$50 85	$50.85	
Total # samples (2.2/mo for entire period)		1064	0	0	0	0	0	0	0	0	0	0	0

Table P.1-3 Marsland Ground Water Restoration -2013 Surety Estimate, Continued

Task		MU1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11	Total
8. Other Laboratory Costs													
Radon, urinalysis, etc. =	$940.73 month												
Total for Other Laboratory Costs:		$6,914.37	$0 00	$0.00	$0.00	$0.00	$0.00	$0.00	$0 00	$0.00	$0.00	$0.00	$0.00
Subtotal Monitoring and Sampling Costs per Mine Unit		**$107,880.27**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Total Monitoring and Sampling Costs		**$107,880.27**	**$0.00**										
VI. MIT Costs													
MIT Costs per Well		$93.53	$93.53	$93.53	$93.53	$93.53	$93.53	$93.53	$93.53	$93.53	$93.53	$93.53	
Restoration period, plus stabilization		19.35	12.00	12.00	12 00	12 00	12 00	12.00	12.00	12.00	12 00	12 00	
Remaining MIT's per 5 year cycle		1	1	1	1	1	2	2	2	3	3	3	
Number of Wells MIT'd for Life of Mine Unit		345	0	0	0	0	0	0	0	0	0	0	
Subtotal MIT Mine Unit		**$32,267.85**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	
5-year MIT Costs for Disposal Wells	$6,425												
Number of DDWs	1												
Number of MITs per DDW	1												
Subtotal MIT DDW Costs	**$6,425**												
Total MIT Costs	**$6,425**												
VI. Supervisory Labor Cost													
Engineer Support =	$8,042 77 month												
HP Technician support =	$4,553.62 month												
Active restoration period (months)		7.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	
Stabilization period (months)		12	12	12	12	12	12	12	12	12	12	12	
1 Engineer support during active restoration		$59,114.36	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0 00	$0 00
2 HP Technician support during active restoration		$33,469.11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3 Engineer support during final stabilization										$96,513.24	$96,513 24	$96,513.24	$289,539.72
4 HP Technician support during final stabilization										$54,643 44	$54,643.44	$54,643.44	$163,930 32
5 Cost reduction due to concurrent restoration of Mine Units					0 00	0 00	0.00	0.00	0 00	-75,578 34	-75,578.34	-75,578.34	-$226,735.02
Subtotal Supervisory Labor per Mine Unit		**$92,583.47**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$75,578.34**	**$75,578.34**	**$75,578.34**	**$226,735.02**
Total Supervisory Labor Costs		**$243,740.15**	**$226,735.02**										
TOTAL RESTORATION COST PER WELLFIELD		**$553,699.46**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$75,578.34**	**$75,578.34**	**$75,578.34**	**$226,735.02**
TOTAL GROUND WATER RESTORATION COSTS	**$233,160.02**												

MU = Mine Unit
Revised 6/11/2013

Table P.1-4 Marsland Wellfield Reclamation - 2013 Surety Estimate

	MU1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11	Totals
Wellfield Piping												
Assumptions:												
Number of Wellhouses	4	0	0	0	0	0	0	0	0	0	0	4
Total Mine Unit surface area (acres)	13.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.50
Total length of small diameter production and injection lines (latera	0	0	0	0	0	0	0	0	0	0	0	0
Total length of 3/8-inch hose (ft)			0	0	0	0	0	0	0	0	0	0
Total length 1-1/4-inch stinger pipe (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Total length of 2-inch downhole production pipe (ft)	4800	0	0	0	0	0	0	0	0	0	0	4800
Total Length of Trunkline (6-inch) (ft)	4000	0	0	0	0	0	0	0	0	0	0	4000
Total Length of Trunkline (8-inch) (ft)	17600	0	0	0	0	0	0	0	0	0	0	17600
Total Length of Trunkline (10-inch) (ft)												0
Total Length of Trunkline (12-inch) (ft)			0	0	0	0	0	0	0	0	0	0
Total Length of All Trunkline (ft)	21600	0	0	0	0	0	0	0	0	0	0	21600
Total number of production wells	120	0	0	0	0	0	0	0	0	0	0	120
Total number of injection wells	200	0	0	0	0	0	0	0	0	0	0	200
Total number of shallow monitor wells	14	0	0	0	0	0	0	0	0	0	0	14
Total number of perimeter monitor wells	11	0	0	0	0	0	0	0	0	0	0	11
I. Production and Injection Piping												
A. Removal and Loading												
Production and Injection Piping Removal Unit Cost ($/ft of pipe)	$0.88	$0.88	$0.88	$0.88	$0.88	$0.88	$0.88	$0.88	$0.88	$0.88	$0.88	
Subtotal Production and Injection Piping Removal and	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
B. Pipe Shredding												
Production and Injection Piping Shredding Unit Cost ($/ft of pipe)	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10	
Subtotal Production and Injection Piping Removal and Loading C	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C. Equipment Costs												
Cat 924G Loader Unit Costs for removal (450'/day)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Shredder Unit Costs for shredding (450'/day)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Subtotal Equipment Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
D. Transport and Disposal Costs (NRC-Licensed Facility)												
Chipped Volume Reduction (ft^3/ft)	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	
Chipped Volume per Wellfield (yd^3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Volume for Disposal Assuming 25% Void Space (yd^3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transportation and Disposal Unit Cost ($/$yd^3$) Unpackaged Bulk	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	
Subtotal Production and Injection Piping Transport and Disposal Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Production and Injection Piping Costs	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Table P.1-4 Marsland Wellfield Reclamation - 2013 Surety Estimate, Continued

	MU1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11	Totals
II. Trunklines												
A. Removal and Loading												
Trunkline Removal Unit Cost ($/ft of pipe)	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	
Subtotal Trunkline Removal and Loading Costs	$42,984.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$42,984.00
B. Pipe Shredding												
Trunkline Shredding Unit Cost ($/ft of pipe)	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	$1.99	
Subtotal Trunkline Shredding Costs	$42,984.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$42,984.00
C. Equipment Costs												
Cat 924G Loader Unit Costs for removal (200'/day)	$157,757.76	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Shredder Unit Costs for shredding (200'/day)	$6,920.64	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Subtotal Equipment Costs	$164,678.40	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$164,678.40
D. Transport and Disposal Costs (NRC-Licensed Facility)												
Chipped Volume Reduction (6-inch) (ft^3/ft)	0.0651	0.0651	0.0651	0.0651	0.0651	0.0651	0.0651	0.0651	0.0651	0.0651	0.0651	
Chipped Volume Reduction (8-inch) (ft^3/ft)	0.1103	0.1103	0.1103	0.1103	0.1103	0.1103	0.1103	0.1103	0.1103	0.1103	0.1103	
Chipped Volume Reduction (10-inch) (ft^3/ft)	0.1712	0.1712	0.1712	0.1712	0.1712	0.1712	0.1712	0.1712	0.1712	0.1712	0.1712	
Chipped Volume Reduction (12-inch) (ft^3/ft)	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	
Chipped Volume per Wellfield (yd^3)	81.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Volume for Disposal Assuming 25% Void Space (ft^3)	101.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	101.9
Transportation and Disposal Unit Cost ($/$ft^3$)	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	
Subtotal Transport and Disposal Costs	$22,585.12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22,585.12
Total Trunkline Costs	**$273,231.52**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$273,231.52**
III. Downhole Pipe												
A. Removal and Loading												
Downhole Piping Removal Unit Cost ($/ft of pipe)	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	
Downhole Hosing Removal Unit Cost ($/ft of pipe)	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	
Removal of 1-1/4-inch stinger pipe	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Removal of downhole production pipe	$480.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Removal of downhole hose	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Subtotal Downhole Piping Removal and Loading Costs	$480.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$480.00
B. Pipe Shredding												
Downhole Piping Shredding Unit Cost ($/ft of pipe)	$0.090	$0.090	$0.090	$0.090	$0.090	$0.090	$0.090	$0.090	$0.090	$0.090	$0.090	
Subtotal Downhole Piping Shredding Costs	$432.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$432.00
C. Equipment Costs												
Smeal Unit Costs for removal	$336.51	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Shredder Unit Costs for shredding	$68.35	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Subtotal Equipment Costs	$404.86	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$404.86
D. Transport and Disposal Costs (NRC-Licensed Facility)												
Chipped Volume Reduction - 1-1/4-inch stinger (ft^3/ft)	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	
Chipped Volume Reduction - 2-inch downhole production (ft^3/ft)	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	
Volume Reduction - 3/8-inch hose (ft3/ft)	0.0313	0.0313	0.0313	0.0313	0.0313	0.0313	0.0313	0.0313	0.0313	0.0313	0.0313	
Chipped Volume - 1-1/4-inch stinger (ft^3)	0	0	0	0	0	0	0	0	0	0	0	
Chipped Volume - 2-inch downhole production (ft^3)	36	0	0	0	0	0	0	0	0	0	0	
Volume 3/8-inch hose (ft3)	0	0	0	0	0	0	0	0	0	0	0	
Volume for Disposal Assuming 25% Void Space (yd^3)	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Transportation and Disposal Unit Cost ($/$yd^3$) (Unpackaged Bulk)	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	$221.64	
Subtotal Downhole Piping Transport and Disposal Costs	$376.79	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$376.79
Total Downhole Piping Costs	**$1,693.65**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$1,693.65**

Table P.1-4 Marsland Wellfield Reclamation - 2013 Surety Estimate, Continued

		MU1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11	Totals
IV. Surface Reclamation													
A. Removal and disposal of contaminated soil around wells													
Volume of contaminated soil (0.37 yd3 per injection and production well)		118.4	0	0	0	0	0	0	0 00	0	0.00	0	118.40
Disposal of contaminated soil	$250.05 per yd3	$29,605 92	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0 00	$0.00	$0.00	$0.00	$29,605.92
Equipment (Cat 924G loader at 2 yd3/hr)		$10,809.33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Labor (1 man-hour per 2 Yd3)		$1,473.27	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
Subtotal removal and disposal of contaminated soil		$41,888.52	$0 00	$0.00	$0.00	$0.00	$0.00	$0.00	$0 00	$0 00	$0.00	$0.00	$41,888.52
B. Recontour and seeding													
Recontour and seeding (est. $300/acre)		$4,050.00	$0.00	$0.00	$0.00	$0 00	$0 00	$0.00	$0.00	$0.00	$0.00	$0.00	
Subtotal Recontour and Seeding		$4,050.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0 00	$0 00	$0.00	$0.00	$4,050.00
Total Surface Reclamation		**$45,938.52**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$45,938.52**
IV. Well Houses													
Total Quantity		4	0	0	0	0	0	0	0	0	0	0	
Average Well House Weight (Lbs.) (Includes wellhead covers for each well)		9200	9200	9200	9200	9200	9200	9200	9200	9200	9200	9200	
A. Removal													
Dismantlement at 2-man-days per wellhouse (man-days)		8	0	0	0	0	0	0	0	0	0	0	
Dismantlement Labor Costs		$1,592 72	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0 00	$0.00	$0.00	$1,592.72
Equipment (Cat 924G at 2 hours per wellhouse) (hrs)		8	0	0	0	0	0	0	0	0	0	0	
Equipment Costs		$1,460.72	$0.00	$0.00	$0 00	$0 00	$0 00	$0 00	$0 00	$0.00	$0 00	$0 00	$1,460 72
Subtotal Well House Dismantlement Costs		$3,053.44	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0 00	$0.00	$0.00	$0.00	$3,053.44
B. Disposal													
Total Disposal Weight (9200 lbs per wellhouse) (Lbs)		36800	0	0	0	0	0	0	0	0	0	0	
Subtotal Disposal Costs		$1,104.00	$0.00	$0.00	$0 00	$0 00	$0.00	$0 00	$0.00	$0.00	$0 00	$0.00	$1,104 00
Total Well House Removal and Disposal Costs		**$4,157.44**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$4,157.44**
TOTAL REMOVAL AND DISPOSAL COSTS PER WELLFIELD		**$325,021.13**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$325,021.13**
TOTAL WELLFIELD BUILDINGS AND EQUIPMENT REMOVAL AND DISPOSAL COSTS		**$325,021.13**											

MU - Mine Unit

Revised 6/11/2013

Table P.1-5 Marsland Well Abandonment - 2013 Surety Estimate

		MU 1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11	Total
I. Well Abandonment (Wellfields)													
# of Production Wells		120	0	0	0	0	0	0	0	0	0	0	
# of Injection Wells		200	0	0	0	0	0	0	0	0	0	0	
# of Perimeter Monitoring Wells		11	0	0	0	0	0	0	0	0	0	0	
# of Shallow Monitoring Wells		14	0	0	0	0	0	0	0	0	0	0	
Total Number of Deep Wells		331	0	0	0	0	0	0	0	0	0	0	331
Total Number of Shallow Wells		14	0	0	0	0	0	0	0	0	0	0	14
Average Diameter of Casing (inches)		5	5	5	5	5	5	5	5	5	5	5	
Production, Injection and Perimeter Well Average Depth (ft)		1100	1100	1100	1100	1100	1100	1100	1100	1100	0	0	900
Shallow Well Average Depth (ft)		400	400	400	400	400	400	400	400	400	0	0	327
Total Mine Unit Well Depth (ft)		369700	0	0	0	0	0	0	0	0	0	0	369700
Well Abandonment Unit Cost ($/ft. of well)		$0.82	$0.82	$0.82	$0.82	$0.82	$0.82	$0.82	$0.82	$0.82	$0.82	$0.82	
Subtotal Abandonment Cost per Wellfield		**$303,154.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$303,154.00**
II. Downhole Pump Disposal													
Number of Downhole Pumps	0												
Pump Disposal Volume(ft3)	0.5												
Total Pump Disposal Volume(yd3)	0.0												0.0
Downhole Pump Disposal Rate ($/yd3)	$221 64												221 64
Subtotal Downhole Pump Disposal		**$0.00**											**$0.00**
Total Wellfield Abandonment Costs		**$303,154.00**											

MU = Mine Unit

Revised 6/11/2013

Table P.1-6 Marsland Satellite Facility Equipment Decommissioning - 2013 Surety Estimate

I. Removal and Loading Costs	
Tankage	
Number of Contaminated Tanks	10
Volume of Contaminated Tank Construction Material (ft^3)	193
Number of Chemical Tanks	0
Disposal Void Factor	1.25
A. Labor to Remove and Load Tankage	
Number of Persons	2
Tanks/Day	1
Number of Days	10
$/Day/Person	$199.09
Subtotal Removal Labor Costs	*$3,981.80*
B. Labor to Clean Chemical Tankage	
Number of Persons	1
Tanks/Day	1
Number of Days	0
$/Day/Person	$199.09
Subtotal Cleaning Labor Costs	*$0.00*
C. Equipment	
Saws, scaffolding, etc.	$6,000
Subtotal Equipment Costs	*$6,000*
Total Equipment Removal and Loading Costs	**$9,981.80**
II. Transportation and Disposal Costs (NRC-Licensed Facility)	
A. Tankage	
Volume of Tank Construction Material (ft^3)	193
Volume for Disposal Assuming Void Space (yd^3)	8.9
Transportation and Disposal Unit Cost ($/$yd^3$) (Unpackaged Bulk)	$221.64
Subtotal Tankage Transportation and Disposal Costs	*$1,972.60*
B. Contaminated PVC Pipe	
Volume of Shredded PVC Pipe (ft^3)	153.6
Volume for Disposal Assuming Void Space (yd^3)	7.1
Transportation and Disposal Unit Cost ($/$yd^3$) (Unpackaged Bulk)	$221.64
Subtotal Contaminated PVC Pipe Transportation and Disposal Costs	*$1,573.64*
C. Pumps	
Volume of Process Pumps (yd^3) (no void factor used)	2.4
Transportation and Disposal Unit Cost ($/$yd^3$) (Unpackaged Bulk)	$221.64
Subtotal Pump Transportation and Disposal Costs	*$531.94*
D. Filters (injection, backwash and yellowcake filters)	
Volume of Filters (yd^3) (no void factor used)	0.0
Transportation and Disposal Unit Cost ($/$yd^3$) (Unpackaged Bulk)	$221.64
Subtotal Filter Transportation and Disposal Costs	*$0.00*
E. Dryer	
Dryer Volume (yd^3) (no void factor used)	0.0
Transportation and Disposal Unit Cost ($/$yd^3$) (Unpackaged Bulk)	$221.64
Subtotal Dryer Transportation and Disposal Costs	*$0.00*
Total Contaminated Equipment Transportation and Disposal Costs	**$4,078.18**

Table P.1-6 Marsland Satellite Facility Equipment Decommissioning - 2013 Surety Estimate, Continued

III. Transportation and Disposal (Solid Waste for Landfill Disposal)	
A. Cleaned Tankage	
Volume of Tank Construction Material (ft^3)	0
Number of Landfill Trips	1
Transportation and Disposal Unit Cost ($/Load)	$912.00
Subtotal Tankage Transportation and Disposal Costs	*$912.00*
B. Uncontaminated PVC Pipe	
Volume of Shredded PVC Pipe (ft^3)	0
Number of Landfill Trips	1
Transportation and Disposal Unit Cost ($/Load)	$912.00
Subtotal PVC Pipe Transportation and Disposal Costs	*$912.00*
Total Uncontaminated Equipment Transportation and Disposal Costs	**$1,824.00**
IV. Supervisory Labor Costs During Plant Decommissioning	
Estimated Duration (months)	6
Engineer	$48,256.62
Radiation Technician	$27,321.72
Total Supervisory Labor Costs	**$75,578.34**
SUBTOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS PER FACILITY	$91,462.32
Building Area (Ft2)	34,000
Building Equipment Removal and Disposal Cost per Square Foot	$2.69
TOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS	**$91,462.32**

Revised 6/11/2013

Table P.1-7 Marsland Building Demolition - 2013 Surety Estimate

	Satellite Plant
I. Decontamination Costs	
A. Wall Decontamination	
Area to be Decontaminated (ft^2)	30,000
HCl Application Rate (Gallons/ft^2)	1
HCl Acid Cost	$1.54
Subtotal Wall Decontamination Materials Costs	$46,200.00
B. Concrete Floor Decontamination	
Area to be Decontaminated (ft^2)	9000
HCl Application Rate (Gallons/ft^2)	2
HCl Acid Cost	$1.54
Subtotal Floor Decontamination Materials Costs	$27,720.00
C. Decontamination Labor	
Labor (man-days)	2
Subtotal Decontamination Labor Cost	$398.18
D. Decontamination Equipment Costs	
Sprayer pump	$500
Recycle pump	$500
Sprayer with hose	$1,000
Subtotal Decontamination Equipment Costs	$2,000
E. Decontamination Waste Disposal (to Ponds)	
Total gallons HCl waste	48,000
Pumping costs (5 HP/30 gpm)	$496.33
Subtotal Decontamination Costs	$76,814.51
Total Decontamination Costs	**$76,814.51**
II. Demolition Costs	
Assumptions (based on 2007 costs):	
Dismantling interior steel, tanks, pumps, etc.	$198,800.00
Dismantling plant building	$99,400.00
A. Building Dismantling	
Dismantle interior components (2007 $'s escalated by CPI)	$202,179.60
Plant building dismantling (2007 $'s escalated by CPI)	$101,089.80
Subtotal Building Dismantling	*$303,269.40*
B. Concrete Floor Removal	
Area of direct-dispose concrete floors (ft2)	13,400
Removal Rate ($/ft2)	$14.04
Subtotal Concrete Floor Removal	*$188,136.00*
Total Demolition Costs	**$491,405.40**

Table P.1-7 Marsland Building Demolition - 2013 Surety Estimate, Continued

III. Disposal Costs	
A. Concrete Floor	
Area of Direct-Dispose Concrete Floor (ft^2)	13,400
Average Thickness of Concrete Floor (ft)	0.75
Volume of Concrete Floor (ft^3)	10,050
Volume of Concrete Floor (Yd3)	372
Transportation and Disposal Unit Cost ($/$Yd^3$) (Unpackaged Bulk)	$221.64
Subtotal Concrete Floor Disposal Costs	*$82,450.08*
Total Disposal Costs	**$82,450.08**
IV Plant Site Reclamation	
A. Plant Site Earthwork	
Material to be Moved (Yd3)	20,000
D8N Bulldozer Earthwork Rate (Yd3/hr)	700
D8N Hourly Rate	$509.74
Subtotal Plant Site Earthwork	*$14,564.00*
B. Revegetation	
Area requiring Revegetation (Ac)	4
Revegetation Unit Cost ($/Ac)	$300
Subtotal Plant Site Revegetation	*$1,200.00*
Total Plant Site Reclamation Costs	**$15,764.00**
SUBTOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	$666,433.99
Building Area (Ft2)	34,138
Building Demolition Cost per Square Foot	$19.52
TOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	**$666,433.99**

Revised 6/11/2013

Table P.1-8 Marsland Miscellaneous Site Reclamation - 2013 Surety Estimate

I. Access Road Reclamation	
Assumptions	
Road Reclamation production rate (Yd3/hr)	200
Length of Main Access Roads (ft)	500
Average Main Access Road width (ft)	25
Depth of Main Access Road Gravel Surface (ft)	1
Surface Area of Main Access Road (Ac)	0.3
Length of Wellfield Access Roads (ft)	500
Average Wellfield Access Road width (ft)	12
Depth of Wellfield Access Road Gravel Surface (ft)	0.5
Surface Area of Wellfield Road (Ac)	0.1
A. Main Access Road Dirtwork	
Main Access Road Gravel Volume (Yd3)	463
Total reclamation time (hrs)	2
D8N Unit Operating Cost ($/hr)	$509.74
Subtotal Main Access Road Gravel Roadbase Removal Costs	$1,019.48
B. Wellfield Road Dirtwork	
Wellfield Road Gravel Volume (Yd3)	111
Total reclamation time (hrs)	1
D8N Unit Operating Cost ($/hr)	$509.74
Subtotal Wellfield Road Gravel Roadbase Removal Costs	$509.74
E. Discing/Seeding	
Assumptions	
Surface Area (acres)	0.4
Discing/Seeding Unit Cost ($/acre)	$300.00
Subtotal Discing/Seeding Costs	$120.00
Total Access Road Reclamation Costs	**$1,649.22**
II. Wastewater Pipeline Reclamation	
Assumptions	
Pipeline Removal Rate (ft./man-day)	67
Pipeline Shredding Rate (ft./man-day)	1,500
Number of Pond Pipelines	2
Length of Pond Pipelines (ft)	2,000
Average Pipe Size (Sch 40)	4
A. Pipeline Removal Costs	
Length of Pipelines (ft)	4,000
Removal Rate (ft/man-day)	67
Removal Labor Rate ($/man-day)	$199.09
Cat 924G Loader Use (days)	60
Cat 924G Loader Cost	$87,643.20
Subtotal Pipeline Removal Costs	$99,588.60
B. Pipeline Shredding Costs	
Length of Pipelines (ft)	4,000
Shredding Rate (ft/man-day)	1,500
Shredding Labor Rate ($/man-day)	$199.09
Shredder Use (days)	3
Shredder Cost	$192.24
Subtotal Pipeline Shredding Costs	$789.51

Table P.1-8 Marsland Miscellaneous Site Reclamation - 2013 Surety Estimate, Continued

C. Pipeline Transportation and Disposal (NRC-Licensed Facility)	
Pipe Diameter (inches)	4
Chipped Volume Reduction (ft^3/ft)	0.0103
Subtotal Volume of Shredded PVC Pipe (yd^3)	1.5
Disposal Void Factor	1.25
Final Disposal Volume (yd3)	1.88
Transportation and Disposal Unit Cost ($/$yd^3$) (Unpackaged Bulk)	$221.64
Subtotal Pipeline Disposal Costs	$416.68
Total Wastewater Pipeline Reclamation Costs	**$100,794.79**
III. Electrical Distribution System Removal	
Assumptions	
Length of High Voltage Lines	500
High Voltage Line Removal Rate ($/ft.)	$2.17
High Voltage Line Removal Cost ($/ft.)	$1,085.00
Substation Removal	$1.175.00
Subtotal Electrical Distribution System Removal Costs	**$2,260.00**
IV. Supervisory Labor Costs During Miscellaneous Reclamation	
Estimated Duration (months)	3
Engineer Rate ($/month)	$8,042.77
Total Engineer Labor	$24,128.31
Radiation Technician Rate ($/month)	$4,553.62
Total Radiation Technician Labor	$13,660.86
Total Supervisory Labor Costs	**$37,789.17**
TOTAL MISCELLANEOUS RECLAMATION COSTS	**$142,493.18**

Sch = Schedule

Revised 6/11/2013

Table P.1-9 Marsland Deep Disposal Well Reclamation - 2013 Surety Estimate

I. Cost Basis	
A. Plugging and Abandonment	
Cost Estimate from April 2009 2nd Well Permit Application for plugging and abandonment	$60,292
April 2009 CPI	213.2
June 2011 CPI	229.5
Subtotal Escalated April 2009 Plugging and Abandonment Costs	**$64,901.57**
B. Site Reclamation	
Cost Estimate from April 2009 2nd Well Permit Application for site reclamation	$2,500
April 2009 CPI	213.2
June 2011 CPI	229.5
Subtotal Escalated April 2009 Reclamation Costs	**$2,691.14**
Subtotal Abandonment cost per well	**$67,592.71**
TOTAL DEEP DISPOSAL WELL RECLAMATION COSTS	**$67,592.71**

CPI: Consumer Price Index

Revised 6/11/2013

Table P.1-10 Marsland Groundwater IX Treatment (GIX) Restoration (Unit Costs) - 2013 Surety Estimate

Assumptions:

1. All pumps are 5 hp pumping at 32 gpm
2. Cost of electricity = $0.0830 Kw hr
3. Horsepower to kilowatt conversion = 0.746 Kw/HP
4. Operator labor costs = $199.09 man-day
5. Labor costs are based on 36 pumps at 1,150 gpm

Wellfield Pumping Electrical Costs per 1000 Gallons (Includes bleed to the Deepwell / Evaporation Pond)

1000 gal	X	5 hp / 32 gpm	X	1 hr / 60 min	X	0.746 kwh / hp	X	$ 0.0830 / kwh		= $ 0.161	

Wellfield Pumping Labor Costs per 1000 Gallons

1000 gal	X	1 min / 1150 gal	X	1 man-day / 1440 min	X	$199.09 / man-day	X	2	operators	= $ $0.240	

Groundwater IX Production Rate

1000 gal / min	X	60 min / hr	X	24 hr / day	X	365 day / year	X	1 / 12	year / month	= *43,800,000*	*gallons / month*

TOTAL GWS COSTS PER 1000 GALLONS = **$ 0.40**

Revised 6/11/2013

Table P.1-11 Marsland Groundwater Reverse Osmosis (RO) Treatment (Unit Costs) - 2013 Surety Estimate

Assumptions:

1. All pumps are 5 hp pumping at 32 gpm			
2 Membrane Replacement			$0.015 per 1000 gal
3 Cost of electricity =			$0.0830 Kw hr
4 Horsepower to kilowatt conversion =			0.746 Kw/HP
5 Operator labor costs =			$199.09 man-day
6 RO System horsepower requirements for 600 gpm rated flow based upon:			
	RO Unit Pump	195 hp	
	Permeate/Injection pump	60 hp	
	Waste pump (I(Bleed - Deepwell / Evap Ponds)	12 hp	
	TOTAL:	267 hp	
7 Chemical costs:			
	Reductant =		$0.240 lb
	Antiscalant =		$15.45 gal

Membrane Replacement Costs per 1000 Gallons

1000 gal	X	$660 membrane cost / month	/	43,800,000 gallons month	= $ 0.015	per Kgal

Wellfield Pumping Electrical Costs per 1000 Gallons

1000 gal	X	5 hp / 32 gpm	X	1 hr / 60 min	X	0.746 kwh / hp	X	$ 0.0830 / kwh	= $ 0.161	per Kgal

Reverse Osmosis Electrical Costs per 1000 Gallons

1000 gal	X	267 hp / 600 gpm	X	1 hr / 60 min	X	0.746 kwh / hp	X	$ 0.0830 / kwh	= $ 0.459	per Kgal

Reverse Osmosis Labor Costs per 1000 Gallons

1000 gal	X	1 min / 600 gal	X	1 man-day / 1440 min	X	$199.09 / man-day	X	2 operators	= $ $0.461	per Kgal

Treatment chemical costs per 1000 Gallons

Antiscalant:

1000 gal	X	0.000008330 gal antiscalant / 1 gal	X	$15.45 / gal antiscalant	= $ $0.129	per Kgal

Reductant:

1000 gal	X	0.001040 lbs reductant / 1 gal	X	$0.240 / lb reductant	= $ $0.250	per Kgal

Reverse Osmosis Production Rate

1000 gal / min	X	60 min / hr	X	24 hr / day	X	365 day / year	X	1 year / 12 month	=	*43,800,000 gallons / month*

TOTAL RO COSTS PER 1000 GALLONS = $ 1.48

RO = Reverse Osmosis

Revised 6/11/2013

Table P.1-12 Marsland Groundwater Recirculation (Unit Costs) - 2013 Surety Estimate

Assumptions:

1. All pumps are 5 hp pumping at 32 gpm
2. Cost of electricity = $0.0830 Kw hr
3. Horsepower to kilowatt conversion = 0.746 Kw/HP
4. Operator labor costs = $199.09 man-day
5. System horsepower requirements for 1,150 gpm rated flow based upon:
   injection pump 30 hp

Wellfield Pumping Electrical Costs per 1000 Gallons

1000 gal	X	5 hp / 32 gpm	X	1 hr / 60 min	X	0.746 kwh / hp	X	$ 0.0830 / kwh		= $	0.161	per Kgal

Wellfield Injection Electrical Costs per 1000 Gallons

1000 gal	X	30 hp / 1150 gpm	X	1 hr / 60 min	X	0.746 kwh / hp	X	$ 0.0830 / kwh		= $	0.027	per Kgal

Recirculation Labor Costs per 1000 Gallons

1000 gal	X	1 min / 1150 gal	X	1 man-day / 1440 min	X	$199.09 / man-day	X	1	operators	= $	0.120	per Kgal

Recirculation Production Rate

1150 gal / min	X	60 min / hr	X	24 hr / day	X	365 day / year	X	1 year / 12 month		=	*50,370,000*	*gallons / month*

TOTAL RECIRCULATION COSTS PER 1000 GALLONS = $ 0.31

Revised 6/11/2013

Table P.1-13 Marsland Well Abandonment (Unit Costs) - 2013 Surety Estimate

Assumptions:

1 Use backhoe for 0.25 hr/well to dig, cut off, and cap well.
2 Drill rig used 2.5 hrs to plug well.
3 Labor for installing chips, etc. will require 2 workers at 0.5 hrs per well

Well Abandonment Costs						**Cost per ft (based on 700 ft wells)**
Labor Costs	1 hours	X $	24.89	per hour	=$ 24.89	$0.0356
Cat 416 Backhoe						
	0.25 hours	X $	122.98	per hour	=$ 30.75	$0.0439
Drill rig						
	2.5 hours	X $	163.34	per hour	=$ 408.35	$0.5834
Well Cap	1 each	X $	12.20	each	=$ 12.20	$0.0174
Materials per foot of well (Variable Cost)						
Cement	0.0714 lbs/ft	X $	0.140	per pound	=$	$0.0100
Bentonite Chips	0.007 tubes/ft	X $	8.50	per tube	=$	$0.0595
Plug Gel	0.0086 sacks/ft	X $	8.50	per sack	=$	$0.0731
Total Estimated Cost per Foot:						**$0.82**

Revised 6/11/2013

Table P.1-14 Marsland Five Year Mechanical Integrity Tests (MIT)

Assumptions:

1 Pulling Unit for 8 hr/day
2 MIT Unit for 8 hr/day
3 Labor for operation of pulling unit requires 2 workers (one operator & one laborer)
4 Labor for operation of MIT Unit requires 1 worker

MIT Costs per Well

Equipment and Labor:

Pulling Unit includes one operator					
8 hours	X	$ 22.63	per hour	=$	181.04
Laborer					
8 hours	X	$ 24.89	per hour	=$	199.12
MIT Unit includes one operator					
8 hours	X	$ 22.63	per hour	=$	181.00
			TOTAL MIT COST PER DAY	=$	561.16
Wells Completed		6	per day		

MIT COSTS PER WELL =$ 93.53

MIT COSTS PER DEEP DISPOSAL WELL (2013 Cost) =$ 6425

Revised 6/11/2013

Table P.1-15 Marsland Master Cost Basis - 2013 Surety Estimate

		MU1	MU2	MU3	MU4	MU5	MU6	MU7	MU8	MU9	MU10	MU11
Total number of production wells		120	0	0	0	0	0	0	0	0	0	0
Total number of injection wells		200	0	0	0	0	0	0	0	0	0	0
Total number of shallow monitor wells		14	0	0	0	0	0	0	0	0	0	0
Total number of perimeter monitor wells		11	0	0	0	0	0	0	0	0	0	0
Total number of restoration wells		10	0	0	0	0	0	0	0	0	0	0
Wellfield Area (ft2)		588,000	0	0	0	0	0	0	0	0	0	0
Wellfield Area (acres)		13.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Affected Ore Zone Area (ft2)		588,000	0	0	0	0	0	0	0	0	0	0
Avg. Completed Thickness		19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
Porosity		0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Affected Volume (ft3)		11,524,800	0	0	0	0	0	0	0	0	0	0
Flare Factor		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Kgallons per Pore Volume		30,000	0	0	0	0	0	0	0	0	0	0
Number of Patterns in Unit(s)												
	Current	0	0	0	0	0	0	0	0	0	0	0
	Estimated next report	120	0	0	0	0	0	0	0	0	0	0
	Total Estimated	120	0	0	0	0	0	0	0	0	0	0
Number of Wells in Unit(s)												
Production Wells												
	Current	0	0	0	0	0	0	0	0	0	0	0
	Estimated next report	120	0	0	0	0	0	0	0	0	0	0
	Total Estimated	120	0	0	0	0	0	0	0	0	0	0
Injection Wells												
	Current	0	0	0	0	0	0	0	0	0	0	0
	Estimated next report	200	0	0	0	0	0	0	0	0	0	0
	Total Estimated	200	0	0	0	0	0	0	0	0	0	0
Shallow Monitor Wells												
	Current	0	0	0	0	0	0	0	0	0	0	0
	Estimated next report	14	0	0	0	0	0	0	0	0	0	0
	Total Estimated	14	0	0	0	0	0	0	0	0	0	0
Perimeter Monitor Wells												
	Current	11	0	0	0	0	0	0	0	0	0	0
	Estimated next report	0	0	0	0	0	0	0	0	0	0	0
	Total Estimated	11	0	0	0	0	0	0	0	0	0	0
Number of Wells per Wellfield		345	0	0	0	0	0	0	0	0	0	0
Total Number of Wells		345										
Average Well Depth (ft) - Deep Wells		1100	1100	1100	1100	1100	1100	1100	1100	1100	0	0
Average Well Depth (ft) - Shallow Wells		400	400	400	400	400	400	400	400	400	0	0

Table P.1-15 Marsland Master Cost Basis - 2013 Surety Estimate (continued)

Electrical Costs			
	2012 Rate	2013 Est Rate	
Power cost (adj for current actual cost)	$0.0797	$0.0830	kwHr
Kilowatt to Horsepower	0.746	0.746	Kw/HP
Horsepower per gallon per minute	0 167	0.167	HP/gpm
Labor Rates			
	2012 Rate	2013 Est Rate (CPI)	
Operator Labor Cost	$195.76	$199.09	day
Pulling Unit Operator	$178.00	$181.03	day
Engineer Cost	$7,908.33	$8,042.77	month
Radiation Technician Costs	$4,477 50	$4,553.62	month
Chemical Costs			
	2012 Rate	2013 Est Rate	
Antiscalant for RO (adj for current actual cost)	$15.45	$15.45	gal
Reductant (adj for current actual cost)	$0.24	$0.24	lb
Cement (adj for current actual cost)	$0.14	$0.14	pound
Bentonite Tubes (adj for current actual cost)	$8.35	$8 50	tube
Salt (adj for current actual cost)	$128.52	$128 52	ton
Plug Gel (adj for current actual cost)	$8.40	$8 50	sack
Well Cap (adj for current actual cost)	$12 00	$12.20	each
Hydrochloric Acid (adj for current actual cost)	$1.54	$1.54	gallon
Analytical Costs			
Guideline 8 (contract lab adjusted for current contract cost)	$248 00	$248.00	analysis
6 parameter (in-house) Est Rate (CPI)	$50.00	$50.85	analysis
Other (radon, bio, etc.) Est Rate (CPI)	$925.00	$940.73	month
Spare Parts			
	2012 Rate	2013 Est Rate (CPI)	
Restoration spare parts estimate	$51,750.00	$52,629 75	year

CPI Escalators (CPI-U, U.S. City Average)	
1988 CPI (average)	118.3
June 2012 CPI (deep well estimate)	213.2
2011 CPI (June 2011 used in last	225.7
Current CPI (June 2011)	229.5
2012 Escalation Factor	1 017

Table P.1-15 Marsland Master Cost Basis - 2013 Surety Estimate (continued)

Equipment Costs

Equipment	Base Rental Rate ($/hr)	Labor Costs ($/hr)	Repair Reserve Costs ($/hr)	Fuel Costs ($/hr)	Mob & Demob ($/hr)	Total ($/hr)
Cat 924G Loader	$36.50	$24.89	$109.50	$11.70	inc.	$182.59
Cat 416 Backhoe	$21.50	$24.89	$64.50	$12.09	inc.	$122.98
Shredder	$8.01			inc	inc	$8.01
Cat D8N Bulldozer	$110.00	$24.89	$330.00	$44.85	inc	$509.74
Pulling Unit	$52.58	inc	inc	inc	inc	$52.58
Mixing Unit	$6.00			inc	inc	$6.00
Drill Rig	$163.34	inc	inc	inc	inc	$163.34

Basis:
Drill rig based on current 2011 contract.
Equipment rates based on Cost Reference Guide - Equipment Watch 2012 updated addition.
Aug 12 costs for off-road fuel. $3.900 gallon

Labor rate based on current operator labor rate

Pipe Volumes

Nominal Pipe Size	Wall Thickness (in.)	Pipe OD (in.)	Volume per foot (ft3/ft)
3/8-inch O2 hose		0.37500	0.03130
2-inch Sch. 40 downhole	0.15400	2.37500	0.00740
1-1/4-inch Sch. 40 stinger	0.14000	1.66000	0.00440
2-inch SDR 13.5 inj & prod.	0.14815	2.29630	0.00690
4-inch SDR 35	0.11430	4.22860	0.01030
6-inch Sch. 40 process pipe	0.28000	6.56000	0.03840
6-inch Trunkline	0.49100	6.56600	0.06510
8-inch Trunkline	0.63900	8.54800	0.11030
10-inch Trunkline	0.79600	10.65400	0.17120
12-inch Trunkline	0.94400	12.63700	0.24080

Table P.1-15 Marsland Master Cost Basis - 2013 Surety Estimate (continued)

Pipe Removal and Shredding Costs

Activity	Removal Rate (ft/man-day)	Shredding Rate (ft/man-day)	Labor Rate (day)	Activity Cost per foot
2-inch SDR 13.5 inj & prod Removal	225		$199.09	$0.88
2-inch SDR 13.5 inj & prod Shredding		1920	$199.09	$0.10
Trunkline Removal	100		$199.09	$1.99
Trunkline Shredding		100	$199.09	$1.99
Downhole Pipe Removal	2000		$199.09	$0.10
Downhole Pipe Shredding		2250	$199.09	$0.09
Downhole Hose Removal	1000		$199.09	$0.20
Waste and RO Building Pipeline Removal	67		$199.09	$2.97
Waste and RO Building Pipeline Shredding		1500	$199.09	$0.13

Waste Disposal Costs

Waste Form	Fee		Density Correction Factor (Tons/Yd3)	Fee per Cubic Yard	Transport Cost	.	Total Transportation and Disposal	
Soil, Bulk Byproduct Material	$166.75	per Ton	0.54	$90.05	$160.00	per Yd3	$250.05	per Yd3
Unpackaged Bulk Byproduct Material (e.g., pipe, equipment)	$146.75	per Ton	0.42	$61.64	$160.00	per Yd3	$221.64	per Yd3
Solid Waste (landfill)	$0.03	per Lb			Incl.	per Lb	$0.03000	per Lb
Solid Waste (landfill)	$912.00	per Load			Incl.	per Load	$912.00	per Load
Void Factor (for disposal)	1.25							

Plant Dismantling

Plant Components:	Number	Units	Estimated Disposal Volume	Units	Activity	Units	2012Cost
Contaminated Tanks	10	each	19.3	Ft3 each	Dismantle interior		$ 198800
Uncontaminated Tanks	0	each	19.3	Ft3 each	Dismantle piping Building		$ 99400
Pumps	13	each	5	Ft3 each			
Downhole Pumps	0	each	0.5	Ft3 each	Concrete floor removal rate	Current Cost $/ft2	14.04
Contaminated Piping	4000	feet	See estimate by piping size and material				
Uncontaminated Piping	0	feet					
Filters	0	each	100	Ft3 each			
Dryer	0	each	400	Ft3 each			
Average PVC Pipe Diameter (inches)	3						

Table P.1-15 Marsland Master Cost Basis - 2013 Surety Estimate (continued)

Plant Decontamination				
Direct Dispose Plant Floor Area	13400 ft2	Decon Solution (HCl) Floor Application Rate	2	gal/ft2
Uncontaminated Plant Floor Area	4400 ft2			
Decontaminated Plant Floor Area*	9000 ft2			
Average concrete thickness	0 75 ft			
Plant Wall Area	30000 ft2	Decon Solution (HCl) Wall Application Rate	1	gal/ft2

Revised 6/11/2013

April 23, 2012

Rhonda Grantham
Supervisor Radiation Safety & Regulatory Affairs/RSO
86 Crow Butte Rd
Crawford, NE 69339

Subject: United States Nuclear Regulatory Commission (USNRC) Regulatory Guide 4.14 Lower Limits of Detection for the Marsland Baseline Samples.

Dear Rhonda:

As requested in conversation with David Blaida, Energy Laboratories, Inc. (ELI) Radiochemical Supervisor on April 20, 2012, the following is an explanation verifying the reported Minimum Detectable Concentrations/Lower Limits of Detection (MDC/LLD) values for the Marsland Baseline Project samples are in compliance with the USNRC regulatory guide 4.14, Section 5 "LLD" for the following requested analytes:

Analyte	**MDC/LLD**	**MDC/LLD**
Matrix	**Water**	**Water**
Radium 226	2E-10 uCi/ml	0.2 pCi/L
Thorium 230	2E-10 uCi/ml	0.2 pCi/L
Polonium 210	1E-9 uCi/ml	1.0 pCi/L
Lead 210	1E-9 uCi/ml	1.0 pCi/L
Uranium	2E-10 uCi/ml	0.2 pCi/L
Matrix	**Soil/sediment (dry)**	**Soil/sediment (dry)**
Radium 226	2E-7 uCi/g	0.2 pCi/g
Thorium 230	2E-7 uCi/g	0.2 pCi/g
Polonium 210	No guidance	No guidance
Lead 210	2E-7 uCi/g	0.2 pCi/g
Uranium	2E-7 uCi/g	0.2 pCi/g
Matrix	**Vegetation, food & Fish (wet)**	**Vegetation, food & Fish (wet)**
Radium 226	5E-8 uCi/kg	0.05 pCi/g
Thorium 230	2E-7 uCi/kg	0.2 pCi/g
Polonium 210	1E-6 uCi/kg	1.0 pCi/g
Lead 210	1E-6 uCi/kg	1.0 pCi/g
Uranium	2E-7 uCi/kg	0.2 pCi/g

ELI has met the criteria per the guidance suggested by the USNRC when reasonably achievable by available conventional laboratory methodology. If for some reason the MDC/LLD was not be met on the original analysis, the samples were recounted or re-analyzed until the 4.14 MDC/LLDs were achieved. If after reanalysis these criteria still could not be met, the laboratory report included a narrative explanation with respect to one or more of the following:

1. Matrix interferences
2. Matrix effects
3. Inadequate sample volumes
4. Radiochemical concentrations were reported above the MDC/LLD

In addition, some of the analytes were reported to two significant figures. Regulatory Guide, 4.14 lists the LLDs to only one significant figure, therefore, it is of ELI's opinion that these should be rounded to the nearest significant figure. For example, 1.3 pCi/L equals 1 pCi/L.

Also, as mutually agreed, the concept of MDC vs. LLD is effectively a "non-issue" in that each calculation is slightly different but clearly generates identical sets of results.

Hopefully this is an adequate explanation of the issues as it pertains to the Marsland Expansion Area. If you have any questions, please do not hesitate to contact Dave Blaida or me.

Thank you,

Client Services Supervisor

Digitally signed by
Steve Dobos
Date: 2012.04.25 15:21:29 -06:00

Steve Dobos
Senior Project manager/Client Relations