STRATA ENERGY INC

A WHOLLY-OWNED SUBSIDIARY OF PENINSULA ENERGY LIMITED

March 11, 2016

Attention: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Strata Energy, Inc., Ross In Situ Recovery Project
Source Materials License SUA-1601, Docket No. 040-09091
Annual Surety Estimate **(Revised March 2016)**

To Whom it May Concern:

As required by License Condition 9.5 Strata Energy Inc. (Strata) submitted the proposed annual update to the financial assurance amount for the Ross ISR Project under a December 4, 2015 cover letter. Strata has since revised the surety estimate in response to Wyoming's Department of Environmental Quality/Land Quality Division (LQD) two comment rounds on the 2014-2015 Permit to Mine Annual Report. The revised surety estimate is enclosed along with the excerpted LQD comments that affected the surety. The changes from the prior estimate are listed below along with which specific LQD comments that prompted the revision. The restoration action plan was also updated to reflect the revised surety costs as well as to address minor editorial corrections.

BLDGS worksheet

- Item III.A.2., revised to included salvageable steel transportation costs. (LQD Comment 13a)
- Item III.B.1&2, revised the portion of concrete floor at the CPP and CPP Truck Bay buildings that would need to be disposed at a NRC-Licensed Facility from 0 to 20 percent. The other 80 percent of the floors will be disposed on site. (LQD Round 2 Comment 14e)

WF BLD PIPE worksheet

- Item V.B.6., Corrected the estimate of 16" HDPE trunk line chip volume from 7,873 ft^3 to 10,157 ft^3 for "From CPP to MU-2". (LQD Comment 14h)

MISC REC worksheet

- Item I.A., Removed the cost to remove gravel from the CPP/Office Area and instead added a cost to scarify gravel in place. (LQD Comment 14i)
- Item I.B.1., Revised the total volume of topsoil in Stockpiles 2 & 3. (LQD Comments 14j & m)
- Added Item XII MISC Ecological Surveys, (LQD Comment 14, General Comment 2)
- Added Item XIII MISC Surface reclamation for Delineation and Historic Hole Abandonment, (LQD Round 2 Comment 15, Cover letter)

NM5501

UC-MIT worksheet

- Revised worksheet to included 5 year MIT costs for wells currently installed. (LQD Comment 14d)

The updated estimate puts the costs of groundwater restoration, decommissioning and reclamation at $10,221,000 over a five year period during which the site would be decommissioned and reclaimed to meet the standards of the WDEQ-LQD and the NRC. The estimate format implements the recommended format provided by the LQD.

Strata hereby requests that NRC approve the estimated bond amount and amend License SUA-1601. Strata respectfully requests that NRC review and approve this estimate in a timely manner as the current bond amount will limit well installation activities in the near future.

If you have any questions regarding the provided information, please contact me at 307-467-5995 or by email at mgriffin@stratawyo.com.

Sincerely,
STRATA ENERGY INC.

Mike Griffin
Vice President of Permitting, Regulatory and Environmental Compliance

Cc: John Saxton, NRC Project Manager **(via email)**

Enclosures: Attachment 1—Revised Restoration Action Plan, Attachment 2—Revised Annual Surety Estimate and Attachment 3—LQD Annual Report Comment Responses

Attachment 1
Revised Restoration Action Plan

I. REVISED RESTORATION ACTION PLAN

A. Purpose Statement

1. Introduction

The following summarizes the Restoration Action Plan (RAP) for the first and second years of development and operation of the Ross ISR Project (calendar year 2015 and 2016). The accompanying surety estimate is based on this RAP and it covers the potential decommissioning and reclamation of facilities planned for construction and operation during the period. In summary, the surety estimate includes the estimated costs by a third party to conduct groundwater restoration, decommission and complete final reclamation of four (4) wellfield headerhouses at Mine Unit 1 (MU-1) and three (3) wellfield headerhouses at Mine Unit 2 (MU-2). The estimate also includes estimated costs to decommission and complete final reclamation at other areas in MU-1 and MU-2 that are in various stages of wellfield development, the Central Processing Plant (CPP), water storage ponds, roads and pipelines and all other related facilities. The estimate puts the costs of groundwater restoration, decommissioning and reclamation at $10,535,616 over a five year period during which the site would be decommissioned and reclaimed to a condition agreed upon by the Wyoming Department of Environmental Quality (WDEQ) Land Quality Division (LQD) and the US Nuclear Regulatory Commission (NRC) that would return the site to unrestricted use. The RAP encompasses the full cycle of activities necessary for:

Aquifer restoration and well plugging;

Building and equipment decontamination, dismantling and disposal;

Pond and wellfield removal and reclamation of the entire site;

Radiological surveying and environmental monitoring;

Administrative, Overhead; and

Contingency of 25%.

Strata's surety estimate presented herein employs assumptions that are based on best professional judgment given the data currently available and WDEQ-LQD guidance contained in Guideline 12 (11/2015). This estimate is presented in the Excel format specified by the WDEQ-LQD. Although this format is different than that originally submitted with the Permit to Mine/NRC License applications the major components of the estimate are the same.

The surety estimate is considered conservative because it does not consider the potential reduction in cost through recovery of salvage value. Significant salvage value would exist for the CPP and Office buildings (e.g., steel), motors and electrical switch gear, gravel road base, etc.

B. Consolidation of State and NRC Surety Instruments

In addition to being crafted to comply with NRC criteria in 10 CFR Part 40, Appendix A, Criterion 9 (Financial Criteria), Strata's proposed surety estimate is designed to address the Wyoming Environmental Quality Act requirements for a reclamation performance bond. The surety estimate is provided in the format specified by the WDEQ-LQD and accepted by NRC staff.

C. Cost Details for Groundwater Restoration, Reclamation, and Decommissioning Activities

1. Introduction

The following tabulation summarizes the costs necessary to hire an independent contractor to assume all groundwater restoration, decommissioning and reclamation activities required for the CPP, the first seven (7) wellfield headerhouses, and associated facilities. Descriptions of the work are provided below, and detailed costs estimates for each major item of work are provided in the attached Excel spreadsheet entitled Ross 2016 Bond Estimate.

Total Restoration and Reclamation Cost Estimate

I.	Groundwater Restoration Cost	$5,133,555
II.	Equipment Removal & Disposal Cost	$96,880
III.	Building Demolition	$543,366
IV	Wellfield Buildings, Pipe & Equipment Removal & Disposal Cost	$447,474
V	Well Abandonment Cost	$1,643,150
VI	Wellfield Surface Reclamation Cost	$36,802
VII	Total Miscellaneous Reclamation Cost	$275,153
	Subtotal Reclamation and Restoration Cost Estimate	$8,176,381
	Administrative, Overhead, and Contingency Items (25%)	$2,044,095
	NET TOTAL	$10,220,476
	TOTAL SURETY	**$10,221,000**

Aquifer Restoration

The Groundwater Restoration worksheet (GW REST) and supporting unit cost worksheets (UC-GWS, UC-RO, UC-RECIRC, and UC-DDW) contain details concerning cost basis figures and assumptions, calculations and methodologies used in deriving cost estimates for the full cycle of groundwater restoration. It is assumed that active restoration will be completed in 48 months and that an additional 12 months will be necessary for final site decommissioning and reclamation following the stabilization monitoring period and regulatory approval of groundwater restoration. This estimate is designed to be descriptive enough for the NRC and WDEQ staff to determine the acceptability of Strata's proposed cost figures and is based on the estimated costs for an independent contractor to perform the decommissioning and reclamation work in accordance with 10 CFR Part 40, Appendix A, Criterion 9 and the Wyoming Environmental Quality Act and its accompanying rules and regulations and guidelines. Strata has developed its cost

estimates to address all items in Appendix C of the NRC's "Standard Review Plan for In Situ Leach Uranium Extraction License Applications" (NUREG-1569, dated June 2003).

Among other items, the groundwater restoration costs are broken down into separate phases of work:

Groundwater sweep;

Reverse osmosis (RO) with permeate injection;

Groundwater recirculation;

Monitoring; and

Vehicles and Labor.

For each phase of work, the estimated number of pore volume displacements (PVDs) required to complete that phase is provided (0.5 PVD for Groundwater Sweep, 7 PVD for Reverse Osmosis and 1 PVD for Recirculation). The worksheets also provide the assumptions and unit prices for all the work necessary to complete each phase of work for the first seven wellfield headerhouses.

Restoration progress is typically measured on the basis of the number of pore volumes (PVs) processed during each phase of groundwater restoration. A pore volume is a term used by the ISR industry to define an indirect measurement of a unit volume of aquifer affected by ISR recovery or restoration (NUREG-1910, NRC 2009). Following industry standards, Strata calculates a PV as follows:

PV = thickness x wellfield area x porosity x flare x conversion factor

The thickness is the average completion thickness for the recovery and injection wells. Based on actual well completions in MU-1 and delineation drilling, the ore zone thickness averages approximately 15 feet across the area of the four headerhouses in Mine Unit 1 and the first three headerhouses in MU2.

The wellfield area is the surficial area of the injection and recovery well patterns for each wellfield headerhouse.

The porosity or pore space is defined as the collective open spaces of the formation or a measure of the amount of liquid or gas that may be absorbed or produced by a particular formation (NUREG-1910). The porosity of the ore zone within the Ross project area was determined by laboratory analysis of core samples collected during exploration drilling. The porosity is estimated to average 34% across the Ross Project area.

The flare is a proportionality factor that estimates the amount of aquifer water outside of the pore volume that has been affected by lixiviant flow during the recovery phase (NUREG-1910). Flare estimates usually include a horizontal and vertical flare factor. The horizontal flare is the volume of water affected by lixiviant outside the edge of the wellfield pattern. The vertical flare is the volume of water affected by lixiviant above and below the completion interval. Based on groundwater modeling of expected operational conditions completed by WWC Engineering to support the permit and license applications for the Ross Project it was determined that the horizontal flare would be approximately 32% and the vertical flare would be approximately 20%. Therefore, the overall flare, which is dependent on the geometry of the affected area, is approximately 58%. This is consistent with other ISR operating facilities.

An estimate of the PV of the four (4) Headerhouses in MU-1 is calculated as follows:

PV = 15 ft. x 1,498,464 ft2 x 0.34 x 1.58 x 7.48 gal/ft3 = 90.32 million gallons

An estimate of the PV of the three (3) Headerhouses in MU-2 is calculated as follows:

PV = 15 ft. x 1,314,900 ft2 x 0.34 x 1.58 x 7.48 gal/ft3 = 79.25 million gallons

Where:

Porosity = 0.34 (dimensionless)

Flare Factor (overall) = 1.58 (dimensionless)

The aquifer restoration phase was based on the processing and circulation of 8.5 pore volumes of groundwater. Because the cost for restoration equipment such as wellfield pumps, lined retention ponds, the deep disposal well (DDW), one RO unit, restoration IX columns, laboratory equipment, trucks, and field equipment will have been incurred for uranium production operations, they are considered operational capital and are not included as capital requirements in any of the RAP budget items. It should be noted that the estimated cost of purchasing and installing an additional high efficiency RO unit ($750,000) is included in the groundwater restoration cost estimate (worksheet GW REST, item VI). This additional RO would be used to augment the RO included with the construction and initial operation of the CPP. As with other operating ISR operations, the NRC and the WDEQ will be able to verify the availability of the restoration equipment during routine inspections.

The surety will be maintained at this calculated level until the number of pore volumes required to satisfactorily complete each phase has been demonstrated. Strata will adjust the surety estimate for aquifer restoration during each annual update review to reflect experience gained from actual work completed and the associated costs.

Description of Work

The first stage of aquifer restoration is groundwater sweep, in which groundwater is pumped from the wellfield headerhouse with no reinjection. This causes water from the formation surrounding the wellfield headerhouse to sweep through the wellfield toward the recovery wells and remove the high TDS production fluids. Based on the anticipated aquifer restoration schedule, during most aquifer restoration operations, when some wellfield headerhouses are undergoing groundwater sweep while others are in RO treatment with permeate injection, the water removed from the groundwater sweep is taken to the RO units (see below) and the purified water (RO permeate) is reinjected into the wellfield headerhouse(s) undergoing RO treatment with permeate injection. The brine from the RO units can be taken to the lined retention ponds and/or to a deep disposal well. For the first wellfield headerhouse undergoing groundwater sweep, it is assumed there are no wells concurrently in RO treatment with permeate injection. Thus, the groundwater from the groundwater sweep will be taken to the RO units, the high-quality permeate will be discharged or used for other purposes and the brine will be disposed via the deep disposal well. It is estimated that the groundwater sweep will remove about 0.5 PV from the wellfield at a rate of 200 gpm (20 gpm at 10 wells) per headerhouse. The duration of the groundwater

sweep will be about two months per headerhouse. Groundwater sweep at one headerhouse may be done concurrently with RO at another headerhouse.

RO is a water treatment process whereby the majority of dissolved ions, which are too large to pass through a filter that passes pure water molecules, are concentrated into brine. The product water that passes through the filter (permeate) typically meets drinking water standards and during most restoration activities is reinjected back into the wellfield. This reinjection of relatively pure water permeate mixes with formation water and helps bring the quality of the underground solutions toward baseline quality. During restoration the RO brine can be pumped to a lined retention pond to level out flow rates or pumped to the disposal well. Groundwater recovered from a depleted portion of the ore zone will be treated with an antiscalant and/or corrosion inhibitor to prevent fouling; these are the only pretreatment chemicals budgeted. The water will also pass through a restoration IX system for removal of uranium and a pre-filtration system for particulate removal. To achieve RO purification, the pretreated solution is pressurized and directed to the first step of a two-stage RO process. Approximately 70 percent of the total feed volume will be converted to product water (permeate) in the first stage. The brine water of the first stage will then act as the feed for the second stage, which yields an overall permeate recovery rate of approximately 90 percent. It is estimated that the RO Phase for all seven headerhouses will take 38 months.

The third phase of aquifer restoration is groundwater recirculation, which begins after completion of the RO treatment with permeate injection phase. In this phase, water from the production zone will be pumped from recovery wells and recirculated into injection wells in the same headerhouse. This recirculation will homogenize the groundwater and help reduce the risk of "hot spots," or areas of unusually high concentrations of dissolved constituents. The only treatment that will potentially occur during recirculation will be the filtration of particulates and/or uranium removal. It is expected that one PV will be circulated from, or within, the wellfield during this phase, at a rate of 500 to 800 gpm per headerhouse. This recirculation can be completed concurrently during the overall RO phase once RO is completed at a particular headerhouse.

The total duration of active aquifer restoration (groundwater sweep, RO treatment with permeate injection, and groundwater recirculation) is estimated to be 48 months for the first seven wellfield headerhouses.

The final step in aquifer restoration will be the stability monitoring phase, which will be used to ensure that chemical species of concern do not increase in concentration to unacceptable levels subsequent to restoration. The stability monitoring phase is described in Section 1.2.1.5 of the WDEQ Reclamation Plan (Section 6.1.2.5 of the NRC Technical Report) and includes well sampling, data analysis and reporting.

Labor Staffing Plan for Groundwater Restoration

The majority of labor costs for decommissioning the Ross Project would be associated with the 48 month period that active groundwater restoration occurs. This would include the operation of the wellfield production and injection wells and the CPP and ancillary facilities to complete the groundwater restoration commitments in accordance with the WDEQ permit and NRC license.

The stability period requires one year of sample collection and an indeterminate period for regulatory approval of groundwater restoration. During this period the manpower requirements lessen significantly as activities at the site are limited to groundwater monitoring and maintenance of the CPP.

Once the stability period is completed the actual facility decommissioning, demolition and disposal occurs. The associated labor costs are included in the surety estimate details for the particular activity. The labor estimate also included 5 years of Environmental Manager/RSO and Environmental/Radiation Safety Technician for this period.

Given the above, Strata has included the labor costs associated with groundwater restoration in section IX of the groundwater restoration worksheet (GW REST):

Position	***Years***
Environmental Manager/RSO	*5*
Restoration Manager	*4*
Environmental/Radiation Safety Technician	*5*
Operators/Laborers (4)	*4*
Maintenance Technician	*4.5*

Facilities Area Decommissioning and Reclamation

Following wellfield restoration and stability monitoring, when the water treatment equipment is no longer needed, reclamation can begin on the surface facilities. Detailed cost estimates for the facilities area decommissioning and reclamation are provided in the following worksheets and supporting unit costs worksheets:

CPP Equipment - EQUIP

Main Facility Buildings- BLDGS

Wellfield Buildings and Pipelines- WF BLDGS PIPE

Well Abandonment- WELL ABAN

Wellfield Reclamation- WF REC

Miscellaneous Reclamation Items- MISC REC

Equipment and Buildings

Unlike the original RAP and surety estimate that included the decommissioning, demolition and disposal of a full scale CPP including yellowcake precipitation and drying equipment, the revised Operations Plan results in the CPP that will only be used as a "Satellite" IX facility. Therefore, uranium elution, precipitation and drying equipment will not be installed. This results in considerably less equipment that will require decontamination and disposal as 11e.(2) waste or solid waste. Additionally, the lack of yellowcake processing will make it easier to decontaminate limited portions of the CPP walls and floor.

Buildings to be removed include the CPP, Administration building, the deep disposal well building, the Potable Water building and the wellfield headerhouse buildings. The latest surety estimate includes the actual sizes of the buildings that were constructed in 2015. Decontamination of salvageable building materials, equipment, pipe, and other materials to be released for unrestricted use will be accomplished by completing a preliminary radiological survey to determine the location and extent of the contamination and to identify any hazards. Processing and water treatment equipment, including tanks, filters, IX columns, pipes, and pumps, will be decontaminated as necessary and disposed of in accordance with applicable regulations. Decontaminated and non-contaminated equipment and materials with the exception of concrete will be disposed will be disposed at the Moorcroft Landfill. A salvage percentage of 60 percent for clean building material (steel) is assumed. This salvage is assumed at no value with the remaining 40 percent disposed at the Moorcroft Landfill. Contaminated equipment and materials will be disposed at a licensed 11e.(2) byproduct disposal facility.

The disposal of concrete from floors and foundations on site as "clean fill" is desired by both the State of Wyoming (WDEQ), Crook County and local municipalities due to the limited space for such material in municipal landfills. This is appropriate due to the benign character of concrete and safety concerns with transporting this material via large trucks on rural and single lane roadways. Additionally, Strata owns the land at the CPP site and adequate areas exist to bury the materials on-site. Also, it is likely that due to the relatively large quantity of concrete it would be recycled rather than buried.

Ponds

Work required to reclaim Pond 1 will include brine disposal in the deep disposal well, removal of the liner and brine residue to a licensed 11.e(2) disposal site, disposal of all non-11.e(2) solid waste to an approved landfill or on-site solid waste facility, backfilling and regrading to restore an acceptable topography, topsoil replacement and revegetation. These reclamation costs are based on the actual as-built details of Pond 1 and are provided in the worksheet MISC REC.

Earthwork

After the buildings and ponds are demolished and removed, the entire site will be regraded to restore the original topography, topsoil will be replaced to approximate its original depth, and the area will be seeded with the approved seed mix. Earthwork costs to complete the regrading of the CPP, parking areas, and access roads are provided in the worksheet MISC REC.

Containment Barrier Wall

The containment barrier wall (CBW) at the CPP will be reclaimed to the extent necessary to restore the flow pattern of shallow groundwater. Reclamation of this wall will be accomplished by creating a series of breaches, also known as finger drains, along the CBW. Each finger drain will consist of a 1.5 ft. wide by 25 ft. long trench that is cut through the CBW at a right angle and to a depth that is 2 ft. below the lowest historical ground water level. Gravel will be placed in the trench from the bottom to a point 2 ft. above the highest recorded ground water level such that a highly permeable flow path is created through the CBW. The remaining trench will be backfilled with topsoil and seeded.

This method of CBW reclamation was selected as a means of effectively restoring the ground water flow system in the CPP area, while minimizing surface and environmental disturbance. The cost estimate for this phase of work is included in the worksheet MISC REC.

Wellfield Equipment Removal and Disposal

Decommissioning and reclamation of the wellfields will include removal of any staging or laydown areas, the headerhouse buildings and all pipes and utilities connecting the wells to the headerhouse buildings and the CPP, shredding or chipping the solid materials to reduce the volume, and disposing of these materials in a permitted landfill or licensed 11e.(2) waste site as appropriate, and reclaiming the surface as described for the other surface facilities. All pumps and tubing will be removed from production, injection and monitoring wells to permit well plugging. The estimated costs for each item of work in this task are included in the worksheet WF BLDGS PIPE.

Well Abandonment

All injection, recovery and monitor wells will be abandoned (plugged) with high solids bentonite in accordance with WDEQ LQD Rules and Regulations Chapter 8. After the well casing is cut off below grade a cement hole plug will be installed prior to backfill above the plug with soil. This work includes abandonment and reclamation of monitor wells and production and injection wells anticipated for use in uranium recovery in MU-1 and MU-2. It also includes an estimated 300 production and injection wells that will be installed in MU-2. It also includes 59 existing five-inch baseline monitor wells. The costs for plugging and abandoning one deep disposal well are included. The estimated costs to abandon and reclaim all wells are included in worksheet WELL ABAN.

Reclamation of Wellfields, Roads, CPP Area

Once all wells are plugged at the wellfield and pipelines, headerhouse buildings and utilities have been removed, a radiological survey (Section K) will be completed prior to any topsoil application and final seeding with the approved seed mix. If deemed necessary, high traffic areas and/or compacted areas will be ripped or chisel plowed prior to seeding. Gravel from main roads, the CPP area, wellfield roads and other areas will be salvaged with scrapers and either used as clean fill material or more likely recycled for use on adjacent private or county roads. If necessary, compacted areas will be ripped or chisel plowed prior to the application of topsoil and final seeding. Procedures are fully described in Sections 6.2 and 6.3 of the NRC Technical Report and the applicable sections of the Mine Plan.

Cost estimates are included for the removal of 10,000 feet of main trunk line (that consists of two 16-inch and two 8-inch diameter HDPE pipelines and 6600 feet of feeder pipelines (two 6-inch diameter HDPE pipelines) in MU-1 and MU-2. Cost estimates are also included to remove and reclaim approximately 9,100 feet of existing and planned wellfield roads associated with MU-1 and the connecting road from MU-1 to the CPP area. Cost estimates are also included to remove and reclaim approximately 2700 feet of planned wellfield roads in MU-2.

Radiological Surveys

During equipment decontamination, contamination surveys of building and equipment surfaces will be performed and analyzed. The results of these surveys will drive decontamination efforts. Following removal of all structures and regrading of the site to approximate original contours, and before topsoil is spread on the regraded area, a gamma survey and soil sampling will be conducted as described in Section 2 of the WDEQ Reclamation Plan (Section 6.4 of the NRC Technical Report). Soils will be cleaned up in accordance with the requirements of 10 CFR Part 40, Appendix A, including consideration of ALARA goals. The proposed limits and ALARA goals for cleanup of soils are summarized in the approved WDEQ

Reclamation Plan and NRC Technical Report. Any areas which do not meet these limits will be remediated by removing contaminated soils and disposing at a licensed site. The site will then be regraded. This process will be repeated until all sites meet the ALARA goals for cleanup. The costs and areas subject to these surveys are provided in worksheets EQUIP, BLDGS, WF BLDGS PIPE and MISC REC.

Revegetation

At the completion of the previous tasks, and after topsoil has been spread across all regraded areas, all of the disturbed lands will be seeded with vegetation species that will return the lands to their pre-project conditions. The reclaimed land will be capable of supporting livestock grazing, dry land farming and wildlife habitat. Baseline soils, vegetation, and radiological data will be used to guide the reclamation activities. The costs and the areas to be revegetated are provided in worksheets WF REC and MISC REC and are based on actual costs for revegetation at the Ross site.

Miscellaneous Reclamation Activities

- *Costs for miscellaneous reclamation activities, some of which were discussed in the preceding sections, are provided in MISC REC. This includes:*

  Item

  - *CPP/Office surface reclamation*
  - *Access road reclamation*
  - *Wastewater pipeline reclamation*
  - *Pond reclamation*
  - *Containment Barrier Wall reclamation*
  - *Culvert removal and disposal*
  - *Fence removal*
  - *Monitoring site removal and disposal*
  - *Radiologic surveys*
  - *Miscellaneous 11e.(2) soil transport and disposal*

The complete bond estimate is contained in Appendix E. The bond estimate was prepared using the approved and current LQD Guideline 12 and the Noncoal ISL Bond Spreadsheet.

Attachment 2
Revised Annual Surety Estimate

Ross Uranium Project Surety Update December 2015 (Revised March 2016)

Total Restoration and Reclamation Cost Estimate

I.	**GROUNDWATER RESTORATION COST**	$5,133,555
II.	**EQUIPMENT REMOVAL & DISPOSAL COST**	$96,880
III.	**BUILDING DEMOLITION AND DISPOSAL COST**	$543,366
IV.	**WELLFIELD BUILDINGS, PIPE & EQUIPMENT REMOVAL & DISPOSAL COST**	$447,474
V.	**WELL ABANDONMENT COST**	$1,643,150
VI.	**WELLFIELD SURFACE RECLAMATION COST**	$36,802
VII.	**TOTAL MISCELLANEOUS RECLAMATION COST**	$275,153
	SUBTOTAL RECLAMATION AND RESTORATION COST ESTIMATE	$8,176,381
	ADMINISTRATIVE, OVERHEAD, AND CONTINGENCY ITEMS (25%)	$2,044,095
	NET TOTAL	$10,220,476
	TOTAL SURETY	**$10,221,000**

Ross Uranium Project Surety Update December 2015 (Revised March 2016)

Ground Water Restoration	MU-1	MU-2
PV Assumptions		
Wellfield Area (ft2) (7 Mods injected 4 in MU-1 and 3 in MU-2)	1498464	1314900
Wellfield Area (acres)	34.40	30.19
Affected Ore Zone Area (ft2)	1498464	1314900
Avg. Completed Thickness	15	15
Porosity	0.34	0.34
Flare Factor (H=1.32, V=1.20, Overall= 1.58)	1.58	1.58
Affected Volume (ft3)	35513597	31163130
Kgallons per Pore Volume	90318	79254
Number of Wells in Unit(s)		
Production Wells (P)		
Current	66	0
Estimated next report period	49	190
Total Estimated	115	190
Injection Wells (I)		
Current	99	0
Estimated next report period	101	310
Total Estimated	200	310
Monitor Wells		
Current	47	17
Estimated next report period	0	88
Total Estimated	47	105
Restoration Wells (not included with P and I wells)		
Current	25	30
Estimated next report period	0	0
Total Estimated	25	30
Number of Wells per Wellfield	387	635
Total Number of Wells	**1022**	
Average Well Depth (ft)	500	620
I. Ground Water Sweep Costs (includes brine disposal)		
PV's Required	0.5	0.5
Total Kgals for Treatment	45159	39627
Ground Water Sweep Unit Cost ($/Kgal)	$0.72	$0.72
Subtotal Ground Water Sweep Costs per Wellfield	$32,516	$28,532
Total Ground Water Sweep Costs	**$61,048**	
II. Reverse Osmosis Costs (includes brine disposal)		
PV's Required	7	7
Total Kgals for Treatment	632227	554779
Reverse Osmosis Unit Cost ($/Kgal)	$0.84	$0.84
Subtotal Reverse Osmosis Costs per Wellfield	$533,853	$468,455
Total Reverse Osmosis Costs	**$1,002,308**	

Ross Uranium Project Surety Update December 2015 (Revised March 2016)

Ground Water Restoration	**MU-1**	**MU-2**
III. Recirculation		
PV's Required	1	1
Total Kgals for Treatment	90318	79254
Recirculation Unit Cost ($/Kgal)	$0.43	$0.43
Subtotal Recirculation Unit Costs per Wellfield	$39,119	$34,327
Total Recirculation Costs	**$73,446**	
IV. Monitoring and Sampling Costs		
A. Restoration Well Sampling		
Estimated Restoration Period (Years)	4	4
1. Well Sampling prior to restoration start		
# of OZ BL Wells	46	35
$/sample	$330	$330
2. Restoration Progress Sampling		
# of OZ BL Wells	46	35
$/sample	$30	$30
Samples/Year	6	6
3. UCL Sampling		
# of UCL Wells	72	100
$/sample	$20	$20
Samples/Year	6	6
Sub-total Restoration Analyses	$82,860	$84,750
B. Short-term Stability		
Estimated Stabilization Period (Months)	12	12
# of OZ BL Wells	46	35
Samples/Year	184	140
$/sample	$330	$330
# of UCL Wells	72	100
Samples/Year	6	6
$/sample	$30	$30
Sub-total Short-term Stability Analyses	$73,680	$64,200
Subtotal Monitoring and Sampling Costs per Wellfield	$156,540	$148,950
Total Monitoring and Sampling Costs	**$305,490**	
V. Mechanical Integrity Test (MIT) Costs		
Five Year MIT Unit Cost ($/well)	$191	$191
Number of Wells (Existing wells at end of 2015)	222	51
Subtotal Mechanical Integrity Testing Costs per Wellfield	$42,402	$9,741
Total Mechanical Integrity Testing Cost	**$52,143**	
TOTAL RESTORATION COSTS PER WELLFIELD	$804,430	$690,005
TOTAL WELLFIELD RESTORATION COST	**$1,494,435**	

Ross Uranium Project Surety Update December 2015 (Revised March 2016)

Ground Water Restoration	MU-1	MU-2
VI. Purchase/Install Additional High Eff. RO Unit (550 gpm)		
Cost for Additional High Eff RO Unit (includes installation)	$750,000	
Total Cost for Additional High Eff RO Unit	**$750,000**	
VII. Building Utility Costs	**CPP**	**Office**
Electricity ($/Month) estimate	$2,500	$300
Propane ($/Month)		
Natural Gas ($/Month) estimate	$2,000	$500
Number of Months	60	60
Subtotal Utility Costs per Building	$270,000	$48,000
Total Building Utility Costs	**$318,000**	
VIII. Vehicle Operation Costs		
Number of Pickup Trucks/Pulling Units (Gas)	6	
Unit Cost in $/hr (WDEQ Guideline No.12, Table D-1)	$28.52	
Average Operating Time (Hrs/Year)	200	
Total Number of Years (Average)	5	
Total Vehicle Operation Costs	**$171,120**	
IX. Labor Costs		
Number of Environmental Managers/RSOs	1	
$/Year	$125,000	
Number of Years	5	
Number of Restoration Managers (during active restoration)	1	
$/Year	$75,000	
Number of Years	4	
Number of Environmental Technicians	1	
$/Year	$65,000	
Number of Years	5	
Number of Operators/Laborers (reduced during stabilization)	4	
$/Year	$55,000	
Number of Years	4	
Number of Maintenance Technicians (reduced during stabilizat	1	
$/Year	$60,000	
Number of Years	4.5	
Total Labor Costs	**$2,400,000**	
TOTAL GROUND WATER RESTORATION COSTS	**$5,133,555**	

Equipment Removal Onsite Disposal and Loading	CPP	DDW Building
I. Removal and Loading Costs		
A. Tankage		
Number of Uncontaminated FG Tanks to be Cut Up	2	
Volume of Uncontaminated Tank Construction Material (ft^3)	246	
Weight of Uncontaminated Tank Construction Material @ 1000 lb/yd3 (tons)	5	
1. Labor for Dismantling		
Number of Persons	3	
Ft^3/Day	50	
Number of Days	5	
$/Day/Person	$200	
Subtotal Labor Costs	$3,000	
2. Equipment		
Number of Days	5	
$/Day	$500	
Subtotal Equipment Costs	$2,500	
3. Off site tranport and disposal at Moorcroft Landfill Unit Cost ($/ton)	$338.00	
Off site transport and disposal cost	$1,540	
Subtotal Uncontaminated tankage Removal, Loading, Disposal Costs	$7,040	
Number of Contaminated FG Tanks to be Cut Up	4	
Volume of Contaminated Tank Construction Material (ft^3)	283	
1. Labor for Dismantling		
Number of Persons	3	
Ft^3/Day	50	
Number of Days	6	
$/Day/Person	$200	
Subtotal Labor Costs	$3,600	
2. Equipment		
Number of Days	6	
$/Day	$500	
Subtotal Equipment Costs	$3,000	
Subtotal Tankage Removal and Loading Costs	$6,600	

Equipment Removal Onsite Disposal and Loading		**CPP**	**DDW Building**
B.	Number of IX Columns to be Decontaminated, Cut Up and Salvaged (no value)		
	Number of 11,000 gal IX Columns	9	
	Number of 5,500 gal Guard IX Columns	1	
	Weight of 11,000 gal IX Column (lbs)	24,000	
	Weight of 5,500 gal Guard IX Column (lbs)	5500	
	Assume 90% steel salvage (no value)		
	Weight of 11,000 gal IX column for disposal (tons)	1.2	
	Weight of 5,500 gal IX column for disposal (tons)	0.275	
1.	Labor for Decontamination and Dismantling		
	Number of Persons	3	
	Number of Days	18	
	$/Day/Person	$200	
	Subtotal Labor Costs	$10,800	
2.	Equipment		
	Number of Days	18	
	$/Day	$500	
	Subtotal Equipment Costs	$9,000	
3.	Off site tranport and disposal at Moorcroft Landfill Unit Cost ($/ton)	$338.00	
	Off site transport and disposal cost	$3,743	
	Subtotal Decontaminated IX Columns Removal and Offsite Disposal Costs	$23,543	
C.	Contaminated PVC Pipe		
	PVC Pipe Footage	7700	30
	Average PVC Pipe Diameter (inches)	4	4
	Shredded PVC Pipe Volume Reduction (ft^3/ft)	0.2	0.2
	Volume of Shredded PVC Pipe (ft^3)	1540	6
1.	Labor for Shredding		
	Number of Persons	2	1
	Ft/Day	350	350
	Number of Days	22	1
	$/Day/Person	$200	$200
	Subtotal Labor Costs	$8,800	$200
	Subtotal PVC Pipe Removal and Loading Costs	$9,000	

Equipment Removal Onsite Disposal and Loading		**CPP**	**DDW Building**
D. Contaminated Pumps			
Number of Contaminated Pumps		16	1
Average Volume (ft^3/pump)		4	6
Volume of Pumps (ft^3)		64	6
1. Labor			
Number of Persons		3	2
Pumps/Day		10	1
Number of Days		2	1
$/Day/Person		$200	$200
Subtotal Labor Costs		$1,200	$400
Subtotal Pump Removal and Loading Costs		$1,600	
E. Contaminated Dryer			
Dryer Volume (ft^3)	NA		
1. Labor			
Number of Persons	NA		
Ft^3/Day	NA		
Number of Days	NA		
$/Day/Person	NA		
Total Labor Cost	NA		
Total Dryer Dismantling and Loading Cost		$0	
F. Contaminated RO Units			
Number of RO Units			
Current		1	
Planned (One RO installed with CPP, one installed later for restoration)		1	
Average Volume (ft^3/RO Unit)		1000	
1. Labor			
Number of Persons		3	
Number of Days		1	
$/Day/Person		$200	
Subtotal Labor Costs		$1,200	
Subtotal RO Unit Removal and Loading Costs		$1,200	
Total Equipment Removal and Loading Costs		**$48,983**	

Equipment Removal Onsite Disposal and Loading		**CPP**	**DDW Building**
II. Transportation and Disposal Costs (NRC-Licensed Facility)			
A. Tankage			
Volume of Tank Construction Material (ft^3)		283	
Volume for Disposal Assuming 10% Void Space (ft^3)		311	
Transportation and Disposal Unit Cost ($/$ft^3$)		$12.85	
Subtotal Tankage Transportation and Disposal Costs		$3,997	
B. PVC Pipe			
Volume of Shredded PVC/HDPE Pipe (ft^3)		1540	
Volume for Disposal Assuming 10% Void Space (ft^3)		1694	
Transportation and Disposal Unit Cost ($/$ft^3$)		$12.85	
Subtotal PVC Pipe Transportation and Disposal Costs		$21,769	
C. Pumps			
Volume of Pumps (ft^3)		64	6
Volume for Disposal Assuming 10% Void Space (ft^3)		70	7
Transportation and Disposal Unit Cost ($/$ft^3$)		$12.85	$12.85
Subtotal Pump Transportation and Disposal Costs		$900	$90
D. Dryer			
Dryer Volume (ft^3)	NA		
Volume for Disposal Assuming Dryer Remains Intact (ft^3)	NA		
Transportation and Disposal Unit Cost ($/$ft^3$)		$12.85	
Total Dryer Transportation and Disposal Costs	NA		
E. RO Units			
Volume of RO Units (ft^3)		1000	
Volume for Disposal Assuming 50% Volume Reduction (ft^3)		1000	
Transportation and Disposal Unit Cost ($/$ft^3$)		$12.85	
Subtotal RO Unit Transportation and Disposal Costs		$12,851	
Subtotal Equipment Transportation and Disposal Costs per Facility		$39,517	$90
Total Equipment Transportation and Disposal Costs		**$39,607**	**$90**
III Health and Safety Costs			
Radiation Safety Equipment		$8,000	200
Total Health and Safety Costs		**$8,000**	**$200**
SUBTOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS PER FACILITY		$96,590	$290
TOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS		**$96,880**	

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Building Demolition and Disposal	CPP 140'x102'x30	CPP Truck Bay 20'x102'x22'	Office 115'x100'x16'	DDW Building 10'x12'x10'	Pot Water Building 30x30x12'
I. Decontamination Costs					
A. Wall Decontamination					
Assumption: Approx 25% of CPP walls require decontamination					
Area to be Decontaminated (ft^2)	3500	1122	0	110	0
Application Rate (Gallons/ft^2)	1	1		1	
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50		$0.50	
Subtotal Wall Decontamination Costs	$1,750	$561	$0	$55	$0
B. Concrete Floor Decontamination					
Assumption: Approx 50% of CPP floor requires decontamination					
Area to be Decontaminated (ft^2)	7200	1020	0	120	0
Application Rate (Gallons/ft^2)	2	2		2	
HCl Acid Wash, including labor ($/Gallon)	$0.50	$0.50		$0.50	
Subtotal Concrete Floor Decontamination Costs	$7,200	$1,020	$0	$120	$0
C. Deep Well Injection Costs					
Total Kgals for Injection	17.9	3.162	0	0.35	0
Deep Well Injection Unit Cost ($/Kgals)	$1.37	$1.37	$1.37	$1.37	$1.37
Subtotal Deep Well Injection Costs	$25	$4	$0	$0	$0
Subtotal Decontamination Costs per Building	$8,975	$1,585	$0	$175	$0
Total Decontamination Costs	**$10,735**		0		0
II. Demolition Costs					
A. Building					
Assumptions:					
Limited contamination of CPP as there is no Precip/Dryer					
Volume of Building (ft^3)	428400	44880	184000	1200	10800
Demolition Unit Cost per WDEQ Guideline No.12,App.K ($/$ft^3$)	$0.287	$0.287	$0.287	$0.287	$0.287
Subtotal Building Demolition Costs	$122,951	$12,881	$52,808	$344	$3,100
B. Concrete Floor					
Area of Concrete Floor (ft^2)	14280	2040	11500	0	900
Demolition Unit Cost per WDEQ Guideline No.12,App.K ($/$ft^2$)	$5.55	$5.55	$5.55	$5.55	$5.55
Subtotal Concrete Floor Demolition Costs	$79,254	$11,322	$63,825	$0	$4,995
C. Concrete Footing					
Length of Concrete Footing (ft)	484	142	430	0	120
Demolition Unit Cost per WDEQ Guide. No.12,App.K ($/lin. ft)	$20.46	$20.46	$20.46	$20.46	$20.46
Subtotal Concrete Footing Demolition Costs	$9,903	$2,905	$8,798	$0	$2,455
Subtotal Demolition Costs per Building	$212,108	$27,108	$125,431	$344	$10,550
Total Demolition Costs	**$375,541**				

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Building Demolition and Disposal	CPP 140'x102'x30	CPP Truck Bay 20'x102'x22'	Office 115'x100'x16'	DDW Building 10'x12'x10'	Pot Water Building 30x30x12'
III. Disposal Costs					
A. Building					
Volume of Building Materials-no concrete, 10% of building full volume (cy)	1587	166	681	44	400
Weight of Building Materials @ 405 lb/cy (ton)	321	34	138	9	81
1. Moorcroft Land Fill					
Assumptions:					
Percentage salvage -no value (40%)	0.4	0.4	0.4	0.4	0.4
Weight for Disposal (tons)	129	13	55	4	32
Disposal Unit Cost ($/ton)	$338.00	$338.00	$338.00	$338.00	$338.00
Subtotal Landfill Disposal Costs	$43,440	$4,551	$18,658	$1,217	$10,951
2 Building Steel Recycle transportation					
Assumptions:					
Percentage salvage -recycle value (60%)	0.6	0.6	0.6	0.6	0.6
Weight for Disposal (tons)	193	20	83	5	49
Transport Unit Cost ($/ton)	$138.00	$138.00	$138.00	$138.00	$138.00
Subtotal Building Steel Recycling Costs	$26,604	$2,787	$11,426	$745	$6,707
Subtotal Building Disposal Costs	$70,044	$7,338	$30,084	$1,962	$17,658
B. Concrete Floor					
Area of Concrete Floor (ft^2)	14280	2040	11500	0	900
Average Thickness of Concrete Floor (ft)	0.5	0.5	0.5	0.5	0.5
Volume of Concrete Floor (ft^3)	7140	1020	5750	0	450
Volume of Concrete Floor (cy)	264	38	213	0	17
1. On-Site					
Percentage (%)	80	80	100	100	100
Volume for Disposal (cy)	212	30	213	0	17
Disposal Unit Cost per WDEQ Guideline No.12,App.K ($/cy)	$8.64	$8.64	$8.64	$8.64	$8.64
Subtotal On-Site Disposal Costs	$1,828	$261	$1,840	$0	$144
2. NRC-Licensed Facility					
Assumptions:					
Percentage (%)	20	20	0	0	0
Volume for Disposal (ft^3)	1428	204	0	0	0
Segregation and Loading Unit Cost ($/$ft^3$)	$0.00	$0.00	$0.00	$0.00	$0.00
Transportation and Disposal Unit Cost ($/$ft^3$)	$12.85	$12.85	$12.85	$12.85	$12.85
Subtotal NRC-Licensed Facility Disposal Costs	$18,351	$2,622	$0	$0	$0
Subtotal Concrete Floor Disposal Costs	$20,179	$2,883	$1,840	$0	$144
C. Concrete Footing					
Length of Concrete Footing (ft)	484	142	430	0	120
Average Depth of Concrete Footing (ft)	2	2	2	2	2
Average Width of Concrete Footing (ft)	3	3	3	3	3
Volume of Concrete Footing (ft^3)	2904	852	2580	0	720
Volume of Concrete Footing (cy)	108	32	96	0	27
Disposal Unit Cost per WDEQ Guideline No.12,App.K ($/cy)	$8.64	$8.64	$8.64	$8.64	$8.64
Subtotal Concrete Footing Disposal Costs	$929	$273	$826	$0	$230
Subtotal Disposal Costs per Building	$91,152	$10,494	$32,750	$1,962	$18,032
Total Disposal Costs	**$154,390**				
IV. Health and Safety Costs					
Radiation Safety Equipment	$2,000	$500		$200	
Total Health and Safety Costs	**$2,700**				
SUBTOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	$314,235	$39,687	$158,181	$2,681	$ 28,582
TOTAL BUILDING DEMOLITION AND DISPOSAL COSTS	**$543,366**				

Wellfield Buildings and Equipment Removal and Disposal	**MU-1**	**MU-2**
I. Wellfield Piping		
Assumptions:		
Number of Header Houses per Wellfield	4	3
Length of Piping per Header House (ft)	50600	50600
Total Length of Piping (ft)	202400	151800
A. Removal and Loading		
Wellfield Piping Removal Unit Cost ($/ft of pipe)	$0.44	$0.44
Subtotal Wellfield Piping Removal and Loading Costs	$89,056	$66,792
B. Transport and Disposal Costs (NRC-Licensed Facility)		
Average Diameter of Piping (inches)	1.5	1.5
Chipped Volume Reduction (ft^3/ft)	0.0069	0.0069
Chipped Volume per Wellfield (ft^3)	1396.56	1047.42
Volume for Disposal Assuming 10% Void Space (ft^3)	1536	1152
Transportation and Disposal Unit Cost ($/$ft^3$)	$12.85	$12.85
Subtotal Wellfield Piping Transport and Disposal Costs	$19,739	$14,804
Wellfield Piping Costs per Wellfield	$108,795	$81,596
Total Wellfield Piping Costs	**$190,391**	
II. Well Pumps and Tubing		
Assumptions:		
Pump and tubing removal costs included under ground water restoration labor costs		
100% of production/injection wells contain pumps and/or tubing		
A. Pump and Tubing Transportation and Disposal		
Number of Production Wells (operating wells only)	115	93
Number of Injection Wells (operating wells only)	200	162
1. Pump Volume		
Number of Production Wells with Pumps	115	93
Average Pump Volume (ft^3)	2	2
Pump Volume per Wellfield (ft^3)	230	186
2. Tubing Volume		
Assumptions:		
Average tubing length/wellfield based on average well depth minus 25 ft		
Number of Production Wells with Tubing	115	93
Number of Injection Wells with Tubing	200	162
Average Tubing Length per Well (ft)	475	595
Tubing Length per Wellfield (ft)	149625	121000
Diameter of Production Well HDPE Tubing (inches)	1.5	1.5
Diameter of Injection Well HDPE Tubing (inches)	1.5	1.5
Chipped Volume Reduction (ft^3/ft)	0.0069	0.0069
Chipped Volume per Wellfield (ft^3)	1032	835
Volume of Pump and Tubing (ft^3)	1262	1021
Volume for Disposal Assuming 10% Void Space (ft^3)	1388	1123
Transportation and Disposal Unit Cost ($/$ft^3$)	$12.85	$12.85
Pump and Tubing Transport and Disposal Costs per Wellfield	$17,839	$14,433
Total Pump and Tubing Costs	**$32,272**	

Wellfield Buildings and Equipment Removal and Disposal	**MU-1**	**MU-2**
III. Well Head Covers		
Total Quantity (operating wells)	315	255
Average Well Head Cover Volume (ft^3) (2'x2'x3')	12	12
A. Removal		
Total Volume (ft^3)	3780	3060
Demolition Unit Cost per WDEQ Guideline No.12,App.K ($/$ft^3$)	$0.287	$0.287
Subtotal Well Head Cover Demolition Costs	$1,085	$878
B. Survey and Decontamination		
Assumptions:		
Cost per Well Head Cover		
Subtotal Survey and Decontamination Costs		
C. Disposal		
Total Volume (cy)	140	113
Volume for Disposal Assuming 10% Void Space (cy)	154	125
Disposal Unit Cost 11E2 ($/cy)	$12.85	$12.85
Subtotal 11E2 Disposal Costs	$1,979	$1,606
Well Head Cover Removal and Disposal Costs per Wellfield	$3,064	$2,484
Total Well Head Cover Removal and Disposal Costs	**$5,548**	
IV. Header Houses		
Total Quantity (operating)	4	3
Average Header House Volume (ft^3) (12'x30'x8')	2880	2880
A. Removal		
Total Volume (ft^3)	11520	8640
Demolition Unit Cost per WDEQ Guideline No.12,App.K ($/$ft^3$)	$0.287	$0.287
Subtotal Building Demolition Costs	$3,306	$2,480
B. Survey and Decontamination		
Assumptions:		
Cost per Header House	$1,000	$1,000
Subtotal Survey and Decontamination Costs	$4,000	$3,000
C. Volume of Building Materials-no concrete,40% of full building volume (yd3)	171	128
1. Moorcroft Land Fill		
Assumptions:		
Weight for Disposal @405 lb/yd3 (tons)	35	26
Disposal Unit Cost ($/ton)	$338.00	$338.00
Subtotal Landfill Disposal Costs	$11,681	$8,761
Total Header House Removal and Disposal Costs per Wellfield	$15,987	$12,241
Total Header House Removal and Disposal Costs	**$28,228**	

Wellfield Buildings and Equipment Removal and Disposal	**MU-1**	**MU-2**	**From CPP to MU-2**
V. Buried Trunk Line			
Number of pipes	2	2	2 each
Size of pipes (diameter in inches)	6	6	16
Size of pipes (diameter in inches)			8
Length of Trunk line Trench (ft)	1600	2100	8100
A. Removal and Loading			
Main Pipeline Removal Unit Cost ($/ft of trench)	$3.33	$3.33	$3.33
Subtotal Trunk line Removal and Loading Costs	$5,328	$6,993	$26,973
B. Transport and Disposal Costs (NRC-Licensed Facility)			
1. 3" HDPE Trunk line			
Piping Length (ft)			
Chipped Volume Reduction (ft^3/ft)			0.022
Chipped Volume (ft^3)			0
2. 6" HDPE Trunk line			
Piping Length (ft)	3200	4200	
Chipped Volume Reduction (ft^3/ft)	0.078	0.078	0.078
Chipped Volume (ft^3)	250	328	0
3. 8" HDPE Trunk line			
Piping Length (ft)			16200
Chipped Volume Reduction (ft^3/ft)			0.141
Chipped Volume (ft^3)			2284
4. 12" HDPE Trunk line			
Piping Length (ft)			
Chipped Volume Reduction (ft^3/ft)			0.293
Chipped Volume (ft^3)			0
5. 14" HDPE Trunk line			
Piping Length (ft)			
Chipped Volume Reduction (ft^3/ft)			0.359
Chipped Volume (ft^3)			0
6. 16" HDPE Trunk line			
Piping Length (ft)			16200
Chipped Volume Reduction (ft^3/ft)			0.486
Chipped Volume (ft^3)			7873
Total Trunk line Chipped Volume (ft^3)	249.6	327.6	10157
Volume for Disposal Assuming 10% Void Space (ft^3)	275	360	11173
Transportation and Disposal Unit Cost 11E2 ($/$ft^3$)	$12.85	$12.85	$12.85
Subtotal Trunk line Transport and Disposal Costs	$3,534	$4,626	$143,581
Trunk line Decommissioning Costs per Wellfield	$8,862	$11,619	$170,554
Total Trunk Line Decommissioning Costs	**$191,035**		
TOTAL WELLFIELD BUILDINGS,PIPE AND EQUIPMENT REMOVAL AND DISPOSAL COSTS	**$447,474**		

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Well Abandonment	MU-1	MU-2	Five Inch MU1 and Regional Baseline Wells
I. Well Abandonment (Wellfields)			
# of Production Wells (operating and/or installed)	115	190	0
# of Injection Wells (operating and/or installed)	200	310	28
# of Monitoring Wells (operating and/or installed)	47	105	26
#of Restoration Wells (operating and/or installed)	25	30	0
Total Number of Wells	387	635	54
Average Diameter of Casing (inches)	4.5	4.5	5
Average Depth (ft)	500	620	420
Well Abandonment Unit Cost per WDEQ Guideline No.12 App L ($2.50/ft)	$1,250	$1,550	$1,050
Subtotal Abandonment Cost per Wellfield	$483,750	$984,250	$56,700
Total Wellfield Abandonment Costs	**$1,524,700**		
II. Waste Disposal Well Abandonment	**DDW- 2**		
Estimated Well Abandonment Cost per Well	$118,450		
Subtotal Waste Disposal Well Abandonment Costs per Well	$118,450		
Total Waste Disposal Well Abandonment Costs	**$118,450**		
TOTAL WELL ABANDONMENT COSTS	**$1,643,150**		

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Wellfield Surface Reclamation		Connecting Road from CPP	MU-1	MU-2
I.	**Wellfield Pattern Area Reclamation**			
	Pattern Area (acres)		34.4	30.19
	Disking/Seeding Unit Cost ($/acre)		$350	$350
	Subtotal Pattern Area Reclamation Costs per Wellfield		$12,040	$10,567
	Total Wellfield Pattern Area Reclamation Costs		**$22,607**	
II.	**Wellfield Road Reclamation**			
	A. Road Reclamation			
	Length of Wellfield Roads (1000 ft)	2.5	6.6	2.7
	Wellfield Road Reclamation Unit Cost ($/1000 ft)	$1,203	$1,203	$1,203
	Subtotal Road Reclamation Costs per Wellfield	$3,008	$7,940	$3,248
	Total Wellfield Road Reclamation Costs	**$14,195**		
SUBTOTAL SURFACE RECLAMATION COSTS PER WELLFIELD		$3,008	$19,980	$13,815
TOTAL WELLFIELD SURFACE RECLAMATION COSTS		**$36,802**		

Miscellaneous Reclamation

I.	**CPP/Office Area Reclamation**	
	Assumptions	
	Concrete used to backfill low areas as Clean Fill	
A.	Scarification of Gravel	
	Assumptions	
	Average haul distance (ft)	NA
	Surface grade (%)	0%
	Average Thickness of Gravel (ft)	0.33
	Surface Area (acres) (minus building floor area)	4.1
	Scarification Unit Cost per WDEQ Guideline No.12A ($/acre)	$61.66
	Total Gravel Scarification Cost	$253
B.	Topsoil Application	
	1. Topsoil Replacement	
	Assumptions	
	Average haul distance (ft)	1000
	Surface area (acres)	4.82
	18 inches of topsoil removed and replaced at borrow area	
	Volume of topsoil (cy)	35,550.00
	Topsoil Removal/Replacement Unit Cost per WDEQ GL No. 12A($/cy)	$0.99
	Total Topsoil Removal/Replacement Cost	$35,195
C.	Disking/Seeding	
	Assumptions	
	Surface Area (acres)	44.1
	Disking/Seeding Unit Cost ($/acre)	$350
	Total Disking/Seeding Costs	$15,435
Total CPF/Office Area Reclamation		**$50,882**

Miscellaneous Reclamation

II. Access Road Reclamation	**Main Access Road**	**Water Supply Well Road**	**DDW Road**
A. Assumptions			
Surface grade			
Length of road (miles)	0.45	0.09	0.25
Average road width (ft)	30	12	24
B. Gravel Percentage salvage -no value (60%)			
Assumptions			
Average haul distance (ft)	500	500	500
Gravel Road Base Width (ft)	30	12	24
Gravel Road Base Area (acres)	1.6	0.1	0.7
Average Road Base Depth (ft)	0.33	0.33	0.33
Volume of Road Base (cy)	871	66	381
Removal Unit Cost per WDEQ Guideline No.12A ($/cy)	$0.82	$0.82	$0.82
Subtotal Gravel Road Base Removal Costs	$714	$54	$312
C. Move Road Fill Material			
Assumptions			
Estimated volume to move (cy)	30,500		
Average haul distance (ft)	750		
Removal Unit Cost per WDEQ Guideline No.12A ($/cy)	$0.90		
Subtotal Gravel Road Fill Removal Costs	$27,450		
D. Scarification with Dozer			
Road Surface Area (acres)	1.6	0.1	0.7
Scarification Unit Cost per WDEQ Guideline No.12A D8 Dozer ($/acre)	$239.17	$239.17	$239.17
Scarification Costs	$391	$30	$171
E. Topsoil Application			
Assumptions	Included in CPP reclamation		
F. Disking/Seeding			
Subtotal Reclamation Costs per Road	$28,555	$84	$483
Total Access Road Reclamation Costs	**$29,122**		

Miscellaneous Reclamation

III. Wastewater Pipeline Reclamation	**DDW-2 Pipeline**	**CPP-Pond 1**
A. Pipeline Removal and Loading		
Length of HDPE Pipe Trench (ft)	1600	900
Main Pipeline Removal Unit Cost ($/ft of trench)	$3.33	$3.33
Subtotal Pipeline Removal Costs	$5,328	$2,997
B. Pipeline Transportation and Disposal (NRC-Licensed Facility)		
Pipe Diameter (inches)	4	4
Chipped Volume Reduction (ft^3/ft)	0.028	0.028
Subtotal Volume of Shredded PVC Pipe (ft^3)	49.28	27.72
Transportation and Disposal Unit Cost ($/$ft^3$)	$12.85	$12.85
Subtotal Pipeline Disposal Costs	$633	$356
C. Disking/Seeding		
Assumptions:		
Width of Pipeline Trench (ft)	2	Included in CPP reclamation
Area of Pipeline Trench (acres)	0.1	
Disking/Seeding Unit Cost ($/acre)	$350	
Subtotal Disking/Seeding Costs	$26	
Subtotal Reclamation Costs per Pipeline	$5,987	$3,353
Total Wastewater Pipeline Reclamation Costs	**$9,340**	

Miscellaneous Reclamation

IV. Pond Reclamation		**WW Storage Pond 1 (3 cells)**	**Sediment Pond**
A. HDPE Liner Removal and Disposal			
Assumptions:			
HDPE Primary liner for Pond 1 constitutes 11E2 waste			
Thickness of HDPE Primary liner (mil)		60	
HDPE Secondary liner for Pond 1 and Sediment pond not contaminated			
Thickness of HDPE Secondary liner (mil)		40	
Liner swell factor (50%)		1.5	
Width of Pond (ft)		240	130
Length of Pond (ft)		545	130
Depth of Pond (ft)		15	15
Surface area of pond (ft^2)		130800	16900
Surface area of liner (ft2)		143616	
Volume of HDPE Liner (cy)	0	40	0
1. Removal and Loading			
Removal and Loading Unit Cost based on engineer's estimate		$30,000.00	
Sub Total Liner Removal and Loading Costs		**$30,000**	
2. Transportation and Disposal 11E2			
Volume of HDPE Primary Liner (ft^3)		1077	
Transportation and Disposal Unit Cost 11E2 ($/$ft^3$)		$12.85	
Sub Total Liner Transportation and Disposal Costs 11E2		**$13,842**	
3. Transportation and Disposal Non Contaminated			
Volume of HDPE Secondary Liner (ft^3)		718	0
Assume loose liner weighs 1500 lbs/yd3			
Offsite Transport and Disposal Unit Cost ($/ton)		$338	
Subtotal Liner Transportation and Disposal Costs		$6,742	$0
Total Liner Transportation and Disposal Costs		**$6,742**	
B. Removal and disposal pond leak detection system			
Labor/equipment estimate		$5,000	
Volume of material estimate (ft3)		500	
Transportation and Disposal Unit Cost 11E2 ($/$ft^3$)		$12.85	
Sub Total Leak Detection Removal and Disposal Costs		**$11,425**	
C. Backfill Pond			
Assumptions per cell (3):			
Estimated volume to approx natural grade (yd3)		10080	13600
Average push distance with dozer (ft)		50	
Approx haul for scraper from road fill (ft)			500
Surface grade (%)		0%	0%
Volume of WW Pond backfill for 3 cells (cy)		30,240	
Backfill Unit Cost per WDEQ Guideline No.12A., ($/cy)		$0.16	$0.82
Subtotal Backfill Costs		$4,838	$11,152
Subtotal Backfill Costs		**$15,990**	
D. Topsoil Application			
Assumptions		Included in CPP reclamation	
E. Soil Sampling and Analysis Costs			
Number of samples		12	
Cost per sample ($)		$150	
Subtotal Soil Sampling Costs ($)		**$1,800**	
Total Pond Reclamation Costs		**$79,799**	

Miscellaneous Reclamation

V. Diversion Berm Earthwork and Reclamation	
Assumptions	
Estimated volume to move (cy)	10800
Average haul distance (ft)	1000
Removal Unit Cost per WDEQ Guideline No.12A ($/cy)	$0.99
Subtotal Berm Fill Removal Costs	$10,692
Topsoil Application	
Assumptions	Included in CPP reclamation
TOTAL DIVERSION BERM EARTHWORK AND RECLAMATION	**$10,692**
VI. Containment Barrier Wall (CBW) Reclamation	
Assumptions	
Labor/equip to excavate/install finger drains (estimate)	$7,650
Gravel for finger drains (estimate)	$3,000
Total Containment Barrier Wall (CBW) Reclamation Costs	**$10,650**
VII Main Trunk Line Reclamation	
Assumptions	
4000 feet requires seeding (located outside wellfield area) (ft)	4000
Assume 20 feet wide (ft)	20
Disking/Seeding Unit Cost ($/acre)	$350.00
Total Trunk Line Reclamation	**$643**

Miscellaneous Reclamation

VII Culvert Removal and Disposal	
Assumptions	
Number	10
Removal Unit Cost per WDEQ Guideline No.12., App J (each)	$137.83
Transport and on-site disposal cost (estimated for each)	$100.00
Total Culvert Removal and Disposal	**$2,378**
IX. Fence Removal and Disposal	
Assumptions	
Length 4-Strand Barbwire Fence (MU-1 50 acres)	6000
Unit Cost per WDEQ Guideline No.12., App H ($/ft)	$0.32
Length CPP Fence	8500
Unit Cost per WDEQ Guideline No.12., App H ($/ft)	$0.32
Total Fence Removal and Disposal Costs	**$4,640**
X. Monitoring Site Removal and Disposal	
Assumptions	
3 Surface Water Sites (estimated at $2400 each)	$7,200
7 Air Mon Sites (estimated at $500 each)	$3,500
1 Met Station (estimated at $2500 each)	$2,500
Total Monitoring Site Removal and Disposal Costs	**$13,200**
XI. Radiologic Surveys	
Assumptions	
Misc meter/smear surveys buildings/equipment (100 at $55 each)	$5,500
Decomm area gamma surveys (est based on baseline survey costs	$15,000
Misc soil samples (Ra-226/U)	$13,000
Total Radiologic Surveys Costs	**$33,500**
XII MISC Ecological Surveys	
Assumptions	
Total Survey Costs	**$30,000**
XII Surface reclamation for Delineation and Historic Hole Abandonment	
Assumptions	
Historic holes associated with Mine Unit 2	200
Delineation Holes outside MU1 and MU2	40
Total acres disturbed (400 ft2 per hole)	2.2
Disking/Seeding Unit Cost ($/acre)	$350
Total Surface Reclamation for Delination and Historic Holes	**$771**
TOTAL MISCELLANEOUS RECLAMATION COSTS	**$275,153**

GROUNDWATER SWEEP (GWS)

Assumptions:

1. All pumps are 5 hp pumping at 20 gpm
2. Cost of electricity = $0.06/kwh
3. All wastewater brine pumped to DDW for injection at $1.37/1000 gallons. with 90% permeate/10% brine split
4. Repair and maintenance costs estimated at $0.10/1000 gallons
5. Process sampling and analysis costs estimated at $0.25/1000 gallons at 200 GPM flow rate
6. Labor costs are covered in GW REST

Wellfield Pumping Costs per 1000 Gallons

$$\frac{1000\ gal}{} \times \frac{5\ hp}{20\ gpm} \times \frac{1\ hr}{60\ min} \times \frac{0.746\ kwh}{hp} \times \frac{\$\ 0.06}{kwh} \times \frac{1}{0.8} = \$\ 0.233125$$

Repair and Maintenance Costs per 1000 Gallons	= $ $0.10
Process Sampling and Analysis Costs per 1000 Gallons	= $ $0.25
RO Wastewater Brine to DDW per 1000 Gallons **Note: only 10% of RO Volume Requires DDW Disposal**	= $ $0.14
TOTAL GWS COSTS PER 1000 GALLONS	**= $ 0.72**

REVERSE OSMOSIS (RO)

Assumptions:

1 Cost of electricity = $0.06/kwh
2 90% permeate/10% brine split
3 Membrane life of 4 years.
4 Includes cost of pumping from wellfield to RO Unit
5 The 10% reject is disposed at the DDW at a cost of $1.37/1000 gallons
6 Process sampling and analysis costs estimated at $0.17/1000 gallons at 700 GPM flow rate
7 Labor costs are covered in GW REST

Reverse Osmosis Costs per 1000 Gallons

Electricity	= $ 0.15
Chemicals	= $ 0.10
Membrane Replacement	= $ 0.00
Repair and Maintenance	= $ 0.10
Pumping from Wellfield	= $ 0.19
Process Sampling and Analysis	= $ 0.17

RO Wastewater Brine to DDW per 1000 Gallons = $ 0.137
Note: only 10% of RO Volume Requires DDW Disposal

TOTAL RO COSTS PER 1000 GALLONS **= $** 0.84

RECIRCULATION (REC)

Assumptions:

1. All pumps are 5 hp pumping at 20 gpm
2. Cost of electricity = $0.06/kwh
4 Repair and maintenance costs estimated at $0.10/1000 gallons
5 Process sampling and analysis costs estimated at $0.10/1000 gallons
6 Labor costs are covered in GW REST

Wellfield Pumping Costs per 1000 Gallons

$$\frac{1000\ gal}{} \times \frac{5\ hp}{20\ gpm} \times \frac{1\ hr}{60\ min} \times \frac{0.746\ kwh}{hp} \times \frac{\$\ 0.06}{kwh} \times \frac{1}{0.8} = \$\ 0.23313$$

Repair and Maintenance Costs per 1000 Gallons = $ 0.10

Process Sampling and Analysis Costs per 1000 Gallons = $ 0.10

TOTAL GWS COSTS PER 1000 GALLONS **= $ 0.43**

DEEP WELL INJECTION

Assumptions:

1. Pump 75 hp pumping at 50 gpm
2. Cost of electricity = $0.06/kwh
3. Repair and maintenance costs estimated at $0.10/1000 gallons
4. Labor costs are covered in GW REST

Waste Disposal Pumping Costs per 1000 Gallons

$$\frac{1000\ gal}{} \times \frac{75\ hp}{50\ gpm} \times \frac{1\ hr}{60\ min} \times \frac{0.746\ kwh}{hp} \times \frac{\$\ 0.06}{} = \$\ 1.12$$

Repair and Maintenance Costs per 1000 Gallons = $ 0.10

Chemical Costs per 1000 Gallons = $ 0.15

Scale Inhibitor	= $	0.10
Corrosion Inhibitor	= $	0.05

TOTAL DEEP WELL INJECTION COSTS PER 1000 GALLONS = $ 1.37

FIVE YEAR MECHANICAL INTEGRITY TESTS (MIT)

Assumptions:

1. Based on actual operating costs
2. Use Pulling Unit for 1 hr/well at cost of $28.50/hr.
3. Use MIT Unit for 1 hr/well at cost of $28.50/hr.
4. Labor for operation of pulling unit will require 2 workers at $26.44/hr
5. Labor for operation of MIT Unit will require 1 worker at $26.44/hr

MIT Costs per Well

Equipment:

Pulling Unit						
	1 hours	X	$ 28.50	per hour		=$ 28.50
MIT Unit						
	2 hours	X	$ 28.50	per hour		=$ 57.00
Labor:						
Pulling Unit						
	1 hours	X	$ 26.44	per hour X	2 workers	=$ $52.88
MIT Unit						
	2 hours	X	$ 26.44	per hour		=$ 52.88

MIT COST PER WELL =$ 191

MAIN PIPELINE REMOVAL

Assumptions:

1. Trenching with track hoe at 400 ft/day
2. Pipeline extraction and backfilling with track hoe at 300 ft/day
3. Trackhoe rental: $1280/week
4. Fuel cost: $18.00/operating hour
5. Trackhoe operation requires 1 worker at $25/hour
6. Pipeline extraction requires 2 workers at $25/hour (in addition to trackhoe operator)
7. Pipelines removed simutaneously
8. Includes removal of manholes
9. Operating schedule: 8 hrs/day, 5 days/week

Main Pipeline Removal Costs per ft of Trench

Equipment

Trackhoe

$$\frac{\$\ 1280}{\text{week}} \times \frac{1\ \text{week}}{5\ \text{days}} \times \frac{1\ \text{days}}{300\ \text{ft}} = \$\ 0.85$$

Fuel

$$\frac{\$\ 18}{\text{hour}} \times \frac{8\ \text{hrs}}{1\ \text{day}} \times \frac{1\ \text{days}}{300\ \text{ft}} = \$\ 0.48$$

Labor

Track hoe Operation

$$\frac{\$\ 25}{\text{man hr}} \times \frac{8\ \text{man hrs}}{1\ \text{day}} \times \frac{1\ \text{days}}{300\ \text{ft}} = \$\ 0.67$$

Pipeline Extraction

$$\frac{\$\ 25}{\text{man hr}} \times \frac{16\ \text{man hrs}}{1\ \text{day}} \times \frac{1\ \text{day}}{300\ \text{ft}} = \$\ 1.33$$

MAIN PIPELINE REMOVAL COST PER FT OF TRENCH =$ 3.33

WELLFIELD PIPING REMOVAL

Assumptions:

1. Trenching with backhoe at 2000 ft/day
2. Pipeline extraction and backfilling with backhoe at 2000 ft/day
3. Backhoe rental: $800/week
4. Fuel cost: $12.40/operating hour
5. Backhoe operation requires 1 worker at $25/hour
6. Pipeline extraction requires 1 workers at $25/hour (in addition to backhoe operator)
7. Operating schedule: 8 hrs/day, 5 days/week

Wellfield Pipe Removal Costs per ft of Pipe

Equipment

Backhoe

$$\frac{\$\ 800}{\text{week}} \times \frac{1\ \text{week}}{5\ \text{days}} \times \frac{1\ \text{days}}{1500\ \text{ft}} = \$\ 0.11$$

Fuel

$$\frac{\$\ 13.00}{\text{hour}} \times \frac{8\ \text{hrs}}{1\ \text{day}} \times \frac{1\ \text{days}}{1500\ \text{ft}} = \$\ 0.07$$

Labor

Backhoe Operation

$$\frac{\$\ 25}{\text{man hr}} \times \frac{8\ \text{man hrs}}{1\ \text{day}} \times \frac{1\ \text{days}}{1500\ \text{ft}} = \$\ 0.13$$

Pipeline Extraction

$$\frac{\$\ 25}{\text{man hr}} \times \frac{8\ \text{man hrs}}{1\ \text{day}} \times \frac{1\ \text{day}}{1500\ \text{ft}} = \$\ 0.13$$

WELLFIELD PIPE REMOVAL COST PER FT OF PIPE =$ 0.44

WELLFIELD ROAD RECLAMATION

Assumptions

1. Gravel road base removed at cost of $111/cy/1000 ft (WDEQ Guideline No. 12, App. C, Level Ground, 500 ft haul)
2. Gravel road base: average depth = 0.3 ft, average width =12 ft
3. Roads scarified prior to topsoil application at cost of $68.69/acre (WDEQ Guideline No. 12, Appendix P)
4. Grading of scarified roads prior to topsoil application at cost of $74.90/acre (WDEQ Guideline No. 12, Appendix G)
5. Topsoil applied at cost of $1.00/cy/1000 ft (WDEQ Guideline No. 12, App. C, Level Ground, 500 ft haul)
6. Stripped topsoil: average depth = 1.5 ft, average width = 16 ft
7. Disking/seeding cost of $350 acre is based on LQD recommendattion and LQD Guideline 12A.

Gravel Road Base Removal Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{0.30\ ft}{} \times \frac{12\ ft}{} \times \frac{1\ cy}{27\ ft^3} \times \frac{\$1.00}{cy} = \$\ 133$$

Scarification Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{16\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{68.69}{} = \$\ 25$$

Grading Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{16\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$74.00}{acre} = \$\ 27$$

Topsoil Application Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{1.50\ ft}{} \times \frac{16\ ft}{} \times \frac{1\ cy}{27\ ft^3} \times \frac{\$1.00}{cy} = \$\ 889$$

Disking/Seeding Costs per 1000 ft of Road

$$\frac{1000\ ft}{} \times \frac{16\ ft}{} \times \frac{1\ acre}{4.356E{+}04\ ft^2} \times \frac{\$350}{acre} = \$\ 129$$

TOTAL WELLFIELD ROAD RECLAMATION COSTS PER 1000 FT OF ROAD = $ 1,203

NON CONTAMINATED WASTE TRANSPORT AND DISPOSAL AT MOORCROFT LANDFILL

Assumptions:

1. 20 yd3 per load
2. 46 miles to Moorcroft Landfill roundtrip
3. Transportation at $3.00 per mile
4. Disposal fee at $200/ ton

Non Contaminated Waste Transport 46 miles X $3.00 / 1 mile	$138.00	20 tons
Non Contaminated Waste Disposal Cost	$4,000.00	20 tons
Total NON CONTAMINATED WASTE TRANSPORT AND DISPOSAL	$338.00	per ton

11E2 BY PRODUCT CONTAMINATED WASTE TRANSPORT AND DISPOSAL

Assumptions:

1. 30 yd3 per load
2. 470 miles to Shirley Basin 11E2 disposal facility (round trip)
3. Transportation at $3.00 per mile
4. Disposal fee at $300/yd3 ($11.11/ft3)

11E2 By Product Waste Transport

$\frac{\text{470 miles}}{} \times \frac{\$3.00}{\text{1 mile}}$ $1,410.00 30 yd3

11E2 By Product Waste Disposal Cost $11.11 ft3

Total 11E2 BY PRODUCT CONTAMINATED WASTE TRANSPORT AND DISPOSAL $12.85 ft3

Abbreviations/Acronyms

$	Dollars
$/Kgal	Dollars per 1000 gallons
avg	average
CBW	Containment Barrier Wall
cy	cubic yard
DDW	Deep Disposal Well
FG	Fiberglass
ft	feet
ft2	square feet
ft3	cubic feet
gal	gallon
gpm	gallons per minute
H&S	Health and Safety
H2S	Hydrogen Sulfide
H2SO4	Sulfuric Acid
HCl	Hydrochloric Acid
Hp	Horsepower
Kgal	1000 gallons
Kwh	Kilowatt-hours
NaOH	Caustic Soda
OD	Outside Diameter
PPE	personal protective equipment
PV	Pore Volume
PVD	Pore Volume Displacement
reqm't	requirement
RO	Reverse Osmosis
yd3	cubic yards
yr	year

Attachment 3
LQD Annual Report Comment Responses

Comment 13:

Section V.

a. Section V.A.1. The surety estimate provided must assume that Strata Energy is not performing restoration and reclamation activities and that the State will hire a third party to perform the restoration and reclamation activities. As such, the LQD Administrator has determined that no salvage of materials to reduce the bond amount will be allowed in the bond estimate, so the bonding amount will increase over the estimate provided. Also, Guideline 12A should be used, when possible, to estimate costs for reclamation; the equipment used in Guideline 12 is most suitable for large mine application, and few reclamation contractors will use that size of machinery. These considerations were used to develop an alternative LQD bond estimate detailed on the attached printout of the bond estimate and which are discussed in the following comments. The LQD bond estimate does not include monitoring costs discussed in section 14.e: General Comment 2 below.

Response a: The bond estimate does not take credit for the salvage value of the clean steel from buildings; however, it does not include any costs to manage this material after decontamination and survey. Strata has contacted a local steel recycling company and was told that despite the current low price on steel that buildings such as those at Ross would eligible for removal from the site at no cost. In subsequent discussions with LQD regarding this issue, the Administrator has agreed that provisions must be made to transport the steel from site but disposal will not be required since the material will be salvaged. The estimate has been changed to include transportation of the steel from the Ross site.

b. Section V.C.1. Based on Administrative considerations, the bond amount presented is not accurate and must be changed.

Response b: It is not possible for Strata to respond to this comment without understanding what "Administrative considerations" entail. Please provide clarification.

c. Section V.C.2. In the 2013-2014 Annual Report, Strata Energy was adamant that restoration could be accomplished in 15 months following completion of mining operations. Why is Strata now claiming four years for restoration?

Response c: As discussed in Strata's response to comments on the last surety, Strata actually proposed a 2-year period to complete active groundwater restoration that was based on the actual pore volume

estimates and installed restoration capacity, which resulted in15 months of active restoration. As noted at the time Strata also included a 9 month contingency period, resulting in the 24 month estimate. Strata has used the same approach for this update. The total affected pore volume in the current approved surety (submitted January 2015) is 50,149,000 gallons, which was the basis for the 24 month active restoration period. The update provided with this annual report includes a new pore volume estimate of 169,572,000 gallons. As discussed in the RAP, and reflected in the surety estimate, the increase in the pore volumes result from the increase in the number of wellfields and corresponding pattern areas and the increase in the average completed thickness of the ore zone from 8 to 15 feet. This additional volume of water must be pumped and treated with the same installed restoration capacity and results in the increased time required to complete active restoration.

d. Section V.C.6 contains inappropriate discussion of salvageable materials. Please remove the language concerning material salvage in the Reclamation Performance Bond discussion.

Response d: As noted above, Strata is not attributing any value for the building materials (i.e., steel) that has significant salvage value and believes it is appropriate to recognize that all of the building materials (especially from new buildings) will not require disposal costs for disposal at a landfill. At the direction of LQD, the estimate has been revised to include transportation of the salvageable steel with no disposal costs.

e. Section V.C.6 also contains language that suggests that concrete will be disposed of on-site. No language exists in the Mine Plan or Reclamation Plan of the permit which would allow disposal of any waste materials. Even clean fill disposal on the permit requires LQD approval. The LQD will allow Strata to take advantage of bond reductions associated with on-site disposal of concrete, if Strata submits an NSR with Reclamation Plan language allowing disposal of clean fill materials from the buildings and maps that show the exact locations for disposal of clean fill during reclamation of the CPP.

Response e: Strata submitted a nonsignificant revision (NSR) to the Permit to Mine on February 20, 2015 (TFN 6 2/133). Among other requested changes, this NSR requested that on-site disposal of clean concrete be allowed. LQD District 3 approved this NSR by letter dated June 22, 2015. This NSR changed the Mine Plan to allow disposal of clean concrete but due to an oversight did not change similar text in the Reclamation Plan. Strata is preparing and will submit an NSR to change the Reclamation Plan to conform to the language currently approved in the Mine Plan.

The NSR (TFN 6 2/133) was approved without the exact location of disposal identified. Strata notes that 1) Strata owns the land where the CPP site is located and 2) the ultimate location will be determined based on the characteristics of the facility at the time of decommissioning. At this time, the most likely location for disposal would be Lined Retention Pond 1. However that may change as the project is developed.

f. Section V.C.11. Reference Document 1 of Guideline 4 requires Strata Energy to provide the number of wells to be abandoned. Please the number of monitoring, injection and production wells to be abandoned in MU-1 and MU- 2 currently present and proposed for the next reporting year.

Response f: Section V.C.11 is a general description of the basis of the estimate contained in Appendix E. As noted in the final sentence, the information requested is contained on the WELL ABAN sheet (page E-15) in the surety estimate.

g. Table 2. If not currently accurate, total acreage affected prior to mining must exclude the acreage of roads that have been enhanced to serve the Strata Energy permit mining operation. If not currently included, these roads must also be included in the affected area represented in the annual report.

Response g: Table 2 clearly indicates the affected acreage over time.

Comment 14:

Bond Estimate

General Comment 2: Including labor costs, Strata must provide an estimate for continued monitoring of wildlife and threatened and endangered species during restoration and reclamation, and for the vegetation study to determine adequate surface reclamation. An estimate for site security must also be included.

Response: The costs for wildlife monitoring and vegetation surveys are routinely included as part of the 25 percent contingency costs for ISR mines due to the very low costs associated with these surveys. However, in order to expedite review and approval of this estimate Strata has revised the Miscellaneous Costs to include an estimate to complete these surveys during restoration and reclamation based on actual costs to Strata. Strata has not included an estimate for site security as the existing infrastructure (gated fencing, code operated gates and intercom system) and 24-hour presence by staff, which currently comprises the site security, would be available during reclamation and restoration in a third-party scenario.

a. Page E-3. Please explain why Strata Energy has reduced proposed the average completed thickness in MU-1 and MU-2 as compared with that presented in the 2013-2014 Annual Report so LQD staff may better understand the operation.

Response a: Strata has not reduced the proposed average completed thickness in this estimate. Quite the contrary, Strata has increased the completed thickness from 8 feet in the 2013-2014 estimate to 15 feet in the current estimate, which is based on the actual installed completion thickness to date in Mine Units 1 and 2. This is thoroughly explained and contained in the pore volume (PV) calculation included in Section V.C.2. It is also included in the Surety Estimate (Sheet GW REST) under "Pore Volume Assumptions".

b. Page E-3, PV Assumptions. The LQD staff calculations of the Affected Volume are 35,513,597 for MU-1 and 31,163,130 for MU-2. Please correct the bond estimate or explain why the Strata Energy estimate is lower for the Affected Volume.

Response b: Strata cannot explain how the LQD arrived at the figures shown in their estimate; however, it appears that they did not include the porosity of the production zone. The calculation of the affected pore volume was provided in Section V.C.2 of the report. The calculations that underlie the Strata estimate have been checked and are correct. Accordingly, no change to the estimate is required.

c. Elution Processing. Except for a heading that states "(including brine disposal)," the cost of elution and deep well disposal has been left out of bond calculation related to groundwater sweeps. Please provide detailed estimates for the process disposal or explain why it was left out of the calculation.

Response c: The reviewer's attention is directed to sheet GW REST (page E-3), sheet UC GWS (page E-23), and sheet UC RO (page E-24) for these costs. Accordingly, no change to the estimate is required.

d. Page E-4. MIT costs for at least one year must be included for all Class 3 injection wells.

Response d: The estimate has been revised to include MIT costs for the wells currently installed at the site (i.e., 273 cased wells). Unit costs are based on actual costs for these tests. Based on the time now included for groundwater restoration and site reclamation, these wells could become due for the 5 year MIT before the completion of reclamation. Wells planned for construction this year should fall outside that 5 year window.

e. Page E-11. The areas associated with various structures at the CPP are not correct. CPP = 15,867 yd^3, Truck Bay = 1,662 yd^3, and Office = 6,815 yd^3. The DDW and Pot Water Building volumes appear to be correct. Please make necessary corrections.

Response e: Strata does not understand the comment as it says the "areas" are not correct and then the "volume" in "yd^3" of each building is listed. It appears the reviewer calculated the full volume of the building (most of which is air) and did not recognize that the estimate is for the disposal volume of only the material comprising the building, which as stated is "10% of the building full volume". Accordingly, no change to the estimate is required.

f. Page E-12. Comparison of the bond estimate production and injection well counts shown on Page E-3 with those on page E-12 shows differences in the numbers to be reclaimed. Please explain the differences or correct the well counts.

Response f: The section referenced is only an estimate for the removal and disposal of downhole tubing and pumps. As stated in Section II.A this is only for "operating wells" that contain downhole equipment. Accordingly, many wells in MU-2 will be in some stage of construction and will not be in operation and will not contain downhole equipment. The reviewer is directed to page E-15 WELL ABAN that contains the estimated cost to plug and abandon all wells estimated for the report period. This estimate is consistent with page E-3. Accordingly, no change to the estimate is required.

g. Page E-13. Please remove salvage value from the bond estimates for buildings.

Response g: Sheet WF BLDGS PIPE (page E-13) does not contain salvage value. It does contain an assumption that the "volume of building material is 40% of the full building volume" to account for the "air" within the building confine. Accordingly, no change to the estimate is required.

h. Page E-14. The LQD calculates the total chipped volume of trunk line "Form CPP to MU-2" to be 10,157 ft^3, not 7,873. Please confirm, correct or explain the lower value.

Response h: Strata appreciates the reviewer finding this error in the spreadsheet. It has been corrected accordingly. This increased the "Total Wellfield Building, Pipe and Equipment Removal and Disposal Costs" from $383,093 to $447,474. The revised Surety Estimate is included.

i. Page E-17. Gravel is considered a naturally occurring material that the LQD often allows to be graded into surfaces to be topsoiled and seeded instead of the materials being removed. Therefore, the LQD recommends leaving the gravel and scarifying compacted surfaces prior to topsoil application. The LQD bond estimate reflects scarification only, not removal.

Response i: The costs to remove gravel from the CPP/Office area has been removed from the Surety Estimate. The unit cost of $61.66 per acre LQD Guideline No. 12A Section II G was added to scarify the area.

j. Page E-17, Section B. The topsoil handling cost used by Strata in this calculation is for 1 ft. of topsoil. Strata will be applying 1.5 ft. of topsoil. Therefore, the cost of application should be $1.30 per cubic yard. Please make necessary changes.

Response j: There is 35,550 yd^3 of topsoil placed in Stockpile 2 and Stockpile 3 available for replacement on the 44.1 acres of disturbance in the CPP area. This amount will be placed uniformly over this area. The bond was updated to clearly reflect this.

k. Page E-17. Is the cost for removal of the fill material used to build the entrance road included in the reclamation costs of the CPP?

Response k: The estimated cost to move the fill used to build the entrance (i.e., main access) road is not included for the reclamation costs for the CPP, but it is included on page E-18 under item II. "Access Road Reclamation" sub item C. "Move Road Fill Material". A review of this section shows that $27,450 (prior to escalators) is estimated for this activity. Accordingly, no change to the estimate is required.

l. Page E-18 appears to be missing the bond estimate for reclamation of two roads in MU-1 and MU-2. Please check you calculations and correct if necessary. The LQD estimate provides the estimated road reclamation costs for the missing roads.

Response l: Pages E-18 thru E-22 "MISC REC" covers miscellaneous reclamation items. The estimated reclamation costs for the roads in MU-1 and MU-2 are included in item II.A of "WF REC" on page E-16. Accordingly, no change to the estimate is required.

m. Page E-20. The corrected topsoil handling costs for the Wastewater Storage Pond and Sediment Pond are $1.34 and $1.57, respectively for 1.5 feet of soil and the respective haul distances. Seeding costs are also missing from the Strata bond estimates on Pages E-20 and E-21. The LQD estimate includes seeding costs.

Response m: There is 35,550 yd^3 of topsoil placed in Stockpile 2 and Stockpile 3 available for replacement on the 44.1 acres of disturbance in the CPP area. This amount will be placed uniformly over this area. The bond was updated to clearly reflect this.

RESPONSE TO COMMENTS ON 2014-2015 STRATA ENERGY, INC. PERMIT TO MINE NO. 802 ANNUAL REPORT

Round 2 Comment

15) Comment 2 on the first page of the cover letter explains bonding of future plugging for historic drill holes outside the monitoring well ring that were accounted for in the Miscellaneous Reclamation section of the surety estimate. Recent discussions with Strata Energy staff concerning developmental drilling indicated that these drill holes have also been bonded, but the location in the surety estimate of the bond amounts was not disclosed. Please provide a line-item in the Miscellaneous Reclamation section of the surety estimate to account for developmental drill holes.

Round 2 Response

The bonding for future plugging for historic drill holes outside the monitoring well ring was based on a requested amendment to the NRC license. However, it does not appear that this amendment will be granted before Mine Unit 2 is ready for hydrologic testing. Therefore, Strata will need to plug these holes in 2016 and this additional bonding has been removed from the current estimate on Sheet MISC REC, resulting in a reduction of $270,604

Delineation drill holes are either plugged or cased as completed wells immediately after drilling while the drill rig is still on the hole. Therefore, the only reclamation costs associated with these holes is surface reclamation and seeding. The majority of delineation holes are located within the Wellfield Pattern Area and reclamation costs are shown on Sheet WF REC. This sheet includes the costs for surface reclamation for 34.4 acres in Mine Unit 1 and 30.19 acres in Mine Unit 2. Strata estimates that 40 delineation holes are outside these two areas. In addition, Strata expects to plug approximately 200 historic drill holes outside these areas in 2016. Surface reclamation costs for these disturbances have been added to the miscellaneous reclamation costs on Sheet MISC REC. This change resulted in an additional $771 in the estimate.

Round 2 Comment

16) The LQD does not typically contact other agencies concerning observations on mining permits unless the permit is not in compliance, and the LQD staff is making an inquiry concerning the issue at hand. In this case the Nationwide Permit number from the Army Corps of Engineers has not been provided in the Related Licenses and Permits section of the permit Adjudication file. Because a pipeline corridor across the Little Missouri River was also observed in the Annual Report figures, an inquiry was made to the Army Corps of Engineers if a permit would be required for that as well. If so, the permit number would also be required to be added to the Adjudication file.

Response d: The estimate has been revised to include MIT costs for the wells currently installed at the site (i.e., 273 cased wells). Unit costs are based on actual costs for these tests. Based on the time now included for groundwater restoration and site reclamation, these wells could become due for the 5 year MIT before the completion of reclamation. Wells planned for construction this year should fall outside that 5 year window.

Round 2 Comment
First round response accepted

e. Page E-11. The areas associated with various structures at the CPP are not correct. CPP = 15,867 yd^3, Truck Bay = 1,662 yd^3, and Office = 6,815 yd^3. The DDW and Pot Water Building volumes appear to be correct. Please make necessary corrections.

Response e: Strata does not understand the comment as it says the "areas" are not correct and then the "volume" in "yd^3" of each building is listed. It appears the reviewer calculated the full volume of the building (most of which is air) and did not recognize that the estimate is for the disposal volume of only the material comprising the building, which as stated is "10% of the building full volume". Accordingly, no change to the estimate is required.

Round 2 Comment
The LQD reviewer misread the bond estimate assumption to read building volume, not building materials volume. The LQD accepts 10% of total building volume as the volume of structures to be disposed of during reclamation. No response is necessary.

However, the LQD cannot accept that no concrete from the CPP facilities will be disposed of in a licensed facility. Surety estimates for other uranium permits provide for disposal of contaminated concrete, and the LQD Administrator believes that 20% of the CPP facility and CPP Truck Bay concrete should be bonded for licensed facility disposal. Please adjust the surety estimate accordingly.

Round 2 Response
Strata has made the requested change to Sheet BLDGS. Strata also corrected an incorrect formula that was identified in the volume calculation for clean concrete disposed on site. The result of these changes was an increase in the bond estimate of $23,115 including contingency.

Strata requests that the LQD update guidance to all ISR operators regarding the appropriate fraction of concrete to be considered for disposal as byproduct material and raise this issue with the Uranium Working Group to