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**LOST CREEK ISR, LLC**

May 23, 2017

Brian Wood  
State of Wyoming  
Department of Environmental Quality - Land Quality Division  
510 Meadowview Drive  
Lander, WY 82520

**RE: Submittal of Non-Significant Revision #14 to Permit to Mine  
Lost Creek Project PT788**

Dear Mr. Wood,

Enclosed with this cover letter is Non-Significant Revision (NSR) #14 to the Permit to Mine for the Lost Creek ISR Project PT788 as detailed on the index sheet. The primary purpose of the revision is to replace the Reclamation Plan bond estimate table with the updated and approved 2016-2017 bond estimate. An additional minor revision to the Reclamation Plan has been made as detailed on the index sheet. The revision is in reply to comment #2 on the WDEQ-LQD letter "2016 Annual Report Review for Permit PT-788" dated February 22, 2017.

If you have any questions regarding this submittal please feel free to contact me at the Casper Office.

Sincerely,

Michael D. Gaither  
Manager EHS and Regulatory Affairs  
Ur-Energy USA, Inc.

**Attachments: NSR #14 Index Sheet and replacement pages**

Cc: Nancy Williams, WDEQ-LQD (electronic copy)  
Mark Newman, BLM Rawlins Office  
John Saxton, NRC Project Manager (electronic copy)  
Ms. Theresa Horne, Ur-Energy, Littleton Office (electronic copy)

INDEX SHEET FOR MINE PERMIT AMENDMENTS OR REVISIONS

MINE COMPANY NAME: Lost Creek ISR, LLC MINE NAME: Lost Creek PERMIT NO.: PT0788

Statement: I, Michael Gaither, an authorized representative of Lost Creek ISR, LLC declare that only the items listed on this and all consecutively numbered Index Sheets are intended as revisions to the current permit document. In the event that other changes inadvertently occurred due to this revision, those unintentional alterations will not be considered approved. Please initial and date. MG 5/23/2017

- NOTES: 1) Include all revision or change elements and a brief description of or reason for each revision element.  
 2) List all revision or change elements in sequence by volume number; number index sheets sequentially as needed.

VOLUME NUMBER	PAGE, MAP OR OTHER PERMIT ENTRY TO BE REMOVED	PAGE, MAP OR OTHER PERMIT ENTRY TO BE ADDED	DESCRIPTION OF CHANGE
Permit to Mine Volume 5: Operations Plan and Reclamation Plan	Reclamation Plan – Table RP-4 <i>Reclamation/Restoration Bond Estimate (Dec15)</i>	Reclamation Plan – Table RP-4 <i>Reclamation/Restoration Bond Estimate (Oct16)</i>	Revised bond estimate for 2016-2017 in LQD format (Note: Formula for number of elutions on Table 2 V added, Table 13 expanded)
Permit to Mine Volume 5: Operations Plan and Reclamation Plan	Reclamation Plan page RP-7 (Rev6 Feb10)	Reclamation Plan page RP-7 (Rev7 May17)	Include reference in Section 2.3 for ion-exchange and elution circuits in the restoration process.

PV = Area x Thickness x Horizontal Flare x Vertical Flare x Porosity x Conversion

$$PV = A_p (\text{ft}^2) \times T (\text{ft}) \times 1.2 \times 1.2 \times 0.25 \times 7.48 (\text{gallons/ft}^3) = PV (\text{gallons})$$

The number of pore volumes planned for each stage of groundwater restoration to meet the restoration objective and to demonstrate the application of BPT is as follows:

- Groundwater transfer - zero to two pore volumes (optional);
- Groundwater sweep – three tenths of a pore volume;
- RO permeate injection - six pore volumes; and
- Groundwater recirculation – one pore volume.

LC ISR, LLC will conduct an in-house water quality monitoring program throughout the progression of the groundwater restoration activities. Upon the expectation that the restoration requirements have been met, LC ISR, LLC will collect appropriate groundwater samples (as outlined in this application) to determine the results. If confirmed, LC ISR, LLC will initiate the stabilization monitoring phase and submit supporting documentation that the restoration parameters are at or below the restoration standards. If at the end of restoration activities the parameters are not at or below the primary standards, LC ISR will either re-initiate certain of the restoration phases or submit documentation to the agencies that BPT has been used in restoration and the aquifer has been restored to its original class of use. The documentation will include an evaluation of the water quality data and a narrative of the application of BPT as applied.

Additional details, descriptions and discussion of the pore volume requirement determination of the various phases of groundwater restoration are presented in the following sub-sections. Uranium will be captured as practicable during restoration (sweep and RO phases primarily) using ion-exchange (see OP-4.1) and elution (see OP-4.2).

### **RP 2.3.1 Groundwater Transfer**

Groundwater transfer (or exchange) involves moving groundwater between a mine unit in restoration and another mine unit where uranium production is beginning. (Alternately, it may be desirable to transfer water between different portions of the same mine unit, depending on the water quality and operational state of the different portions.) Both mine units will first have received approval for UIC Class III injection. The transferred groundwater may undergo treatment using one or more of the permit-approved processes (such as ion exchange, chemical pH adjustment, and/or reverse osmosis) prior to injection within the destination mine unit. This technique is generally used to replace operationally-affected waters in the restoration mine unit with baseline quality water from the production mine unit. The operationally-affected waters from the restoration mine unit are then used as the basis for the lixiviant in the production mine unit. Because water is transferred (or

**Table RP-4: Reclamation/Restoration Bond Estimate (Oct16)**

Abbreviations/Acronyms	
\$	Dollars
\$/Kgal	Dollars per 1000 gallons
avg	average
ft	feet
ft <sup>2</sup>	square feet
ft <sup>3</sup>	cubic feet
gal	gallon
gpm	gallons per minute
H&S	Health and Safety
H <sub>2</sub> S	Hydrogen Sulfide
H <sub>2</sub> SO <sub>4</sub>	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 Estimate
reqm't	requirement
RO	Reverse Osmosis
WDW	Waste Disposal Well
yd <sup>3</sup>	cubic yards
yr	year

**TABLE 1: SUMMARY**

<b>Total Restoration and Reclamation Cost Estimate</b>									
<b>I.</b>	<b>GROUNDWATER RESTORATION COST</b>					\$8,196,299			
<b>II.</b>	<b>EQUIPMENT REMOVAL &amp; DISPOSAL COST</b>					\$103,756			
<b>III.</b>	<b>BUILDING DEMOLITION AND DISPOSAL COST</b>					\$1,077,492			
<b>IV.</b>	<b>WELLFIELD BUILDINGS &amp; EQUIPMENT REMOVAL &amp; DISPOSAL COST</b>					\$663,593			
<b>V.</b>	<b>WELL ABANDONMENT COST</b>					\$1,210,149			
<b>VI.</b>	<b>WELLFIELD AND SATELLITE SURFACE RECLAMATION COST</b>					\$44,491			
<b>VII.</b>	<b>TOTAL MISCELLANEOUS RECLAMATION COST</b>					\$785,864			
	<b>SUBTOTAL RECLAMATION AND RESTORATION COST ESTIMATE</b>					\$12,081,644			
				<b>CPI ESCALATOR-</b>	<b>0</b>	<b>to</b>	<b>0</b>	<b>( %)</b>	\$0
								<b>SUBTOTAL</b>	\$12,081,644
								<b>ADMINISTRATIVE, OVERHEAD, AND CONTINGENCY ITEMS (29%)</b>	\$3,503,677
								<b>TOTAL</b>	\$15,585,321
								<b>TOTAL CALCULATED SURETY (IN 2015 DOLLARS)</b>	\$15,585,300
<p>All dollars in the supporting spreadsheets were escalated to 2015 dollars using the on-line inflation calculator provided by the Bureau of Labor Statistics. Therefore, the inflation, at least for this year's calculation, is set at "0" on this page. See link below to source of inflation rates</p>									
<p><a href="http://data.bls.gov/cgi-bin/cpicalc.pl">http://data.bls.gov/cgi-bin/cpicalc.pl</a></p>									

**TABLE 2: GROUNDWATER RESTORATION**

<b>Ground Water Restoration</b>				<b>Wellfield 1</b>	<b>Wellfield 2</b>
<b>PV Assumptions</b>					
	Wellfield Area (ft2)			3,069,319	1,320,840
	Wellfield Area (acres)			70.46	30.32
	Affected Ore Zone Area (ft2)			3,069,319	1,320,840
	Avg. Completed Thickness			18.2	18.0
	Porosity			0.26	0.26
	Flare Factor (line drive flare applied seperately)			1.44	1.44
	Affected Volume (ft3)			80,440,712	8,901,405
	Kgallons per Pore Volume (including line drives)			156,488	66,583
<b>Number of Patterns in Unit(s)</b>					
	Current			261	0
	Estimated next report period			56	108
	Total Estimated			317	108
<b>Number of Wells in Unit(s)</b>					
<b>Production Wells</b>					
	Current			317	0
	Estimated next report period			0	108
	Total Estimated			317	108
<b>Injection Wells</b>					
	Current			597	0
	Estimated next report period			0	245
	Total Estimated			597	245
<b>Monitor Wells</b>					
	Current			57	99
	Estimated next report period			0	0
	Total Estimated			57	99
<b>Restoration Wells</b>					
	Current			0	0
	Estimated next report period			0	0
	Total Estimated			0	0
	Number of Wells per Wellfield			971	452
	Total Number of Wells			1423	
	Average Well Depth (ft)			454	450
<b>I. Restoration Well Installation Costs</b>					
	Number of Restoration Wells			0	0
	Well Installation Unit Cost (\$/Well)			\$9,613	\$10,341
	Subtotal Restoration Well Installation Costs per Wellfield			\$0	\$0
	<b>Total Restoration Well Installation Costs</b>			<b>\$0</b>	
<b>II. Ground Water Sweep Costs</b>					
	PV's Required			0.3	0.3
	Total Kgals for Treatment			46,946	19,975
	Ground Water Sweep Unit Cost (\$/Kgal)			\$2.19	\$2.19
	Subtotal Ground Water Sweep Costs per Wellfield			\$103,002	\$43,825
	<b>Total Ground Water Sweep Costs</b>			<b>\$146,827</b>	
<b>III. Reverse Osmosis Costs</b>					

**TABLE 2: GROUNDWATER RESTORATION**

<b>Ground Water Restoration</b>				<b>Wellfield 1</b>	<b>Wellfield 2</b>
		PV's Required		6	6
		Total Kgals for Treatment		938,928	399,495
		Reverse Osmosis Unit Cost (\$/Kgal)		\$0.79	\$0.79
		Subtotal Reverse Osmosis Costs per Wellfield		\$741,096	\$315,321
		<b>Total Reverse Osmosis Costs</b>		<b>\$1,056,417</b>	
<b>IV.</b>	<b>Chemical Reductant Costs</b>				
		Number of Patterns		0	0
		Chemical Reductant Unit Cost (\$/pattern)		\$0	\$0
		Subtotal Chemical Reductant Costs per Wellfield		\$0	\$0
		<b>Total Chemical Reductant Costs</b>		<b>\$0</b>	
<b>V.</b>	<b>Elution Costs</b>				
	A.	Elution Processing Costs			
		Kgals/Elution Required		13.5	13.5
		Number of Elutions [PV(gal)*conc/ 4000lbs/elution]		21	9
		Processing Unit Cost (\$/Elution)		\$538	\$538
		Subtotal Processing Costs		\$11,044	\$4,699
	B.	Deep Well Injection Costs			
		Deep Well Injection Volume (Kgals/Elution)		98,865	63,038
		Total Kgals for Injection		98,865	63,038
		Deep Well Injection Unit Cost (\$/Kgals)		\$2.48	\$2.48
		Subtotal Deep Well Injection Costs		\$245,169	\$156,326
		Subtotal Elution Costs per Wellfield		\$256,213	\$161,025
		<b>Total Elution Costs</b>		<b>\$417,238</b>	
<b>VI.</b>	<b>Monitoring and Sampling Costs</b>				
	A.	Restoration Well Sampling			
		Estimated Restoration Period (Years)		3.25	3.25
	1.	Well Sampling prior to restoration start			
		# of Wells		14	13
		\$/sample		\$379	\$379
	2.	Restoration Progress Sampling			
		# of Prod Wells		317	108
		\$/sample		\$31	\$31
		Samples/Year		3	3
		# of MP Wells		18	31
		\$/Sample		\$ 379	\$ 379
		Samples/Year		2	2
	3.	UCL Sampling			
		# of Wells		63	72
		\$/sample		\$21	\$21
		Samples/Year		24	24
		Sub-total Restoration Analyses		\$260,595	\$155,506
	B.	Short-term Stability			
		Estimated Stabilization Period (Months)		12	12
		# of MP Wells		18	31
		Samples/Year		6	6
		\$/sample		\$379	\$379
		# of UCL Wells		57	65

**TABLE 2: GROUNDWATER RESTORATION**

<b>Ground Water Restoration</b>				<b>Wellfield 1</b>	<b>Wellfield 2</b>
		Samples/Year		6	6
		\$/sample		\$21	\$21
		Sub-total Short-term Stability Analyses		\$48,114	\$78,684
		Subtotal Monitoring and Sampling Costs per Wellfield		\$308,709	\$234,190
		<b>Total Monitoring and Sampling Costs</b>		<b>\$542,899</b>	
<b>VII.</b>	<b>Mechanical Integrity Test (MIT) Costs</b>				
		Five Year MIT Unit Cost (\$/well)		\$144	\$144
		Number of Wells (0% since rest complete before 5-year)		914	231
		Subtotal Mechanical Integrity Testing Costs per Wellfield		\$131,616	\$33,264
		<b>Total Mechanical Integrity Testing Cost</b>		<b>\$164,880</b>	
<b>TOTAL RESTORATION COSTS PER WELLFIELD</b>				<b>\$1,540,636</b>	<b>\$787,625</b>
<b>TOTAL WELLFIELD RESTORATION COST</b>				<b>\$2,328,261</b>	
<b>VIII.</b>	<b>Building Utility Costs</b>			<b>Central Plant</b>	<b>Shop</b>
		Electricity (\$/Month)		\$3,812	\$500
		Propane (\$/Month)		\$2,525	\$404
		Natural Gas (\$/Month)		\$0	\$0
		Number of Months		61	61
		Subtotal Utility Costs per Building		\$386,561	\$55,144
		<b>Total Building Utility Costs</b>		<b>\$535,035</b>	
<b>Ground Water Restoration</b>					
<b>IX.</b>	<b>Irrigation Maintenance and Monitoring Costs</b>			<b>Irrigator 1</b>	<b>Irrigator 2</b>
	<b>A.</b>	<b>Irrigation Maintenance and Repair</b>			
		Irrigation Operation Months/Year		0	0
		Cost per Month		\$0	\$0
		Total Number of Years		0	0
		Subtotal Maintenance and Repair Costs		\$0	\$0
	<b>B.</b>	<b>Irrigation Monitoring and Sampling</b>			
		# of Irrigation Fluid Samples/Year		0	0
		Cost/sample		\$0	\$0
		# of Vegetation Samples/Year		0	0
		Cost/sample		\$0	\$0
		# of Soil Samples/Year		0	0
		Cost/sample		\$0	\$0
		# of Soil Water Samples/Year		0	0
		Cost/sample		\$0	\$0
		Total Number of Years		0	0
		Subtotal Sampling Costs		\$0	\$0
		Subtotal Maintenance and Monitoring Costs per Irrigator		\$0	\$0
		<b>Total Irrigation Maintenance and Monitoring Costs</b>		<b>\$0</b>	
<b>X.</b>	<b>Capital Costs (Brine RO Purchase)</b>				
		Purchase/Installation Costs for 100 GPM RO		\$200,000	
		<b>Total Capital Costs</b>		<b>\$200,000</b>	
<b>XI.</b>	<b>Vehicle Operation Costs</b>				
		Number of Pickup Trucks/Pulling Units (Gas)		10	
		Annual Cost based on actual lease+assoc cost		\$12.49	



**TABLE 2: GROUNDWATER RESTORATION**

<b>Ground Water Restoration</b>				<b>Wellfield 1</b>	<b>Wellfield 2</b>
	Average Operating Time (Hrs/Year)			281.5	
	Total Number of Years (Average)			6.08	
	<b>Total Vehicle Operation Costs</b>			<b>\$213,769</b>	
<b>XII.</b>	<b>Labor Costs</b>				Avg. Years
	Number of Mine Managers			1	6.08
	\$/Year			169,472	
	subtotal			1,030,390	
	Number of Environmental Managers/RSOs			1	6.08
	\$/Year			\$124,085	
	subtotal			\$754,437	
	Number of Restoration Managers			1	6.08
	\$/Year			\$96,395	
	subtotal			\$586,082	
	Number of Environmental Technicians			1	6.08
	\$/Year			\$52,624	
	subtotal			\$319,954	
	Number of Operators/Laborers/Secretary			9	3.23
	\$/Year			\$57,000	
	subtotal			\$1,656,990	
	Number of Maintenance Technicians			2	3.58
	\$/Year			\$79,802	
	subtotal			\$571,382	
	<b>Total Labor Costs</b>			<b>\$4,919,234</b>	
<b>TOTAL GROUND WATER RESTORATION COSTS</b>				<b>\$8,196,299</b>	

**TABLE 3: EQUIPMENT**

Equipment Removal and Loading					Central Plant
<b>I.</b>	<b>Removal and Loading Costs</b>				
A.	Tankage and Vessels				
		Number of Tanks			149
		Volume of Tank Construction Material (ft <sup>3</sup> )			2,105
	1.	Labor			
		Number of Persons			3
		Ft <sup>3</sup> /Day			100
		Number of Days			21
		\$/Day/Person			\$219
		Subtotal Labor Costs			\$13,797
	2.	Equipment			
		Number of Days			21
		\$/Day			\$448
		Subtotal Equipment Costs			\$9,408
		Subtotal Tankage Removal and Loading Costs			\$23,205
B.	PVC/HDPE Pipe				
		PVC/HDPE Pipe Footage			4,526
		Average PVC Pipe Diameter (inches)			3.4
		Shredded PVC Pipe Volume Reduction (ft <sup>3</sup> /ft)			0.02
		Volume of Shredded PVC Pipe (ft <sup>3</sup> )			90.52
	1.	Labor			
		Number of Persons			2
		Ft <sup>3</sup> /Day			
		Ft/Day			1,000
		Number of Days			5
		\$/Day/Person			\$219
		Subtotal Labor Costs			\$2,190
	2	Equipment			
		Rental Rate for shredder (hourly)			18.03
		Subtotal Equipment Costs			\$721
		Subtotal PVC Pipe Removal and Loading Costs			\$2,911
C.	Pumps				
		Number of Pumps			44
		Average Volume (ft <sup>3</sup> /pump)			4.8

**TABLE 3: EQUIPMENT**

<b>Equipment Removal and Loading</b>					<b>Central Plant</b>
			Volume of Pumps (ft <sup>3</sup> )		211.2
		1. Labor			
			Number of Persons		3
			Pumps/Day		12
			Number of Days		4
			\$/Day/Person		\$219
			Subtotal Labor Costs		\$2,628
			Subtotal Pump Removal and Loading Costs		\$2,628
	D.	Dryer			
			Dryer Volume (ft <sup>3</sup> )		2,066
		1. Labor			
			Number of Persons		3
			Ft <sup>3</sup> /Day		340
			Number of Days		6
			\$/Day/Person		\$219
			Total Labor Cost		\$3,942
			Total Dryer Dismantling and Loading Cost		\$3,942
	E.	RO Units			
			Number of RO Units		
			Current		34
			Planned		2
			Average Volume (ft <sup>3</sup> /RO Unit)		16.2
		1. Labor			
			Number of Persons		3
			Number of Days		2
			\$/Day/Person		\$219
			Subtotal Labor Costs		\$1,314
			Subtotal RO Unit Removal and Loading Costs		\$1,314
			Subtotal Equipment Removal and Loading Costs per Facility		\$34,000
			<b>Total Equipment Removal and Loading Costs</b>		<b>\$34,000</b>
<b>II. Transportation and Disposal Costs (NRC-Licensed Facility)</b>					
	A.	Tankage			
			Volume of Tank Construction Material (ft <sup>3</sup> )		2,105
			Volume for Disposal Assuming 10% Void Space (ft <sup>3</sup> )		2,316

**TABLE 3: EQUIPMENT**

<b>Equipment Removal and Loading</b>					<b>Central Plant</b>
				Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26
				Subtotal Tankage Transportation and Disposal Costs	\$21,446
	B.	PVC Pipe			
				Volume of Shredded PVC Pipe (ft <sup>3</sup> )	90.52
				Volume for Disposal Assuming 10% Void Space (ft <sup>3</sup> )	100
				Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26
				Subtotal PVC Pipe Transportation and Disposal Costs	\$926
	C.	Pumps			
				Volume of Pumps (ft <sup>3</sup> )	211.2
				Volume for Disposal Assuming 10% Void Space (ft <sup>3</sup> )	232
				Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26
				Subtotal Pump Transportation and Disposal Costs	\$2,148
	D.	Dryer			
				Dryer Volume (ft <sup>3</sup> )	2,066
				Volume for Disposal Assuming Dryer Remains Intact (ft <sup>3</sup> )	2,066
				Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26
				Total Dryer Transportation and Disposal Costs	\$19,131
	E.	RO Units			
				Volume of RO Units (ft <sup>3</sup> )	583.2
				Volume for Disposal Assuming 50% Volume Reduction (ft <sup>3</sup> )	291.6
				Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26
				Subtotal RO Unit Transportation and Disposal Costs	\$2,700
				Subtotal Equipment Transportation and Disposal Costs per Facility	\$46,351
				<b>Total Equipment Transportation and Disposal Costs</b>	<b>\$46,351</b>
	<b>III.</b>	<b>Health and Safety Costs</b>			
				Radiation Safety Equipment	\$23,405
				<b>Total Health and Safety Costs</b>	<b>\$23,405</b>
				SUBTOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS PER FACILITY	\$103,756
				<b>TOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS</b>	<b>\$103,756</b>

TABLE 4: BUILDINGS

					Plant/Office	Shop	Pole Barn	Varous Concrete Pads
					1	2	3	
<b>Building Demolition and Disposal</b>								
<b>I. Decontamination Costs</b>								
A. Wall Decontamination								
	Area to be Decontaminated (ft <sup>2</sup> )				12,449	0	0	0
	Wash rate (ft <sup>2</sup> /hr)				480	480	480	480
	Hours of work				26	0	0	0
	Labor rate (\$/hr)				\$27.40	\$27.40	\$27.40	\$27.40
	Manlift rental rate (\$/hr)				20.60	20.60	20.60	20.60
	Cost of labor and equipment				1,244.90	0.00	0.00	0.00
	Application Rate of Acid (Gallons/ft <sup>2</sup> of wall)				0.003	0.003	0.003	0.003
	Total quantity of acid				37.3	0.0	0.0	0.0
	Cost of acid (\$/gal)				\$1.13	\$1.13	\$1.13	\$1.13
	Subtotal cost of acid				\$42.20	\$0.00	\$0.00	\$0.00
	Subtotal Wall Decontamination Costs				\$1,287	\$0	\$0	\$0
B. Concrete Floor Decontamination								
	Area to be Decontaminated (ft <sup>2</sup> )				32,322	-	-	-
	Application Rate (Gallons/ft <sup>2</sup> )				0.003	0.003	0.003	0.003
	HCl Acid Wash, including labor (\$/Gallon)				\$29.03	\$29.03	\$29.03	\$29.03
	Subtotal Concrete Floor Decontamination Costs				\$2,815	\$0	\$0	\$0
C. Deep Well Injection Costs								
	Total Kgals for Injection				44.9	0	0	0
	Deep Well Injection Unit Cost (\$/Kgals)				\$2.48	\$2.48	\$2.48	\$2.48
	Subtotal Deep Well Injection Costs				\$111	\$0	\$0	\$0
	Subtotal Decontamination Costs per Building				\$4,213	\$0	\$0	\$0
	<b>Total Decontamination Costs</b>				<b>\$4,213</b>			
<b>II. Demolition Costs</b>								
A. Building								
	Assumptions:							
	Volume of Building (ft <sup>3</sup> )				1,248,000	111,375	22,400	0
	Demolition Unit Cost per WDEQ Guideline No.12,App.K (\$/ft <sup>3</sup> )				\$0.266	\$0.266	\$0.266	\$0.266
	Subtotal Building Demolition Costs				\$331,968	\$29,626	\$5,958	\$0
B. Concrete Floor								
	Area of Concrete Floor (ft <sup>2</sup> )				41,600	4,725	1,600	12,373
	Demolition Unit Cost per WDEQ Guideline No.12,App.K (\$/ft <sup>2</sup> ), adjusted for thickness				\$1.52	\$0.76	\$0.76	\$1.17
	Subtotal Concrete Floor Demolition Costs				\$63,232	\$3,591	\$1,216	\$14,482
C. Concrete Footing								
	Length of Concrete Footing (ft)				1,870	380	-	371
	Demolition Unit Cost per WDEQ Guide. No.12,App.K (\$/lin. ft), adjusted for increased volume				\$15.67	\$15.67	\$15.67	68.2
	Subtotal Concrete Footing Demolition Costs				\$29,303	\$5,955	\$0	\$25,268
	Subtotal Demolition Costs per Building				\$424,503	\$39,172	\$7,174	\$39,750
	<b>Total Demolition Costs</b>				<b>\$510,599</b>			
<b>III. Disposal Costs</b>								
A. Building								
	Volume of Demolished Building (cy) Based on FEMA Estimates				15,253	1,361	274	-
1. Off-Site								
	Assumptions:							
	Off-site disposal cost of \$13.80/cy							
	Percentage (%)				100	100	100	100
	Volume for Disposal (cubic yards)				15,253	1,361	274	-
	Transport and Disposal Unit Cost (\$/cy)				\$14.40	\$14.40	\$14.40	\$14.40
	Subtotal Off-Site Disposal Costs				\$219,648	\$19,602	\$3,942	\$0
2. NRC-Licensed Facility								
	Percentage (%)				0	0	0	0
	Volume for Disposal (ft <sup>3</sup> )				0	0	0	0

**TABLE 4: BUILDINGS**

					Plant/Office	Shop	Pole Barn	Varous Concrete Pads
<b>Building Demolition and Disposal</b>					<b>1</b>	<b>2</b>	<b>3</b>	
		Volume for Disposal Assuming 10% Void Space (ft <sup>3</sup> )			0	0	0	0
		Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )			\$9.26	\$9.26	\$9.26	\$9.26
		Subtotal NRC-Licensed Facility Disposal Costs			\$0	\$0	\$0	\$0
		Subtotal Building Disposal Costs			\$219,648	\$19,602	\$3,942	\$0
	<b>B.</b>	<b>Concrete Floor</b>						
		Area of Concrete Floor (ft <sup>2</sup> )			41,600	4,725	1,600	12,373
		Average Thickness of Concrete Floor (ft)			1	0.375	0.5	0.77
		Volume of Concrete Floor (ft <sup>3</sup> )			41,600.0	1,771.9	800.0	9,575.9
		Volume of Concrete Floor (cy)			1,541	66	30	355
	<b>1.</b>	<b>Off-Site</b>						
		Percentage (%)			64	100	100	100
		Volume for Disposal (cy)			986	66	30	355
		Disposal Unit Cost per Rawlins Landfill 2016 quote, assuming 25% porosity of rubble and 150#/ft <sup>3</sup> density of concrete			\$68.35	\$68.35	\$68.35	\$68.35
		Transportation cost (cy)(10cy/load)			\$28.80	\$28.80	\$28.80	\$28.80
		Subtotal Off-Site Transport & Disposal Costs			\$95,797	\$6,375	\$2,879	\$34,456
	<b>2.</b>	<b>NRC-Licensed Facility</b>						
		Assumptions:						
		Additional \$0/ft <sup>3</sup> for segregation of concrete						
		Percentage (%)			36	0	0	0
		Volume for Disposal (ft <sup>3</sup> )			14,976	-	-	-
		Segregation and Loading Unit Cost (\$/ft <sup>3</sup> )			\$0.62	\$0.62	\$0.62	\$0.62
		Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )			\$9.26	\$9.26	\$9.26	\$9.26
		Subtotal NRC-Licensed Facility Disposal Costs			\$147,996	\$0	\$0	\$0
		Subtotal Concrete Floor Disposal Costs			\$243,793	\$6,375	\$2,879	\$34,456
	<b>C.</b>	<b>Concrete Footing</b>						
		Length of Concrete Footing (ft)			1870	380	0	370.5
		Average Depth of Concrete Footing (ft)			1.93	2.25	0	0
		Average Width of Concrete Footing (ft)			1.93	2.25	0	0
		Volume of Concrete Footing (ft <sup>3</sup> )			6,966	1,924	0	0
		Volume of Concrete Footing (cy)			258	71	0	0
		Disposal Unit Cost per Rawlins Landfill 2016 quote assuming 25% porosity of rubble and 150#/ft <sup>3</sup> density of concrete			\$68.35	\$68.35	\$68.35	\$68.35
		Transportation Cost			\$28.80	\$28.80	\$28.80	\$28.80
		Subtotal Concrete Footing Transport & Disposal Costs			\$25,063	\$6,922	\$0	\$0
		Subtotal Disposal Costs per Building			\$488,504	\$32,899	\$6,821	\$34,456
		<b>Total Disposal Costs</b>			<b>\$562,680</b>			
	<b>III.</b>	<b>Health and Safety Costs</b>						
		Radiation Safety Equipment			\$0	\$0	\$0	\$0
		<b>Total Health and Safety Costs</b>			<b>\$0</b>			
		<b>SUBTOTAL BUILDING DEMOLITION AND DISPOSAL COSTS</b>			<b>\$917,220</b>	<b>\$72,071</b>	<b>\$13,995</b>	<b>\$74,206</b>
		<b>TOTAL BUILDING DEMOLITION AND DISPOSAL COSTS</b>			<b>\$1,077,492</b>			

**TABLE 5: WELLFIELD BUILDINGS**

<b>Wellfield Buildings and Equipment Removal and Disposal</b>		<b>Wellfield 1</b>	<b>Wellfield 2 (Contaminated)</b>	<b>Wellfield 2 (Noncontaminated)</b>
<b>I. Wellfield Piping</b>				
Assumptions:				
	Number of Header Houses per Wellfield	13	4	1
	Length of Piping per Header House (ft)	21,887	24,231	24,231
	Total Length of Piping (ft)	284,531	96,924	24,231
<b>A. Removal and Loading</b>				
	Wellfield Piping Removal Unit Cost (\$/ft of pipe)	\$0.32	\$0.32	\$0.32
	Subtotal Wellfield Piping Removal and Loading Costs	\$91,050	\$31,016	\$7,754
<b>B. Transport &amp; Disposal Costs (NRC or Public Landfill)</b>				
	Average Diameter of Piping (inches)	1.6	1.6	1.6
	Chipped Volume Reduction (ft <sup>3</sup> /ft)	0.008	0.008	0.008
	Chipped Volume per Wellfield (ft <sup>3</sup> )	2276.248	775.392	193.848
	Volume for Disposal Assuming 10% Void Space (ft <sup>3</sup> )	2504	853	213
	Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26	\$9.26	\$0.81
	Subtotal Wellfield Piping Transport and Disposal Costs	\$23,187	\$7,899	\$173
<b>C. Chipping Cost</b>				
	Chip rate ft/hr	500	500	500
	Rental rate of chipper \$/hr	17.68	17.68	17.68
	Subtotal cost of chipping	\$10,058.17	\$3,426.26	\$856.57
	Wellfield Piping Costs per Wellfield	\$124,295	\$42,341	\$8,783
	<b>Total Wellfield Piping Costs</b>	<b>\$175,420</b>		
<b>II. Well Pumps and Tubing</b>				
Assumptions:				
Pump and tubing removal costs included under ground water restoration labor costs				
100% of contaminated prod/in wells contain pumps and/or tubing				
<b>A. Pump and Tubing Transportation and Disposal</b>				
	Number of Production Wells	317	108	81
	Number of Injection Wells	597	200	150
	Number of Monitor Wells (noncontaminated)	57	0	99
<b>1. Pump Volume</b>				
	Number of Wells with Pumps	355	108	27
	Average Pump Volume (ft <sup>3</sup> )	0.42	0.42	0.42
	Pump Volume per Wellfield (ft <sup>3</sup> )	149.1	45.36	11.34
<b>2. Tubing Volume</b>				
Assumptions:				
Average tubing length/wellfield based on average well depth minus 25 ft				
	Manpower Hourly Rate	27.4	27.4	27.4
	Number of Production Wells with Tubing	355	108	27
	Number of Injection Wells with Tubing	358	200	150
	Average Tubing Length per Well (ft)	420	416	416
	Tubing Length per Wellfield (ft)	299,460	128,128	73,632
	Man Hours Required to pull injection stinger	0.5	0.5	0.5
	Man Hours Required to pull production string/pump	1.5	1.5	1.5
	Diameter of Production Well HDPE Tubing (inches)	2.375	2.375	2.375
	Diameter of Injection Well HDPE Tubing (inches)	1.315	1.315	1.315

**TABLE 5: WELLFIELD BUILDINGS**

<b>Wellfield Buildings and Equipment Removal and Disposal</b>		<b>Wellfield 1</b>	<b>Wellfield 2 (Contaminated)</b>	<b>Wellfield 2 (Noncontaminated)</b>
	Chipped Volume Reduction for 2.375" OD (ft <sup>3</sup> /ft)	0.01	0.01	0.01
	Chipped Volume Reduction for 1.315" OD (ft <sup>3</sup> /ft)	0.003	0.003	0.003
	Chipped Volume per Wellfield (ft <sup>3</sup> )	1,942	699	300
	Cost for Rental of Chipper	\$17.68	\$17.68	\$17.68
	Cost of Pulling Injection Stingers	\$4,904.60	\$2,740.00	\$2,055.00
	Cost of Pulling Production Pumps	\$14,590.50	\$4,438.80	\$1,109.70
	Cost for Chipping Pipe (rental of chipper and manpower)	\$26,996	\$11,551	\$6,638
	Volume of Pump and Tubing (ft)	2,091	744	311
	Volume for Disposal Assuming 20% Void Space (ft)	2509	893	373
	Transportation and Disposal Unit Cost (\$/ft)	\$9.26	\$9.26	\$0.72
	Subtotal Pump and Tubing Removal, Chipping, Transport and Disposal C	\$69,724	\$26,999	\$10,072
	Pump and Tubing Costs per Wellfield	\$69,724	\$26,999	\$10,072
	<b>Total Pump and Tubing Costs</b>	<b>\$106,795</b>		
<b>III.</b>	<b>Buried Trunkline</b>			
	Length of Trunkline Trench (ft)	9,840	2,172	-
A.	Removal and Loading			
	Main Pipeline Removal Unit Cost (\$/ft of trench)	\$2.71	\$2.71	\$2.71
	Subtotal Trunkline Removal and Loading Costs	\$26,666	\$5,886	\$0
B.	Transport and Disposal Costs (NRC-Licensed Facility)			
1.	6" HDPE Trunkline			
	Piping Length (ft)	1,374	1,738	-
	Chipped Volume Reduction (ft <sup>3</sup> /ft)	0.066	0.066	0.066
	Chipped Volume (ft <sup>3</sup> )	91	115	-
2.	8" HDPE Trunkline			
	Piping Length (ft)	92	1,004	3,960
	Chipped Volume Reduction (ft <sup>3</sup> /ft)	0.111	0.111	0.111
	Chipped Volume (ft <sup>3</sup> )	10	111	440
3.	10" HDPE Trunkline			
	Piping Length (ft)	-	-	-
	Chipped Volume Reduction (ft <sup>3</sup> /ft)	0.173	0.173	0.173
	Chipped Volume (ft <sup>3</sup> )	-	-	-
4.	12" HDPE Trunkline			
	Piping Length (ft)	2,145	726	-
	Chipped Volume Reduction (ft <sup>3</sup> /ft)	0.243	0.243	0.243
	Chipped Volume (ft <sup>3</sup> )	521	176	-
5.	20" HDPE Trunkline			
	Piping Length (ft)	16,068	3,960	-
	Chipped Volume Reduction (ft <sup>3</sup> /ft)	0.598	0.598	0.598
	Chipped Volume (ft <sup>3</sup> )	9,609	2,368	-
	Total Trunkline Chipped Volume (ft <sup>3</sup> )	10,231	2,771	440
	Volume for Disposal Assuming 10% Void Space (ft)	11254	3048	484
	Transportation and Disposal Unit Cost (\$/ft)	\$9.26	\$9.26	\$0.72
	Subtotal Trunkline Transport and Disposal Costs	\$104,212	\$28,224	\$348
	Trunkline Decommissioning Costs	\$130,878	\$34,110	\$348
	<b>Total Trunkline Decommissioning Costs</b>	<b>\$165,336</b>		



TABLE 5: WELLFIELD BUILDINGS

Wellfield Buildings and Equipment Removal and Disposal	Wellfield 1	Wellfield 2 (Contaminated)	Wellfield 2 (Noncontaminated)
<b>IV. Wellhead Covers</b>			
Total Quantity	914	308	45
Average Well Cover Volume (ft <sup>3</sup> )	12.7	12.7	12.7
A. Removal			
Total Volume (ft <sup>3</sup> )	11607.8	3911.6	571.5
Demolition Unit Cost per WDEQ Guideline No.12,App.K (\$/ft <sup>3</sup> )	\$0.290	\$0.290	\$0.290
Subtotal Well House Demolition Costs	\$3,365	\$1,134	\$166
B. Survey and Decontamination			
Assumptions:			
Cost per Well House	\$0	\$0	\$0
Subtotal Survey and Decontamination Costs	\$0	\$0	\$0
C. Disposal			
Total Volume (cy)	430	145	21
Volume for Disposal Assuming 10% Void Space (cy)	43	14	2
Disposal Unit Cost per 11e2 or Guideline No.12,App.K (\$/cy)	\$249.98	\$249.98	\$19.31
Subtotal 11e2 Disposal Costs	\$10,749	\$3,500	\$39
Well House Removal and Disposal Costs per Wellfield	\$14,114	\$4,634	\$205
<b>Total Well House Removal and Disposal Costs</b>	<b>\$18,953</b>		
<b>VI. Header Houses</b>			
Total Quantity	13	4	1
Average Header House Volume (ft <sup>3</sup> )	1,338	1,332	1,332
A. Removal			
Total Volume (ft <sup>3</sup> )	17,394	5,328	1,332
Demolition Unit Cost per WDEQ Guideline No.12,App.K (\$/ft <sup>3</sup> )	\$0.290	\$0.290	\$0.290
Subtotal Building Demolition Costs	\$5,042	\$1,544	\$386
B. Survey and Decontamination			
Assumptions:			
Cost per Header House	\$0	\$0	\$0
Subtotal Survey and Decontamination Costs	\$0	\$0	\$0
C. Disposal			
Total Volume (cy)	644	197	49
Volume for Disposal Assuming 10% Void Space (cy)	580	178	44
Transp & Dispos. Cost per 11e2 contract & Rawlins Landfill (\$/cy)	\$249.98	\$249.98	\$14.40
Subtotal Off-Site Transport and Disposal Costs	\$144,988	\$44,496	\$634
Header House Removal and Disposal Costs per Wellfield	\$150,030	\$46,040	\$1,020
<b>Total Header House Removal and Disposal Costs</b>	<b>\$197,090</b>		
<b>TOTAL REMOVAL AND DISPOSAL COSTS PER WELLFIELD</b>	<b>\$489,042</b>	<b>\$154,123</b>	<b>\$20,428</b>
<b>TOTAL WELLFIELD BUILDINGS AND EQUIPMENT REMOVAL AND DISPOSAL COSTS</b>	<b>\$663,593</b>		

**TABLE 6: WELL ABANDONMENT**

Well Abandonment				Wellfield 1	Wellfield 2	Regional Monitor, Supply & Class V	
<b>I. Well Abandonment (Wellfields)</b>							
		# of Production Wells		317	108	50	
		# of Injection Wells		597	234		
		# of Monitoring Wells		57	99		
		#of Restoration Wells		0	0		
		Total Number of Wells		971	441	50	
		Average Diameter of Casing (inches)		4.33	4.33	4.33	
		Average Depth (ft)		454	450	599.4	
		Well Abandonment Unit Cost (\$/well)		\$591	\$588	\$719	
		Subtotal Abandonment Cost per Wellfield		\$574,207	\$259,245	\$35,928	
		<b>Total Wellfield Abandonment Costs</b>		<b>\$869,380</b>			
<b>II. Waste Disposal Well Abandonment</b>				<b>DDW 1</b>	<b>DDW 2</b>	<b>DDW 3</b>	<b>DDW 4</b>
	A.	Well Plugging					
		Grout Unit (\$/hr)					
		Number of Hours					
		Drill Rig Operating Costs		\$0	\$0	\$0	\$0
		Cementing Costs					
		Equipment Transport Costs					
		Well Cap Welding Costs					
		Brine Makeup and Injection Costs					
		Subtotal Well Plugging Costs per Well		\$109,800	\$109,800	\$109,800	
	B.	Pump Dismantling and Decontamination					
		Number of Persons		2	2	2	0
		Number of Pumps		1	1	1	0
		Pumps/Day		1	1	1	0
		Number of Days		1	1	1	
		\$/Day/Person		\$219	\$219	\$219	\$219
		Subtotal Dismantling and Decon Costs per Well		\$438	\$438	\$438	\$0
	C.	Tubing String Disposal (NRC-Licensed Facility)					
		Length of Tubing String (ft)		5,946	5,973	6,201	5980
		Diameter of Tubing String (inches)		2.875	2.875	2.875	2.875
		Volume of Tubing String (ft <sup>3</sup> )		268	269	279	269
		Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )		\$9.26	\$9.26	\$9.26	\$9.26

**TABLE 6: WELL ABANDONMENT**

<b>Well Abandonment</b>				<b>Wellfield 1</b>	<b>Wellfield 2</b>	<b>Regional Monitor, Supply &amp; Class V</b>	
		Subtotal Tubing String Disposal Costs per Well		\$2,481	\$2,492	\$2,587	\$2,495
		Subtotal Waste Disposal Well Abandonment Costs per Well		\$112,719	\$112,730	\$112,825	\$2,495
		<b>Total Waste Disposal Well Abandonment Costs</b>		<b>\$340,769</b>			
		<b>TOTAL WELL ABANDONMENT COSTS</b>		<b>\$1,210,149</b>			
Waste disposal well abandonment cost is based on a 2013 estimate from a third party contractor escalated to 2015 prices							

**TABLE 7: WELLFIELD RECLAMATION**

Wellfield and Satellite Surface Reclamation				Wellfield 1	Wellfield 2	Wellfield 3
<b>I.</b>	<b>Wellfield Pattern Area Reclamation</b>					
	Pattern Area (acres)			45.5	25	0
	Disking/Seeding Unit Cost (\$/acre)			\$329	\$329	\$329
	Subtotal Pattern Area Reclamation Costs per Wellfield			\$14,985	\$8,233	\$0
	<b>Total Wellfield Pattern Area Reclamation Costs</b>			<b>\$23,218</b>		
<b>II.</b>	<b>Wellfield Road Reclamation</b>					
A.	Road Construction					
	Length of Wellfield Roads (1000 ft)			7.95	11.20	0
	Wellfield Road Reclamation Unit Cost (\$/1000 ft)			\$1,111	\$1,111	\$1,111
	Subtotal Road Reclamation Costs per Wellfield			\$8,831	\$12,442	\$0
	<b>Total Wellfield Road Reclamation Costs</b>			<b>\$21,273</b>		
SUBTOTAL SURFACE RECLAMATION COSTS PER WELLFIELD				\$23,816	\$20,675	\$0
<b>TOTAL WELLFIELD SURFACE RECLAMATION COSTS</b>				<b>\$44,491</b>		
<b>III.</b>	<b>Satellite Area Reclamation</b>			<b>Satellite 1</b>	<b>Satellite 2</b>	<b>Satellite 3</b>
	<b>Assumptions:</b>					
	Area of Disturbance (acres)			0	0	0
	Average Depth of Stripped Topsoil (ft)			0	0	0
	Surface Grade: Level Ground					
	Average Length of Topsoil Haul (ft)			0	0	0
A.	Ripping Overburden with Dozer					
	Ripping Unit Cost per WDEQ Guideline No.12, App.I1 (\$/acre)			\$0.00	\$0.00	\$0.00
	Subtotal Ripping Costs			\$0	\$0	\$0
B.	Topsoil Application with Scraper					
	Volume of Topsoil Removed (cy)			0	0	0
	Application Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)			\$0.00	\$0.00	\$0.00
	Subtotal Topsoil Application Costs			\$0	\$0	\$0
C.	Discing and Seeding					
	Discing/Seeding Unit Cost (\$/acre)			\$329	\$329	\$329
	Subtotal Discing/Seeding Costs			\$0	\$0	\$0
	Subtotal Surface Reclamation Costs per Satellite			\$0	\$0	\$0
	<b>Total Satellite Building Area Reclamation Costs</b>			<b>\$0</b>		
<b>TOTAL WELLFIELD AND SATELLITE SURFACE RECLAMATION COSTS</b>				<b>\$44,491</b>		

TABLE 8: MISC RECLAMATION

Miscellaneous Reclamation			
<b>I.</b>	<b>Central Plant/Office Area + Deep Well Pad Reclamation</b>		
	Assumptions		
	Concrete, asphalt, and building material used to backfill low areas		
A.	Ripping and Hauling Asphalt		
	Assumptions		
	Average haul distance (ft)	0	
	Surface grade (%)	0%	
	Average Thickness of Asphalt (ft)	0	
	Surface Area (acres)	0	
	Ripping Unit Cost per WDEQ Guideline No.12, App.I (\$/acre)	\$0.00	
	Volume of Asphalt (cy)	0	
	Hauling Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)	\$0.00	
	Total Asphalt Ripping and Hauling Cost	\$0	
B.	Borrow Cover		
1.	Topsoil Removal/Replacement		
	Assumptions		
	Surface area of borrow area (acres)	15.85	
	18 inches of topsoil removed and replaced at borrow area		
	Volume of topsoil (cy)	3,985	
	Topsoil Removal/Replacement Unit Cost (\$/cy)	\$0.43	
	Total Topsoil Removal/Replacement Cost	\$1,726	
2.	Borrow Application		
	Assumptions		
	Final borrow cover depth will range from 0 to 4 ft, average = 1 ft		
	Average haul distance = 1000 ft		
	Surface grade (%)	0%	
	Borrow Volume (cy)	0	
	Borrow Cover Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)	\$0.43	
	Total Borrow Application Cost	\$0	
	Total Borrow Cover Cost	\$1,726	
C.	Discing/Seeding		
	Assumptions		
	Includes discing/seeding of borrow area (3 acres)		
	Surface Area (acres)	15.85	
	Discing/Seeding Unit Cost (\$/acre)	\$329	
	Subtotal Discing/Seeding	\$5,219.88	
D.	Ripping for Soil Prep		
	Surface Area (acres)	15.9	
	Ripping Unit Cost (\$/Acre)	171.7	
	Ripping Subtotal	2,721.4	
	<b>Total CPF/Office Area Reclamation</b>	<b>\$9,667</b>	

TABLE 8: MISC RECLAMATION

Miscellaneous Reclamation										
				Main E-W Access Rd	Plant Rd. (including emergency access rd)	Secondary Rd from Main Rd. to drill shop and MU1 plus MU1 access Rd from Main Rd	Deep Well #1	Deep Well #3	Deep Well #4	Deep Well #2
<b>II. Access Road Reclamation</b>										
A. Assumptions										
Surface grade				0%	0%	0%	0%	0%	0%	0%
Length of road (miles)				9.25	0.43	0.31	0.3	0.19	0.06	0.19
Average road width (ft)				20	20	14	14	14	14	14
B. Ripping and Hauling Asphalt										
Assumptions										
Average haul distance (miles)				0	0	0	0	0	0	0
Average Thickness of Asphalt (ft)				0	0	0	0	0	0	0
Asphalt Surface Area (acres)				0.0	0.0	0.0	0.0	0.0	0.0	0
Ripping Unit Cost per WDEQ Guideline No.12, App.I (\$/acre)				\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Volume of Asphalt (cy)				0	0	0	0	0	0	0
Hauling Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)				\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Subtotal Asphalt Ripping and Hauling Costs				\$0	\$0	\$0	\$0	\$0	\$0	\$0
B. Gravel Road Base Removal										
Assumptions										
Average haul distance (ft)				150	150	150	150	150	150	150
Gravel Road Base Width (ft)				20	20	14	14	14	14	14
Gravel Road Base Area (acres)				22.4	1.0	0.5	0.5	0.3	0.1	0.3
Average Road Base Depth (ft)				0.25	0.25	0.25	0.25	0.25	0.25	0.25
Volume of Road Base (cy)				9044	420	212	205	130	41	130
Removal Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)				\$0.72	\$0.72	\$0.72	\$0.72	\$0.72	\$0.72	\$0.72
Subtotal Gravel Road Base Removal Costs				\$6,521	\$303	\$153	\$148	\$94	\$30	\$94
C. Ripping Overburden with Dozer										
Overburden Surface Area (acres)				21.8	1.0	0.3	0.5	0.3	0.1	0.3
Ripping Unit Cost per WDEQ Guideline No.12, App.II (\$/acre)				\$837.00	\$837.00	\$837.00	\$837.00	\$837.00	\$837.00	\$837.00
Subtotal Ripping Overburden Costs				\$18,247	\$837	\$251	\$427	\$268	\$84	\$251
D. Topsoil Application										
Assumptions										
Average haul distance (ft)				1357	500	213	750	250	100	250
Topsoil Surface Area (ft <sup>2</sup> )				949,608	45,408	11,900	22400	14000	4200	14000
Depth of Topsoil (ft)				1.284	1.86	1.5	1.5	1.5	1.5	1.5
Volume of Topsoil (cy)				45159	3128	661	1244	778	233	778
Topsoil Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)				\$0.72	\$0.72	\$0.72	\$0.72	\$0.72	\$0.72	\$0.72
Subtotal Topsoil Application Costs				\$32,560	\$2,255	\$477	\$897	\$561	\$168	\$561
E. Discing/Seeding										
Assumptions										
Surface Area (acres)				22.4	1.0	0.5	0.5	0.3	0.1	0.3
Discing/Seeding Unit Cost (\$/acre)				\$329	\$329	\$329	\$329	\$329	\$329	\$329
Subtotal Discing/Seeding Costs				\$7,385	\$343	\$173	\$168	\$106	\$34	\$106
Subtotal Reclamation Costs per Access Road				\$64,713	\$3,738	\$1,054	\$1,640	\$1,029	\$316	\$1,012
<b>Total Access Road Reclamation Costs</b>				<b>\$73,502</b>						

TABLE 8: MISC RECLAMATION

Miscellaneous Reclamation					
III. Wastewater Pipeline Reclamation					
	Deep Well #1	Deep Well #3	Deep Well #4	Class V	Deep Well #2
A. Pipeline Removal and Loading					
Length of HDPE Pipe Trench (ft)	18,025	589	400	800	6340
Main Pipeline Removal Unit Cost (\$/ft of trench)	\$2.71	\$2.71	\$2.71	\$2.71	\$2.71
Subtotal Pipeline Removal Costs	\$48,848	\$1,596	\$1,084	\$2,168	\$17,181
B. Pipeline Transportation and Disposal (NRC-Licensed Facility)					
Pipe Diameter (inches)	3.9	2	2	3.9	\$2
Chipped Volume Reduction (ft <sup>3</sup> /ft)	0.189	0.13	0.13	0.189	0.13
Subtotal Volume of Shredded PVC Pipe (ft <sup>3</sup> )	3406.725	76.57	52	151.2	824.2
Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26	\$9.26	\$9.26	\$9.26	\$9.26
Subtotal Pipeline Disposal Costs	\$31,546	\$709	\$482	\$1,400	\$7,632
C. Discing/Seeding					
Assumptions:					
Width of Pipeline Trench (ft)	6	6	6	0	6
Area of Pipeline Trench (acres)	2.5	0.1	0.1	0.0	0.9
Discing/Seeding Unit Cost (\$/acre)	\$329	\$329	\$329	\$329	\$329
Subtotal Discing/Seeding Costs	\$818	\$27	\$18	\$0	\$288
Subtotal Reclamation Costs per Pipeline	\$81,212	\$2,332	\$1,584	\$3,568	\$25,101
<b>Total Wastewater Pipeline Reclamation Costs</b>	<b>\$113,797</b>				
IV. Holding Pond Reclamation					
	N Pond	S Pond			
A. Soil Sampling and Monitoring					
Number of Soil Samples	5	5			
\$/Sample	\$91	\$91			
Subtotal Soil Sampling and Monitoring Costs	\$455	\$455			
B. Liner/Subsoil Removal and Disposal					
Assumptions:					
Sand liner and subsoil constitute by-product material					
Thickness of sand liner (ft)	1.021	1.021			
Thickness of contaminated subsoil (ft)	0	0			
Removal and Loading Unit Cost based on engineer's design report and Cat Performance Handbook					
Width of Pond (ft)	119.3	119			
Length of Pond (ft)	224	223			
Surface area of pond (ft <sup>2</sup> )	26,723	26,537			
1. Removal and Loading					
Volume of Sand Liner (cy)	1011	1003			
Sand Liner Removal and Loading Unit Cost (\$/cy)	4.32	4.32			
Subtotal Liner Removal and Loading Costs	\$4,368	\$4,338			
2. Transportation and Disposal					
Volume of Sand Liner (ft <sup>3</sup> )	27,284	27,094			
Transportation and Disposal Unit Cost (\$/ft <sup>3</sup> )	\$9.26	\$9.26			
Subtotal Liner Transportation and Disposal Costs	\$252,653	\$250,893			
Subtotal Liner Removal and Disposal Costs	\$257,021	\$255,231			
C. Topsoil Application (see plant calc above)					
Assumptions:					
Area of surface disturbance (ft <sup>2</sup> )	0	0			
Average thickness of topsoil (ft)	0	0			
Average haul distance (ft)	0	0			
Surface grade (%)	0%	0%			
Volume of Topsoil (cy)	0	0			
Topsoil Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)	\$0.00	\$0.00			
Subtotal Topsoil Application Costs	\$0	\$0			

TABLE 8: MISC RECLAMATION

<b>Miscellaneous Reclamation</b>				
D. Discing/Seeding				
Assumptions:				
Area of surface disturbance (acres)	0	0		
Discing/Seeding Unit Cost (\$/acre)	\$329	\$329		
Subtotal Discing/Seeding Costs	\$0	\$0		
E. Cost to Dispose of Water in Ponds				
Volume of water in ponds (gallons)	304,763	268,758		
Cost of disposal in Class I Wells per 1,000 gallons	\$2.48	\$2.48		
Subtotal cost of pond water disposal	\$755.77	\$666.48		
Subtotal Reclamation Costs per Pond	\$258,232	\$256,352		
<b>Total Holding Pond Reclamation Costs</b>	<b>\$514,584</b>			
<b>V. Reservoir Reclamation</b>	<b>Reservoir 1</b>	<b>Reservoir 2</b>		
A. Soil Sampling and Analysis Costs	\$0	\$0		
B. Leachate Collection System Removal Costs	\$0	\$0		
C. Topsoil/Subsoil Application				
Assumptions:				
Average haul distance (ft)	0	0		
Surface grade (%)	0%	0%		
Volume of Topsoil/Subsoil (cy)	0	0		
Topsoil/Subsoil Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)	\$0.00	\$0.00		
Topsoil/Subsoil Unit Cost per WDEQ Guideline No.12, App.E (\$/cy)	\$0.000	0		
Subtotal Topsoil/Subsoil Application Costs per Reservoir	\$0	\$0		
D. Discing/Seeding				
Surface Area (acres)	0	0		
Discing/Seeding Unit Cost (\$/acre)	\$329	\$329		
Subtotal Discing/Seeding Costs	\$0	\$0		
Subtotal Reclamation Costs per Reservoir	\$0	\$0		
<b>Total Purge Storage Reservoir Reclamation Costs</b>	<b>\$0</b>			
<b>VI. Exploration Hole Surface Reclamation</b>				
A. Number of Historic Holes (Year 2005-Sept 2015)	849			
Number of plug holes planned for this year	0			
Cost for surface reclamation/hole	\$60.00			
Subtotal Reclamation Costs per Irrigation Area	\$50,940			
<b>Total Exploration Hole Surface Reclamation Costs</b>	<b>\$50,940</b>			
<b>VII. Culvert Removal</b>				
Feet of culvert to remove	375			
Cost per foot (\$/ft per G.L. 12 App J)	\$4.94			
	\$1,853			
<b>VIII. Fence Removal (facility wide)</b>				
Feet of fence to remove	33,357			
Cost to remove (\$/ft G.L. 12 App H)	\$0.39			
	\$13,009			
<b>IX. Cost to Remove, Transport, and Dispose of Contaminated Soil</b>				
Volume of Soil to Remove (yd3)	33.6			
Cost to Remove Soil (\$/yd3)	\$3.35			
Cost to Transport and Dispose of Soil (\$/yd3)	\$250			
	\$8,512			
<b>TOTAL MISCELLANEOUS RECLAMATION COSTS</b>	<b>\$785,864</b>			



**TABLE 9: RADIUM TREATMENT**

<b>RADIUM TREATMENT</b>			
<b>Assumptions:</b>			
1.	Based on actual operating costs		
<b>Radium Treatment Costs per 1000 Gallons</b>			
	Resin Replacement	= \$	0.34
	Chemical (Caustic)	= \$	0.009
	Filtration	= \$	0
	Electricity	= \$	0
	By Product Disposal of Sludge	= \$	0
<b>TOTAL RADIUM TREATMENT COSTS PER 1000 GALLONS</b>		<b>= \$</b>	<b>0.35</b>



**TABLE 11: REVERSE OSMOSIS**

<b>REVERSE OSMOSIS (RO)</b>					
<b>Assumptions:</b>					
1	Cost of electricity = \$0.07/kwh				
2	90% permeate/10% reject split				
3	Membrane life of 4 years with a cost of \$__x__ per membrane element				
4	Includes cost of pumping from wellfield to RO Unit				
5	The water is pumped through the RO and returned to the wellfield with a 150 hp pump at actual cost of				
	\$0.17 /1000 gallons				
6	Process sampling and analysis costs estimated at \$0.177/1000 gallons				
7	Labor costs are not included				
<b>Reverse Osmosis Costs per 1000 Gallons</b>					
	Electricity				= \$ 0.17
	Chemicals				= \$ 0.0824
	Membrane Replacement				= \$ 0
	Repair and Maintenance				= \$ 0.0721
	Pumping from Wellfield				= \$ 0.218
	Pumping to Wellfield				= \$ 0
	Radium Treatment				
	\$ 0.35	X	0.20		= \$ 0.0698
	Pumping to Irrigator				
	\$ 0	X	0.2		= \$ 0.000
	Process Sampling and Analysis				= \$ 0.177
<b>TOTAL RO COSTS PER 1000 GALLONS</b>					<b>= \$ 0.79</b>





**TABLE 14: DEEP WELL INJECTION**

<b>DEEP WELL INJECTION</b>										
<b>Assumptions:</b>										
1.	Pump 90 hp pumping at 20 gpm									
2.	Cost of electricity = \$0.072/kwh									
3.	Repair and maintenance costs based on 1,000 gallons of flow									
4.	Repair and maintenance costs estimated at \$0.15/1000 gallons									
5.	Chemical costs based on 1,000 gallons of injection \$0.27									
6.	Labor costs are not included									
<b>Waste Disposal Pumping Costs per 1000 Gallons</b>										
	1000 gal	X	$\frac{90 \text{ hp}}{39 \text{ gpm}}$	X	$\frac{1 \text{ hr}}{60 \text{ min}}$	X	$\frac{0.746 \text{ kwh}}{\text{hp}}$	X	$\frac{\$ 0.07}{\text{kwh}}$	= \$ 2.07
<b>Repair and Maintenance Costs per 1000 Gallons</b>										
									= \$ 0.15	
<b>Chemical Costs per 1000 Gallons</b>										
									= \$ 0.27	
	Scale Inhibitor			= \$	0.27					
	Corrosion Inhibitor			= \$	0.00					
	Oxygen Scavenger			= \$	0.00					
<b>TOTAL DEEP WELL INJECTION COSTS PER 1000 GALLONS</b>										
									= \$ 2.48	

**TABLE 15: WELL ABONDONMENT**

<b>WELL ABONDONMENT</b>										
<b>Assumptions:</b>										
1.	Use backhoe for 1.5 hr/well to dig and reclaim pit at cost of \$30.21/hr.									
2.	Use hose reel/tow vehicle for 0.75 hr/well to pull hoses and pump abandonment fluid at cost of \$37.99/hr.									
3.	Use cementer/tow vehicle for 1 hr/well to pump plug gel at cost of \$37.99/hr.									
4.	Labor for backhoe, hose reel, cementer will require 1 workers at 3.25 hr/well at cost of \$27.40/hr.									
5.	Materials include one hole plug at \$3.01 and 9 sack of high solids bentonite grout/100 ft of 4.33 inch well casing.									
	Cost of high solids bentonite grout is \$9.72/sack.									
<b>Well Abandonment Costs</b>										
<u>Fixed Costs</u>										
Backhoe										
	1.5	hours	X	\$ 30.21	per hour	=	\$ 45.32			
Hose Reel/Tow Vehicle										
	0.75	hours	X	\$ 24.99	per hour	=	\$ 18.74			
Cementer/Tow Vehicle										
	1	hours	X	\$ 37.99	per hour	=	\$ 37.99			
Labor										
	3.25	man	X	\$ 27.40	per man	=	\$ 89.05			
		hours			hour					
Materials										
	1	hole	X	\$ 3.10	per hole	=	\$ 3.10			
		plug			plug					
	Total Fixed Costs						=	\$ 194.20		
<u>Variable Costs</u> (per 100 ft of well depth)										
Materials										
	9	sack	X	\$ 9.72	per	=	\$ 87.48			
		plug gel			sack					
		per 100 feet								
<b>Cost per Well per Unit of Average Depth</b>										
	<b>Well Depth (ft)</b>									
				450		=	\$ 588			
				500		=	\$ 632			
				550		=	\$ 675			
				600		=	\$ 719			
				650		=	\$ 763			

**TABLE 16: MIT**

<b>FIVE YEAR MECHANICAL INTEGRITY TESTS (MIT)</b>									
<b>Assumptions:</b>									
1. Based on actual operating costs									
2. Use Hose Reel for 0.75 hr/well at cost of \$12.50/hr									
3. Use MIT Unit for 2 hr/well at cost of \$28.50/hr *1.04 Inf.									
4. Labor for operation of pulling unit will require 2 workers at \$27.40/hr									
5. Labor for operation of MIT Unit will require 1 worker at \$27.40/hr									
<b>MIT Costs per Well</b>									
<b>Equipment:</b>									
Hose Reel									
	0.75	hours	X	\$ 12.50	per hour				= \$ 9.38
MIT Unit									
	2	hours	X	\$ 29.64	per hour				= \$ 59.28
<b>Labor:</b>									
Hose Reel									
	0.75	hours	X	\$ 27.40	per hour	X	1	workers	= \$ 20.55
MIT Unit									
	2	hours	X	\$ 27.40	per hour				= \$ 54.80
<b>MIT COST PER WELL = \$ 144</b>									



**TABLE 17: MAIN PIPELINE REMOVAL**

<b>MAIN PIPELINE REMOVAL</b>						
<b>Assumptions:</b>						
1.	Trenching with trackhoe at 500 ft/day					
2.	Pipeline extraction and backfilling with trackhoe at 300 ft/day					
3.	Trackhoe rental: \$1,550/week					
4.	Fuel cost: \$8.37/operating hour					
5.	Trackhoe operation requires 1 worker at \$27.40/hour					
6.	Pipeline extraction requires 1 workers at \$27.40/hour (in addition to trackhoe operator)					
7.	Pipelines removed simutaneously					
8.	Includes removal of manholes					
9.	Operating schedule: 8 hrs/day, 5 days/week					
<b>Main Pipeline Removal Costs per ft of Trench</b>						
<b>Equipment</b>						
<b>Trackhoe</b>						
	\$ 1,550	X	1 week	X	1 days	= \$ 1.03
	week		5 days		300 ft	
<b>Fuel</b>						
	\$ 8.37	X	8 hrs	X	1 days	= \$ 0.22
	hour		1 day		300 ft	
<b>Labor</b>						
<b>Trackhoe Operation</b>						
	\$ 27.4	X	8 man hrs	X	1 days	= \$ 0.73
	man hr		1 day		300 ft	
<b>Pipeline Extraction</b>						
	\$ 27.4	X	8 man hrs	X	1 day	= \$ 0.73
	man hr		1 day		300 ft	
<b>MAIN PIPELINE REMOVAL COST PER FT OF TRENCH</b>						<b>= \$ 2.71</b>

**TABLE 18: WELLFIELD PIPING REMOVAL**

<b>WELLFIELD PIPING REMOVAL</b>						
<b>Assumptions:</b>						
1.	Trenching with 310SL John Deere Backhoe at 2000 ft/day					
2.	Pipeline extraction and backfilling with backhoe at 2000 ft/day					
3.	Backhoe rental: \$788/week					
4.	Fuel cost: \$6.01/operating hour					
5.	Backhoe operation requires 1 worker at \$27.40/hour					
6.	Pipeline extraction requires 1 workers at \$27.40/hour (in addition to backhoe operator)					
7.	Operating schedule: 8 hrs/day, 5 days/week					
<b>Main Pipeline Removal Costs per ft of Pipe</b>						
<b>Equipment</b>						
<b>Backhoe</b>						
	\$ 788	X	1 week	X	1 days	=\$ 0.08
	week		5 days		2000 ft	
<b>Fuel</b>						
	\$ 6.01	X	8 hrs	X	1 days	=\$ 0.02
	hour		1 day		2000 ft	
<b>Labor</b>						
<b>Backhoe Operation</b>						
	\$ 27.40	X	8 man hrs	X	1 days	=\$ 0.11
	man hr		1 day		2000 ft	
<b>Pipeline Extraction</b>						
	\$ 27.40	X	8 man hrs	X	1 day	=\$ 0.11
	man hr		1 day		2000 ft	
<b>WELLFIELD PIPELINE REMOVAL \$ PER FT OF PIPE</b>						<b>=\$ 0.32</b>

**TABLE 19: WELLFIELD ROAD RECLAMATION**

<b>WELLFIELD ROAD RECLAMATION</b>										
<b>Assumptions</b>										
1.	Gravel road base removed at cost of \$0.721/cy (WDEQ Guideline No. 12, App. C, Level Ground, 500 ft haul)									
2.	Gravel road base: average depth = 0.3 ft, average width = 14 ft									
3.	Roads scarified prior to topsoil application at cost of \$49.83/acre (WDEQ Guideline No. 12, Appendix P)									
4.	Grading of scarified roads prior to topsoil application at cost of \$54.33/acre (WDEQ Guideline No. 12, Appendix G))									
5.	Topsoil applied at cost of \$0.72/cy/1000 ft (WDEQ Guideline No. 12, App. C, Level Ground, 500 ft haul)									
6.	Stripped topsoil: average depth = 1.5 ft, average width = 20 ft									
7.	Discing/seeding cost of \$327/acre is based on estimation in UC-Disk tab									
Gravel Road Base Removal Costs per 1000 ft of Road										
	1000 ft	X	0.30 ft	X	14 ft	X	$\frac{1 \text{ cy}}{27 \text{ ft}^3}$	X	$\frac{\$0.72}{\text{cy}}$	= \$ 112
Scarification Costs per 1000 ft of Road										
	1000 ft	X	20 ft	X	1 acre			X	$\frac{\$49.83}{\text{acre}}$	= \$ 23
					4.356E+04		ft <sup>2</sup>			
Grading Costs per 1000 ft of Road										
	1000 ft	X	20 ft	X	1 acre			X	$\frac{\$54.33}{\text{acre}}$	= \$ 25
					4.356E+04		ft <sup>2</sup>			
Topsoil Application Costs per 1000 ft of Road										
	1000 ft	X	1.50 ft	X	20 ft	X	$\frac{1 \text{ cy}}{27 \text{ ft}^3}$	X	$\frac{\$0.72}{\text{cy}}$	= \$ 800
Discing/Seeding Costs per 1000 ft of Road										
	1000 ft	X	20 ft	X	1 acre			X	$\frac{\$329}{\text{acre}}$	= \$ 151
					4.356E+04		ft <sup>2</sup>			
<b>TOTAL WELLFIELD ROAD RECLAMATION COSTS PER</b>										
	<b>1000 FT OF ROAD</b>									<b>= \$ 1,111</b>

**TABLE 20: BYPRODUCT TRANSPORT AND DISPOSAL**

<b>BYPRODUCT MATERIAL TRANSPORTATION AND DISPOSAL</b>									
<b>Assumptions:</b>									
1.	Based on actual 2016 costs for transportation to and disposal at an NRC-licensed disposal facility.								
2.	Includes profit for transporter and disposal facility.								
3.	All types of waste shipped vi bulk container (30-yd <sup>3</sup> dumpster or 30-yd <sup>3</sup> dump truck).								
4.	Each shipment contains 30,000 lbs of material.								
		<b>Transportation Cost</b>				<b>Disposal Cost</b>			<b>Total</b>
		\$ 60.73	/yd <sup>3</sup>	+	\$ 189.25	/yd <sup>3</sup>	=	\$ 249.98	/yd <sup>3</sup>
							=	\$ 9.26	/ft <sup>3</sup>

**TABLE 21: DISKING/SEEDING**

<b>DISKING/SEEDING</b>						
<b>Assumptions:</b>						
1.	Based on cost estimate					
<b>TOTAL DISKING/SEEDING COSTS PER ACRE</b>					<b>= \$</b>	<b>329.33</b>