

2017 Surety Estimate
 North Butte ISR Project Permit 632 / NRC License SUA 1548
 Cameco Resources

Itemized changes in 2017 surety bond calculation

	<i>Adjustments</i>	2016 Approved Total =
		\$23,192,000
Updated CPI index and costs related to index (Master Costs page)	\$425,000	\$23,617,000
Updated electrical costs	(\$408,000)	\$23,209,000
Updated WDEQ Guideline 12 (5/2016) & 12A costs (2/2016)	(\$52,000)	\$23,157,000
Updated chemical/analytical/and quoted costs	(\$273,000)	\$22,884,000
GWR-WF page, rounded MIT frequency to 2 times instead of fractions	\$183,000	\$23,067,000
GWR-SITE page, removed future DDW cost plus MIT cost and only 1 new RO system to be installed	(\$4,893,000)	\$18,174,000
Updated well counts WF Data page and removed planned wells for MU-3	(\$419,000)	\$17,755,000
WA page, removed past delin holes, updated current holes, no new drilling, updated water well costs, & removed P&A for DDW #3.	(\$537,000)	\$17,218,000
EQUIP page, updated RO systems to be removed = 2	(\$4,000)	\$17,214,000
BLDGS page, remove column for DDW #3 and hidden columns with cost	(\$53,000)	\$17,161,000
WF REC page, removed constructed roads for MU-3N & 3S	(\$12,000)	\$17,149,000
WF Data page, updated prerestoration, restoration years for MU 1 & 2	\$4,743,000	\$21,892,000
Net Update for 2017 Surety Estimate		\$21,892,000

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Total Restoration and Reclamation Cost Estimate		2017	
I. & II.	Groundwater Restoration (I GWR-WF + II GWR-SITE Sheets)	\$13,968,403	
III.	Well & Drill Hole Abandonment (III WA Sheet)	\$2,842,102	
IV.	Wellfield Buildings & Equipment Removal & Disposal (IV WF BLDGS Sheet)	\$802,248	
V	Wellfield & Satellite Surface Reclamation (V WF REC Sheet)	\$109,072	
VI	Equipment Removal and Disposal (VI EQUIP Sheet)	\$229,590	
VII.	Building Demolition and Disposal (VII BLDGS Sheet)	\$589,090	
VIII	Miscellaneous Reclamation (VIII MISC REC Sheet)	\$496,344	
	Subtotal Restoration and Reclamation Cost Estimate	\$19,036,850	
	Contractor Profit & Overhead ¹ 10%	Calc'd with Master Costs	
	Contingency ² 15%	\$2,855,527	
	TOTAL³, rounded down	\$21,892,000	

1 - Per WDEQ/LQD Guideline No. 12, Section 12(b)

2 - Per WDEQ/LQD Guideline No. 12, Section 12(a) and (c-h), Section 13 and NRC License Condition 9.5 (SUA-1548)

3 - Costs reflect both WDEQ & NRC requirements. No salvage value assumed.

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I. GROUND WATER RESTORATION - WELLFIELD	Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S
A. Ground Water Sweep (GWS) Costs				
Estimated PV's	1	1	0	0
Total K-gals for GWS	64,127	79,415	0	0
Bleed to Deep Disposal Well (%)	100%	100%	100%	100%
<u>Groundwater Sweep Unit Cost (\$/kgal)</u>	\$2.08	\$2.08	\$2.08	\$2.08
Subtotal Ground Water Sweep Costs per Wellfield	\$133,283	\$165,058	\$0	\$0
Total Ground Water Sweep Costs	\$298,341			
B. Reverse Osmosis Costs				
Estimated PV's	4.5	4.5	0	0
Total K-gals for RO	288,572	357,368	0	0
<u>Wellfield Pumping Cost</u>	\$0.19	\$0.19	\$0.19	\$0.19
<u>Reverse Osmosis Unit Cost (\$/kgal)</u>	\$0.56	\$0.56	\$0.56	\$0.56
Bleed to Deep Disposal Well (%)	20%	20%	20%	20%
Brine Volume for Disposal	57,714	71,474	0	0
<u>DDW Disposal Cost(\$/kgal)</u>	\$1.19	\$1.19	\$1.19	\$1.19
Permeate Volume for Re-Use	230,858	285,895	0	0
<u>Satellite Pumping Cost (\$/kgal)</u>	\$0.69	\$0.69	\$0.69	\$0.69
Subtotal Reverse Osmosis Costs per Wellfield	\$446,020	\$552,352	\$0	\$0
Total Reverse Osmosis Costs	\$998,373			
C. Reverse Osmosis with Chemical Reductant Costs				
Estimated PV's	3.5	3.5	0	0
Total kgals for RO	224,445	277,953	0	0
<u>Wellfield Pumping Cost</u>	\$0.19	\$0.19	\$0.19	\$0.19
<u>Reverse Osmosis with Chemical Reductant Unit Cost (\$/kgal)</u>	\$0.65	\$0.65	\$0.65	\$0.65
Bleed to Deep Disposal Well (%)	20%	20%	20%	20%
Brine Volume for Disposal (kgal)	44,889	55,591	0	0
<u>DDW Disposal Cost(\$/kgal)</u>	\$1.19	\$1.19	\$1.19	\$1.19
Permeate Volume for Re-Use	179,556	222,362	0	0
<u>Satellite Pumping Cost (\$/kgal)</u>	\$0.69	\$0.69	\$0.69	\$0.69
Subtotal RO with Chemical Reductant Costs per Wellfield	\$367,127	\$454,651	\$0	\$0
Total Reverse Osmosis with Chemical Reductant Costs	\$821,778			
D. Mechanical Integrity Testing (MIT) Costs				
Pre-Restoration, Restoration and Stability Period (yrs)	6.0	11.0	0.0	0.0
Number of Injection Wells	303	293	109	0
Number of MITs per Well	2	2	0.0	0.0
<u>MIT Costs per Injection Well</u>	\$146	\$146	\$146	\$146
Number of Production Well	193	185	53	0
<u>MIT Costs per Production Well</u>	\$226	\$226	\$226	\$226
Subtotal MIT Costs per Wellfield	\$175,462	\$168,935	\$0	\$0
Total Wellfield MIT Costs	\$344,398			

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I. GROUND WATER RESTORATION - WELLFIELD	Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S
F. Monitoring and Sampling Costs				
1 Pre-Restoration Monitoring				
a. Excursion Monitoring (M, MO and MU wells, twice per month)				
# of Wells	33	31	21	22
Total # samples	0	2976	0	0
UCL Parameters (\$/sample)	\$30	\$30	\$30	\$30
Subtotal Pre-Restoration Monitoring Costs per Mine Unit	\$0.00	\$89,280	\$0	\$0
Total Pre-Restoration Monitoring Costs	\$89,280			
2. Restoration Monitoring				
a. Sampling Prior to Start-up (MP Wells)				
# of Wells	16	18	6	7
Modified Guideline 8 (\$/sample)	\$372	\$372	\$0	\$0
b. Restoration Progress Monitoring (MP Wells, every 2 months)				
# of Wells	16	18	6	0
Total # samples	480	648	0	0
Restoration Progress Parameters (\$/sample)	\$65	\$65	\$65	\$65
c. Excursion Monitoring (M, MO and MU wells, every 2 months)				
# of Wells	33	31	21	0
Total # samples	990	1116	0	0
UCL Parameters (\$/sample)	\$30	\$30	\$30	\$30
Subtotal Restoration Monitoring Costs per Mine Unit	\$66,852	\$82,296	\$0	\$0
Total Restoration Monitoring Costs	\$149,148			
3 Stability Monitoring				
a. Beginning of stability (MP wells)				
# of Wells	16	18	6	7
Modified Guideline 8 (\$/sample)	\$372	\$372	\$0	\$0
b. Quarterly sampling (MP wells)				
# of Wells	16	18	6	7
Total # samples	64	72	0	0
Modified Guideline 8 (\$/sample)	\$372	\$372	\$372	\$372
c. Monitor Well Sampling (M wells, every 2 months)				
# of Wells	23	24	17	17
Total # samples	138	144	0	0
UCL Parameters (\$/sample)	\$30	\$30	\$30	\$30
Subtotal Stability Monitoring Costs per Mine Unit	\$33,900	\$37,800	\$0	\$0
Total Stability Monitoring Costs	\$71,700			
4 Other Laboratory Costs				
Radon, Bioassay, etc.	\$29,040			
Subtotal Monitoring and Sampling Costs per Mine Unit	\$129,792	\$209,376	\$0	\$0
Total Monitoring and Sampling Costs	\$339,168			

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I. GROUND WATER RESTORATION - WELLFIELD	Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S
G. Header House Heating Costs				
Number of Header Houses per Unit(s)	10	9	0	0
Pre-Restoration and Restoration Period (yrs)	5.0	10.0	0.0	0.0
Electrical Heating Costs (\$/yr)	\$3,375	\$3,375	\$3,375	\$3,375
Subtotal Header House Heating Cost per Wellfield	\$168,750	\$303,750	\$0	\$0
Total Header House Heating Costs	\$472,500			
TOTAL RESTORATION COST PER WELLFIELD	\$1,420,435	\$1,854,123	\$0	\$0
TOTAL WELLFIELD RESTORATION COST	\$3,274,557			

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II. GROUND WATER RESTORATION - SITE WIDE			
	Satellite No. 1	Satellite No. 2	DDW Fed BY-2
A. Building Utility Costs			
Assumptions:			
Electricity Unit Cost (\$/yr)	\$27,468	\$27,468	\$4,425
Propane (\$/yr)	\$31,865	\$31,865	\$0
Natural Gas (\$/yr)	\$0	\$0	\$0
Number of Years	10		10
Subtotal Utility Cost per Building	\$593,325	\$0	\$44,253
Total Building Utility Costs	\$637,579		
B. Booster Pump Operation Costs			
Number of years to the end of Restoration	10		
Booster Pump Operating Cost (\$/yr)	\$36,305		
Total Booster Pump Operating Cost	\$363,053		
C. Infrastructure, Equipment Maintenance, Replacement and Repair Costs (Est. based on SR actual)			
Annual Maintenance Cost (\$/yr)	\$23,000	*Based on SRH Surety for one Facility	
Restoration Period (yrs)	10		
Total Cost	\$230,000		
D. Deep Disposal Well MIT Costs			
Five-year MIT Costs for Disposal Wells	\$17,420		
Number of DDWs	1		
Number of MITs per DDW	2		
Total DDW MIT Cost	\$34,841		
E. Capital Costs			
Reverse Osmosis Unit (1 x 250-gpm @ \$250K each)	\$250,000		
Total Capital Costs	\$250,000		
F. Vehicle Operation Costs			
Number of Pickup Trucks (Gasoline)	3		
Truck Cost (\$/hr)	\$21.37		
Average Operating Time (hrs/yr)	1000		
Restoration and Stability Period (yrs)	11		
Total Vehicle Operation Cost	\$705,081		
G. Labor Costs			
Assumptions:			
Qty. Restoration Managers	1		
\$/hr	\$59.49		
Qty. Environmental Techs/HPTs	1		
\$/hr	\$44.62		
Qty. Operators/Laborers	6		
\$/hr	\$38.67		
Qty. Maintenance Technicians	1		
\$/hr	\$34.21		
Hrs/yr	2080		
Restoration and Stability Period (yrs)	11		
Total Labor Cost	\$8,473,291		
TOTAL SITE-WIDE RESTORATION COSTS	\$10,693,845		

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III. WELL AND DRILL HOLE ABANDONMENT		Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S	Mine Unit 4	Water Wells	Misc Wells
A. Well Abandonment (Wellfields)								
1	Sealing Costs							
	Total # of Wells per Wellfield	544	510	184	23	0	2	0
	Well Average Depth (ft)	680	750	750	750	0	485	650
	Well Abandonment (Sealing) Costs (\$/ft)	\$2.75	\$2.75	\$2.75	\$2.75	\$2.75	\$2.75	\$2.75
	Subtotal Sealing Costs per Wellfield	\$1,017,280	\$1,051,875	\$379,500	\$47,438	\$0	\$2,668	\$0
2	Casing Removal and Disposal Costs							
	Total # of Wells per Wellfield	544	510	184	23	0	2	0
	Total # of Wells for Casing Removal and Disposal	544	510	184	23	0	2	0
	Remove and Dispose Casing (\$/well)	\$33	\$33	\$33	\$33	\$33	\$33	\$33
	Subtotal Casing Removal and Disposal Costs per Wellfield	\$17,952	\$16,830	\$6,072	\$759	\$0	\$66	\$0
	Subtotal Well Abandonment Costs per Wellfield	\$1,035,232	\$1,068,705	\$385,572	\$48,197	\$0	\$2,734	\$0
	Total Well Abandonment Costs	\$2,540,439						
B. Removal of Contaminated Soil Around Wells								
	# of Production and Injection Wells	496	478	0	0	0		
	Remove Contaminated Soil Around Wells (\$/well)	\$86.54	\$86.54	\$86.54	\$86.54	\$86.54		
	Subtotal Contaminated Soil Removal/Disposal per Wellfield	\$42,922	\$41,364	\$0	\$0	\$0		
	Total Contaminated Soil Removal/Disposal Costs	\$84,286						
C. Drill Hole Abandonment								
1	Drill Hole Plug and Abandonment							
	Projected # of Drill Holes							
	##	0						
	Total # of Drill Holes	0						
	Average Depth of Fallback (feet)	200						
	Total Footage Requiring Abandonment (ft)	0						
	Hole Abandonment (\$/ft)	\$3.30						
	Subtotal Plug and Abandonment Costs	\$0						
2	Incidental Costs							
	Mobilization	\$1,100						
	Total # of Drill Holes	0						
	Site Location (\$/hole)	\$11						
	Capping (\$/hole)	\$11						
	Small Site Grading and Seeding (\$/site)	\$55						
	Subtotal Incidental Costs	\$0						
3	Subsurface Retained Abandonment Cost							
	Reclamation Cost per hole (Equipment, materials, labor)	\$77						
	40% of Reclamation Costs (GL 12 Appendix L, footnote 6)	\$31						
	Plugged and Abandoned Boreholes - Surface Cost 40% (2016)	12						
	Subtotal Subsurface Retained Abandonment Cost	\$370						
	Total Delineation Hole Abandonment	\$370						
D. Waste Disposal Well Abandonment								
		DDW Fed						
		BY-2						
1	Plug & Abandon per WDEQ-WQD UIC Permit #11-468	\$217,007						
	Total Waste Disposal Well Abandonment Costs	\$217,007						
	TOTAL WELL + DRILL HOLE ABANDONMENT COSTS	\$2,842,102						

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IV. WELLFIELD BUILDINGS & EQUIPMENT REMOVAL + DISPOSAL	Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S
A. Wellfield Piping				
Number of Header Houses per Wellfield	10	9	2	0
Approximate Length of Piping per Header House (ft)	13,800	13,800	13,800	13,800
*average 46 wells per with 300 ft pipeline/well)				
Approximate Total Length of Piping (ft)	138,000	124,200	27,600	0
1 Removal and Loading				
<u>Wellfield Piping Removal Unit Cost (\$/ft of pipe)</u>	\$1.62	\$1.62	\$1.62	\$1.62
Subtotal Wellfield Piping Removal and Loading Costs	\$223,849	\$201,464	\$44,770	\$0
2 Transport and Disposal Costs (NRC-Licensed Facility)				
Average Diameter of Piping (inches)	2	2	2	2
<u>Chipped Volume Reduction (ft³/ft)</u>	0.011	0.011	0.011	0.011
Chipped Volume per Wellfield (ft ³)	1480	1332	296	0
Volume for Disposal Assuming 10% Void Space (ft ³)	1628	1465	326	0
<u>Transportation and Disposal Unit Cost (\$/ft³)</u>	\$5.77	\$5.77	\$5.77	\$5.77
Subtotal Wellfield Piping Transport and Disposal Costs	\$9,390	\$8,451	\$1,878	\$0
Subtotal Wellfield Piping Costs per Wellfield	\$233,239	\$209,915	\$46,648	\$0
Total Wellfield Piping Costs	\$489,802			
B. Well Pumps and Downhole Tubing				
Assumptions: pump and tubing removal costs included under groundwater restoration labor				
60% of production/injection wells contain pumps and/or tubing				
1 Pump and Tubing Transportation and Disposal				
Number of Production Wells	193	185	53	0
Number of Injection Wells	303	293	109	0
Number of Monitor Wells	33	31	21	22
a. Pump Volume				
Number of Production Wells with Pumps	193	185	53	0
<u>Pump Volume (ft³)</u>	0.43	0.43	0.43	0.43
Pump Volume per Wellfield (ft ³)	83.6	80.1	23.0	0.0
b. Tubing Volume				
Average Tubing Length per Well (ft)	655	725	725	725
*Average tubing length/wellfield based on average well depth minus 25 ft				
Number of Production Wells with Tubing	116	111	32	0
Number of Injection Wells with Tubing	182	176	65	0
Tubing Length per Wellfield (ft)	216,543	230,405	85,695	15,950
Diameter of Production Well Fiberglass Tubing (inches)	2	2	2	2
Diameter of Injection Well HDPE Tubing (inches)	1.25	1.25	1.25	1.25
<u>Chipped Volume Reduction (ft³/ft)</u>	0.011	0.011	0.011	0.011
Chipped Volume per Wellfield (ft ³)	2322	2470	919	171
Volume of Pump and Tubing (ft ³)	2405	2550	942	171
Volume for Disposal Assuming Void Space (ft ³)	2646	2805	1036	188
<u>Transportation and Disposal Unit Cost (\$/ft³)</u>	\$5.77	\$5.77	\$5.77	\$5.77
Subtotal Pump and Tubing Transport and Disposal Costs Per Wellfield	\$15,266	\$16,187	\$5,977	\$1,085
Total Pump and Tubing Transport and Disposal Costs	\$38,515			
C. Wellhead Cover Removal				
Number of Production and Injection Wells	496	478	162	0
<u>Well Head Removal, Decontamination, and Disposal Cost</u>	\$13	\$13	\$13	\$13
Subtotal Wellhead Removal Costs	\$6,317	\$6,088	\$2,063	\$0
Total Wellhead Cover Removal Costs	\$14,467			
D. Header Houses				
Total Quantity	10	9	2	0
Average Header House Volume (ft ³)	1600	1600	1600	1600
1 Removal				
Total Volume (ft ³)	16000	14400	3200	0
<u>Demolition Cost</u>	\$0.293	\$0.293	\$0.293	\$0.293

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IV. WELLFIELD BUILDINGS & EQUIPMENT REMOVAL + DISPOSAL	Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S
Subtotal Building Demolition Costs	\$4,682	\$4,213	\$936	\$0
2 Survey and Decontamination				
Cost per Header House	\$667	\$667	\$667	\$667
Subtotal Survey and Decontamination Costs	\$6,666	\$5,999	\$1,333	\$0
3 Disposal				
Total Volume for Disposal - Incl. 33% Factor (cy)	196	176	39	0
Volume for Disposal Assuming Void Space (cy)	215	194	43	0
Disposal Cost, Landfill (cy)	\$42.17	\$42.17	\$42.17	\$42.17
Subtotal County Landfill Disposal Costs	\$9,071	\$8,163	\$1,814	\$0
Header House Soil Removal Volume (assume 10'Wx20'Lx2.5'D)	500	501	502	503
11e.(2) Disposal Cost (ft ³)	\$5.80	\$5.80	\$5.80	\$5.80
Subtotal 11(e)2 Disposal Cost	\$29,024	\$26,174	\$5,828	\$0
Subtotal Header House Removal and Disposal Costs per Wellfield	\$49,442	\$44,550	\$9,912	\$0
Total Header House Removal and Disposal Costs	\$103,904			
TOTAL REMOVAL AND DISPOSAL COSTS PER WELLFIELD	\$646,687			
E. Buried Trunkline	Main Trunkline Trench			
Assumptions:				
Length of Trunkline Trench (ft)	7500		715	
Length of Waste Water Pipeline Trench (ft)	2600			
1 Removal and Loading				
Main Pipeline Removal Unit Cost (\$/ft of trench)	\$3.24		\$3.13	
Subtotal Trunkline Removal and Loading Costs	\$32,766		\$2,238	
2 Transport and Disposal Costs (NRC-Licensed Facility)				
a. 4" HDPE Trunkline (Wastewater Disposal Line)				
Piping Length (ft)	4,600			
Chipped Volume per Lft (ft ³ /ft)	0.0385			
Chipped Volume (ft ³)	177			
b. 8" HDPE Trunkline				
Piping Length (ft)			1430	
Chipped Volume per Lft (ft ³ /ft)			0.1413	
Chipped Volume (ft ³)			202	
b. 10" HDPE Trunkline (Restoration) (x2)				
Piping Length (ft)	15,000			
Chipped Volume per Lft (ft ³ /ft)	0.220			
Chipped Volume (ft ³)	3,293			
c. 18" HDPE Trunkline (Prod/Inject) (x2)				
Piping Length (ft)	15,000			
Chipped Volume per Lft (ft ³ /ft)	0.616	approx		
Chipped Volume (ft ³)	9,233			
Total Trunkline Chipped Volume (ft ³)	12,703		202	
Volume for Disposal Assuming 10% Void Space (ft ³)	13,973		222	
Transportation and Disposal Unit Cost (\$/ft ³)	\$5.77		\$5.77	
Subtotal Trunkline Transport and Disposal Costs (NRC Licensed Facility)	\$80,621		\$1,282	
3 Transport and Disposal Cost (Landfill)				
a. 2" Steel Line (O ₂)				
Piping Length (ft)	7500			
b. 3" HDPE Trunkline (CO ₂)				
Piping Length (ft)	7500			
c. 1" Fiber Optics Line				
Length (ft)	7500			
Volume for Disposal Assuming 10% Void Space (cy)	917			
Disposal Cost, Landfill (cy)	\$42.17			
Subtotal Transport and Disposal Costs	\$38,653			
Subtotal Trunkline Decommissioning Costs per Wellfield	\$152,040		\$3,521	
Total Trunkline Decommissioning Costs	\$155,561			

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TOTAL WELLFIELD BUILDINGS + EQUIPMENT REMOVAL	\$802,248			

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V. WELLFIELD & SATELLITE SURFACE RECLAMATION	Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S
A. Wellfield Pattern Area Reclamation				
Pattern Area (acres)	67	67	20	23
*Assumes wellfield pattern area X 2				
<u>Discing/Seeding Unit Cost (\$/acre)</u>	\$330	\$330	\$330	\$330
Subtotal Pattern Area Reclamation Costs per Wellfield	\$21,970	\$22,149	\$6,690	\$7,451
Total Wellfield Pattern Area Reclamation Costs	\$58,260			
1 Wellfield Road Reclamation				
Road Construction				
Length of Wellfield Roads (1000 ft)	8	4	0	0
<u>Wellfield Road Reclamation Unit Cost (\$/1000 ft)</u>	\$930	\$930	\$930	\$930
Subtotal Wellfield Road Reclamation Costs	\$7,661	\$4,040	\$0	\$0
Total Wellfield Road Reclamation Costs	\$11,701			
2 Wellfield Laydown Area Reclamation		DDW Staging Area	MU-3 Temp Laydown Area	PW-1 Area
Area of Disturbance (acres)		3.86	2.1	0.265
Average Depth of Stripped Topsoil (ft)		0.67	0.5	0.67
Surface Grade: Level Ground				
Average Length of Topsoil Haul (ft)		500	500	500
a. Ripping Overburden with Dozer				
<u>Ripping Cost (per acre)</u>		\$921	\$921	\$921
Subtotal Ripping Costs	\$0	\$3,554	\$1,933	\$244
b. Topsoil Application with Scraper				
Volume of Topsoil Removed (cy)	0	4172	1694	286
<u>Moving Materials (0% Grade)</u>	\$1.23	\$1.23	\$1.23	\$1.23
Subtotal Topsoil Application Costs	\$0	\$5,117	\$2,078	\$351
c. Discing and Seeding				
<u>Discing/Seeding Unit Cost (\$/acre)</u>	\$330	\$330	\$330	\$330
Subtotal Discing/Seeding Costs	\$0	\$1,274	\$693	\$87
Subtotal Surface Reclamation Costs per WF laydown area	\$0	\$9,945	\$4,704	\$683
Total Wellfield Laydown Area Reclamation Costs	\$15,332			
3 Wellfield Fence Removal				
Length of Fencing (ft)	9,800	5,400	6,300	0
Fence Removal Costs	\$0.42	\$0.42	\$0.42	\$0.42
Subtotal Fence Removal Costs per Wellfield	\$4,096	\$2,257	\$2,633	\$0
Subtotal Wellfield Fence Removal Costs	\$8,987			
Total Wellfield Surface Reclamation	\$94,280			
B. Satellite + Office Area Reclamation	Satellite No.1	WW-2, Silo, Sat Laydown Area		
Assumptions:				
Area of Disturbance (acres)	3.9	2.01		
Average Depth of Stripped Topsoil (ft)	0.5	0.5		
Surface Grade: Level Ground				
Average Length of Topsoil Haul (ft)	2000	2000		
1 Ripping Overburden with Dozer				
<u>Ripping Cost (per acre)</u>	\$921	\$921		
Subtotal Ripping Costs	\$3,545	\$1,851		
2 Topsoil Application with Scraper				
Volume of Topsoil Removed (cy)	3106	1621		

V. WELLFIELD & SATELLITE SURFACE RECLAMATION	Mine Unit 1	Mine Unit 2	Mine Unit 3N	Mine Unit 3S
Moving Materials (0% Grade)	\$1.23	\$1.23		
Subtotal Topsoil Application Costs	\$3,809	\$1,989		
3 Discing and Seeding				
Discing/Seeding Unit Cost (\$/acre)	\$330	\$330		
Subtotal Discing/Seeding Costs	\$1,271	\$663		
Subtotal Surface Reclamation Costs per Satellite	\$8,624	\$4,503		
4 Satellite Area Fence Removal				
Length of Fencing (ft)	3,200			
Fence Removal Costs per foot	\$0.42			
Subtotal Fence Removal Costs per Satellite	\$1,338			
Total Satellite Area Reclamation	\$14,464			
5 Main Trunkline Removal, surface reclamation	Main pipeline	Waste water disposal line	Mine Unit 3N	
Length of Pipeline Trench	7500	2,600	715	
Width of Pipeline Trench	4	4	4	
Area of Pipeline Trench (acres)	0.69	0.24	0.07	
Discing/Seeding Unit Cost (\$/acre)	\$330	\$330	\$330	
Subtotal Discing/Seeding Costs	\$227.27	\$78.79	\$21.67	
Subtotal reclamation Costs per Trunkline	\$328			
TOTAL WELLFIELD + SATELLITE SURFACE RECLAMATION	\$109,072			

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VI. EQUIPMENT REMOVAL & LOADING	Satellite No. 1
A. Removal and Loading Costs	
1 Tankage	
Number of Tanks	20
Volume of Tank Construction Material (ft ³)	1190
Tank Removal Cost	\$129
Subtotal Tankage Removal and Loading Costs	\$153,346
2 PVC/Steel Pipe	
PVC Pipe Footage	6000
Average PVC Pipe Diameter (inches)	4
Shredded PVC Pipe Volume Reduction (ft3/ft)	0.038
Volume of Shredded PVC Pipe (ft ³)	231
Steel Pipe Footage	0
Average Steel Pipe Diameter (inches)	0
Volume (ft ³)	0
Pipe Removal Cost	\$8.37
Subtotal PVC/Steel Pipe Labor & Equipment Costs	\$50,240
3 Pumps	
Number of Pumps	16
Average Volume (ft ³ /pump)	5
Volume of Pumps (ft ³)	79
Pump Removal Cost	\$100
Subtotal Pump Removal and Loading Costs	\$7,859
4 RO Units	
Number of RO Units (500 gpm)	
Current	1
Planned	1
RO Average Volume (ft3/Unit)	250
RO Removal Cost	\$4.86
Subtotal RO Unit Removal and Loading Costs	\$2,430
Subtotal Equipment Removal and Loading Costs per Facility	\$213,876
B. Transportation and Disposal Costs (NRC-Licensed Facility)	
1 Tankage	
Volume of Tank Construction Material (ft ³)	1,190
Volume for Disposal Assuming Void Space (ft ³)	1,309
Transportation and Disposal Unit Cost (\$/ft3)	\$7.32
Subtotal Tankage Transportation and Disposal Costs	\$9,586

VI. EQUIPMENT REMOVAL & LOADING	Satellite No. 1
2 PVC / Steel Pipe	
Volume of Shredded PVC Pipe (ft ³)	231
Volume for Disposal Assuming Void Space (ft ³)	254
Volume of Steel Pipe (ft ³)	0
Volume for Disposal Assuming Void Space (ft ³)	0
<u>Transportation and Disposal Unit Cost (\$/ft3)</u>	\$5.77
Subtotal PVC Pipe Transportation and Disposal Costs	\$1,465
3 Pumps	
Volume of Pumps (ft ³)	79
Volume for Disposal Assuming Void Space (ft ³)	87
<u>Transportation and Disposal Unit Cost (\$/ft3)</u>	\$7.32
Subtotal Pump Transportation and Disposal Costs	\$635
4 Dryer	
Dryer Volume (ft ³)	0
Volume for Disposal Assuming Dryer Remains Intact (ft ³)	0
<u>Transportation and Disposal Unit Cost (\$/ft3)</u>	\$7.32
Subtotal Dryer Transportation and Disposal Costs	\$0
5 RO/Degasser Units	
Volume of RO/Degasser Units (ft ³)	500
Volume for Disposal Assuming Volume Reduction (ft ³)	550
<u>Transportation and Disposal Unit Costs</u>	\$7.32
Subtotal RO Unit Transportation and Disposal Costs	\$4,028
Subtotal Equipment Transportation + Disposal Costs per Facility	\$15,714
C. Health and Safety Costs	
Radiation Safety Equipment	
	Accounted for under "II.GWR SITE COSTS"
Total Health and Safety Costs	
SUBTOTAL EQUIPMENT REMOVAL + DISPOSAL PER FACILITY	\$229,590
TOTAL EQUIPMENT REMOVAL + DISPOSAL COSTS	\$229,590

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VII. BUILDING DEMOLITION + DISPOSAL	Satellite No. 1	DDW Fed BY-2	Bunkhouse No. 1	Tank & Pad (2)	O ₂ Tank Pad	Satellite CO ₂ Pad	Silo Pad	Acid Tank Pad
A. Decontamination Costs								
1 Wall Decontamination								
Area to be Decontaminated (ft ²)	0	880	0	0	0	0	0	0
HCl Acid Wash, including labor (\$/ft ²)	\$0.99	\$0.99	\$0.99	\$0.99	\$0.99	\$0.99	\$0.99	\$0.99
Subtotal Wall Decontamination Costs	\$0	\$874	\$0	\$0	\$0	\$0	\$0	\$0
2 Concrete Floor Decontamination								
Area to be Decontaminated (ft ²)	17,164	480	0	0	0	0	0	0
HCl Acid Wash, including labor (\$/ft ²)	\$0.63	\$0.63	\$0.63	\$0.63	\$0.63	\$0.63	\$0.63	\$0.63
Subtotal Concrete Floor Decontamination Costs	\$10,759	\$301	\$0	\$0	\$0	\$0	\$0	\$0
3 Deep Well Injection Costs								
Total kgals for Injection (1 gal used per ft ²)	17.16	1.36	0	0	0	0	0	0
Deep Well Injection Unit Cost (\$/kgals)	\$1.19	\$1.19	\$1.19	\$1.19	\$1.19	\$1.19	\$1.19	\$1.19
Subtotal Deep Well Injection Costs	\$20	\$2	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Decontamination Costs per Building	\$10,780	\$1,176	\$0	\$0	\$0	\$0	\$0	\$0
Total Decontamination Costs	\$11,956							
B. Demolition Costs								
1 Building (Tanks)								
Volume of Building (ft ³)	538,158	4,800	2,496	100,000	0	0	0	0
Demolition Cost	\$0.29	\$0.29	\$0.29	\$0.29	\$0.29	\$0.29	\$0.29	\$0.29
Subtotal Building Demolition Costs	\$157,465	\$1,404	\$730	\$29,260	\$0	\$0	\$0	\$0
2 Concrete Floor								
Area of Concrete Floor (ft ²)	17,164	480	0	556	663	732	452	625
Demolition Cost	\$0.84	\$0.84	\$0.84	\$0.84	\$0.84	\$0.84	\$0.84	\$0.84
Subtotal Concrete Floor Demolition Costs	\$14,349	\$401	\$0	\$465	\$554	\$612	\$378	\$523
3 Concrete Footing								
Length of Concrete Footing (ft)	524	88	0	0	0	0	85	100
Demolition Cost	\$17	\$17	\$17	\$17	\$17	\$17	\$17	\$17
Subtotal Concrete Footing Demolition Costs	\$9,033	\$1,511	\$0	\$0	\$0	\$0	\$1,465	\$1,724
Subtotal Demolition Costs per Building	\$180,847	\$3,316	\$730	\$29,725	\$554	\$612	\$1,843	\$2,246
Total Demolition Costs	\$219,874							
C. Disposal Costs								
1 Building								
Volume of Building (cy)	19,932	178	92	3,704	0	0	0	0
Off-Site County Landfill								
Percentage (%)	100	100	100	100	100	100	100	100
Total Volume for Disposal - Incl. 33% Factor (cy)	6,577	59	31	1,222	0	0	0	0
Disposal Cost, Landfill (cy)	\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$42
Subtotal County Facility Off-Site Bldg. Disposal Costs	\$277,351	\$2,474	\$1,286	\$51,537	\$0	\$0	\$0	\$0
2 Concrete Floor								
Area of Concrete Floor (ft ²)	17,164	480	0	556	663	732	452	625
Average Thickness of Concrete Floor (ft)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Volume of Concrete Floor (ft ³)	12,873	360	0	417	497	549	339	469
Volume of Concrete Floor (cy)	477	13	0	15	18	20	13	17
a. On-Site Concrete Disposal								
Percentage (%)	75	75	100	100	100	100	100	100
Volume for Disposal (cy)	358	10	0	15	18	20	13	17
Concrete Disposal On Site (cy)	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49
Subtotal Floor Off-Site County Facility Disposal Costs	\$3,395	\$95	\$0	\$147	\$175	\$193	\$119	\$165
b. NRC-Licensed Facility								
Percentage (%)	25	25	0	0	0	0	0	0
Volume for Disposal (ft ³)	3218	90	0	0	0	0	0	0
Transportation and Disposal Unit Cost (\$/ft ³)	\$5.80	\$5.80	\$5.80	\$5.80	\$5.80	\$5.80	\$5.80	\$5.80
Subtotal NRC-Licensed Facility Disposal Costs	\$18,682	\$522	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Concrete Floor Disposal Costs	\$22,076	\$617	\$0	\$147	\$175	\$193	\$119	\$165
3 Concrete Footing								
Length of Concrete Footing (ft)	524	88	0	0	0	0	85	100
Average Depth of Concrete Footing (ft)	4	4	4	4	4	4	4	4
Average Width of Concrete Footing (ft)	1	1	1	1	1	1	1	1
Volume of Concrete Footing (ft ³)	2,096	351	0	0	0	0	340	400
Volume of Concrete Footing (cy)	78	13	0	0	0	0	13	15
Concrete Disposal On Site (cy)	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49	\$9.49
Subtotal Concrete Footing On-Site Disposal Costs	\$737	\$123	\$0	\$0	\$0	\$0	\$120	\$141
Subtotal Disposal Costs per Building	\$300,164	\$3,214	\$1,286	\$51,684	\$175	\$193	\$239	\$305
Total Disposal Costs	\$357,260							
D. Health and Safety Costs								
Accounted for under "II.GWR SITE COSTS"								
TOTAL BUILDING & MISCELLANEOUS DEMOLITION + DISPOSAL	\$589,090							

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VIII. MISCELLANEOUS RECLAMATION		
A.	Access Road Reclamation (includes culverts)	N. Uranium Road
1	Assumptions	
	Surface grade	0%
	Length of Road (ft)	11,000
	Width of Road (ft)	24
	Area of road (ft ²)	264,000
2	Gravel Road Base Removal	
	Average haul distance (ft)	1000
	Gravel Road Base Width (ft)	24
	Gravel Road Base Area (ft ²)	264,000
	Average Road Base Depth (ft)	0.5
	Volume of Road Base (cy)	4,889
	Moving Materials (0% Grade)	\$0.95
	Subtotal Gravel Road Base Removal Costs	\$4,625
3	Ripping Overburden with Dozer	
	Overburden Surface Area (acres)	6.1
	Ripping Cost (per acre)	\$921
	Subtotal Ripping Overburden Costs	\$5,580
3a.	Culvert removal	
	# of culverts	9
	Guideline 12, Appendix J cost per culvert. (2/2016)	\$121
	Subtotal Culvert removal	\$1,086.57
4	Topsoil Application	
	Average haul distance (ft)	1000
	Topsoil Surface Area (ft ²)	264,000
	Depth of Topsoil (ft)	0.5
	Volume of Topsoil (cy)	4,889
	Moving Materials (0% Grade)	\$0.95
	Subtotal Topsoil Application Costs	\$4,625
5	Discing/Seeding	
	Surface Area (acres)	6
	Discing/Seeding Unit Cost (\$/acre)	\$330
	Subtotal Discing/Seeding Costs	\$2,000
	Subtotal Reclamation Costs per Access Road	\$16,830
	Total Access Road Reclamation Costs	\$17,916
D.	Surge Ponds Reclamation	Surge Ponds

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VIII. MISCELLANEOUS RECLAMATION			
1	Soil Sampling and Monitoring		
	Number of Soil Samples		30
	\$/Sample		\$372
	Subtotal Soil Sampling and Monitoring Costs		\$11,160
2	Liner/Subsoil/Leak Detection Removal and Disposal		
	Thickness of clay liner (ft)		0.25
	Thickness of sludge (ft)		0.5
	Width of Pond (ft)		280
	Length of Pond (ft)		340
	Surface area of pond (ft ²)		95,200
	a. Removal and Loading		
	Volume of Clay Liner and Sludge (cy)		2,644
	Volume of Geotextile Liner (cy)		10
	Liner and Sludge Removal and Loading Unit Cost (\$/cy)		\$4.16
	Length of Piping (ft)		400
	Wellfield Piping Removal Unit Cost (\$/ft of pipe)		\$1.62
	Subtotal Removal and Loading Costs		\$11,693
	b. Transportation and Disposal		
	Volume of Clay Liner and Sludge (cy)		2,655
	Transportation and Disposal Unit Cost (\$/cy), Clay liner		\$156.73
	Volume of Geotextile Liner @ 40% void (cy)		17
	Transportation and Disposal Unit Cost (\$/cy), Geotextile liner		\$156.73
	Average Diameter of Piping (inches)		2
	<u>Chipped Volume Reduction (ft³/ft)</u>		0.011
	Chipped Volume (ft ³)		4.3
	Volume for Disposal Assuming 10% Void Space (ft ³)		4.7
	Transportation and Disposal Unit Cost (\$/ft ³)		\$5.77
	Subtotal Liner Transportation and Disposal Costs		\$418,872
	Subtotal Liner Removal and Disposal Costs		\$430,565
3	Topsoil Application		
	Area of surface disturbance (ft ²)		95,200
	Average thickness of topsoil (ft)		10
	Average haul distance (ft)		1000
	Surface grade (%)		0%
	Volume of Topsoil (cy)		35,259
	Topsoil Unit Cost per WDEQ Guideline No.12, App.C (\$/cy)		\$0.792
	Subtotal Topsoil Application Costs		\$27,925
4	Revegetation		
	Area of surface disturbance (acres)		3.2
	Revegetation Unit Cost (\$/acre)		\$330
	Subtotal Revegetation Costs		\$1,049

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VIII. MISCELLANEOUS RECLAMATION				
	5	Fence Removal		
		Length of Fencing (ft)		1,500
		Fence Removal Costs per foot		\$0.42
			Subtotal Fence Removal Costs	\$627
			Total Surge Ponds Reclamation Costs	\$471,327
E.		Remove Monitoring Stations		
		Air Quality Monitoring Stations		6
		Removal Unit Cost		\$818
			Subtotal Air Quality Monitoring Stations	\$4,905
			Total Removal of Monitoring Stations	\$4,905
F.		Subsurface Release of Solutions Decommissioning Costs		
		Number of trunkline failures		\$0
		Typical Volume Soil Contaminated per event, cubic yards		0
		Soil Removal cost, per cubic yard		\$160
			Subtotal Subsurface Soil Decommission	\$0
G.		Surface Releases of Solutions Decommissioning Costs		
		Total Surface Area Affected, acres		0.17
		Est. Portion Contaminated Soil, %		20%
		Est. volume soil to be removed assuming 3" depth, cubic yards		\$14
		Soil Removal cost, per cubic yard		\$160
			Subtotal Surface Soil Decommission	\$2,196
			TOTAL MISCELLANEOUS RECLAMATION	\$496,344

Unit Costs

	Qty	Units
ELECTRICAL POWER COSTS		
*Pumping Costs for Operating DDWs, RO, and Wellfield are included in GW Rest Costs (Based on SRH Actual Costs)		
Satellite - Typical		
Miscellaneous Pumps, Fans, Sumps, etc.	22.5	HP
Lighting	35.0625	kW (per square ft)
kW to HP Conversion Factor	0.746	
Electricity Cost	\$0.0625	per kWhr
Efficiency Factor	90%	
Operating Hours Per Year	8760	hours
Satellite Power Cost	\$27,468	per year
DDW - Typical		
Misc. Pumps, Fans, Sumps, etc.	2	HP
Lighting	0.49	kW
Heating (assume operation only 6 mos/yr)	12.5	kW
kW to HP Conversion Factor	0.746	kW/hp
Electricity Cost	\$0.0625	per kWhr
Efficiency Factor	90%	
Operating Hours Per Year	8760	hours
DDW Electrical Cost	\$4,425	per year
Header House Heating		
Heater Power Usage	12.5	kW
Days Used	180	days per year
Electricity Cost	\$0.0625	kWhr
Header House Heating Cost	\$3,375	per year
GROUNDWATER RESTORATION UNIT COSTS		
Wellfield Pumping		
Equipment		
Wellfield Pump Sizes	5	hp
Wellfield Pump Flow Rate	25	gpm
kW to HP Conversion Factor	0.746	
Cost of Electricity	\$0.0625	kWhr
Efficiency	80%	
Wellfield Pumping Cost	\$0.194	per kgal
Satellite Pumping		
Equipment		
Satellite Pump Sizes	60	hp
Satellite Pump Flow Rate	75	gpm
kW to HP Conversion Factor	0.746	
Cost of Electricity	\$0.0625	kWhr
Efficiency	90%	
Satellite Pumping Cost	\$0.691	per kgal
Deep Disposal Well Injection		
Equipment		
Deep Disposal Well Pump Size	75	hp
Deep Disposal Well Flow Rate	75	gpm
kW to HP Conversion Factor	0.746	
Cost of Electricity	\$0.0625	kWhr
Efficiency	80%	
Reagent		
Antiscalant Cost (Scaletrol)	\$4.32	per lb
Density of Water	8.34	lbs/gal
Specific Gravity (Scaletrol)	1.284	

Unit Costs

	Qty	Units
Antiscalant Cost (Scaletrol)	\$46.26	per gal
Antiscalant Dose (ScaleTrol)	0.0000048	gal/gal
Deep Disposal Well Cost	\$1.19	per kgal
Total Groundwater Sweep Costs	\$2.08	per kgal
Reverse Osmosis		
Equipment		
System Capacity	250	gpm
Unit Pump	60	hp
Injection Pump	60	hp
Waste Pump	15	hp
kW to HP Conversion Factor	0.746	
Cost of Electricity	\$0.0625	kWhr
Efficiency	90%	
Reagents		
Tripolyphosphate Usage Rate	0.00000130	lb/gal
Tripolyphosphate Cost	\$1.07	per lb
EDTA Usage Rate	0.00000315	lb/gal
EDTA Cost	\$1.76	per lb
Antiscalant Cost (Hypersperse)	\$2.78	per lb
Density of Water	8.34	lbs/gal
Specific Gravity (Hypersperse)	1.124	
Antiscalant Cost (Hypersperse)	\$26.06	per gal
Antiscalant Dose (Hypersperse)	0.0000036	gal/gal
Sodium Sulfide Usage Rate	0.000170	lb/gal
Sodium Sulfide Cost	\$0.530	per lb
RO Cost (without Reductant)	\$0.560	per kgal
RO Cost (with Reductant)	\$0.650	per kgal
MIT Costs for Production Wells		
Equipment		
Pulling Unit Hours	4	hrs/day
Pulling Unit Cost	\$41.27	\$/hour
MIT Unit Hours	8	hrs/day
MIT Unit Cost	\$34.22	\$/hour
Labor		
Required Hours	8	hrs/day
Required Laborers	1.5	per day
Labor Cost	\$38.67	\$/hour
Productivity	4	wells/day
MIT - Production Wells	\$226	per well
MIT Costs for Injection Wells		
Equipment		
Pulling Unit Hours	0	hrs/day
Pulling Unit Cost	\$41.27	\$/hour
MIT Unit Hours	8	hrs/day
MIT Unit Cost	\$34.22	\$/hour

Unit Costs

	Qty	Units
Labor		
Required Hours	8	hrs/day
Required Laborers	1	per day
Labor Cost	\$38.67	\$/hour
Productivity	4	wells/day
MIT - Injection Wells	\$146	per well
Booster Pump Operating Cost		
Equipment		
Wellfield Pump Sizes	40	hp
Number of Pumps Running (avg.)	2	per year
Hours Running	24	per day
kW to HP Conversion Factor	0.746	
Cost of Electricity	\$0.0625	kWhr
Efficiency	90%	
Booster Pump Operating Costs	\$36,305	per year
WELL ABANDONMENT UNIT COSTS		
Removal of Contaminated Soil		
Equipment		
Cat 416 Backhoe Time: around well	0.25	hours
Cat 416 Backhoe Time: general	0.03	hours
Cat 416 Backhoe Cost	\$30.89	per hour
Labor		
Radiation Technician: around wells	0.25	hours
Radiation Technician: general	0.03	hours
Radiation Technician Cost	\$44.62	per hour
Operator: around wells	0.25	hours
Operator: general	0.03	hours
Operator Cost	\$38.67	per hour
Disposal		
By-Product Disposal: around wells	0.37	cubic yard
By-Product Disposal: general	1	cubic yard
Disposal Cost (incl. Transport)	\$156.73	per cubic yard
Removal of Contaminated Soil around Wells	\$87	per well
General Removal of Contaminated Soil	\$160	per cubic yard
DDW Pump Dismantling and Disposal		
Labor		
Number of Laborers	2	per day
Number of Pumps Dismantled	0.5	per day
Hours Per Day	8	hours
Laborers Cost	\$38.67	\$/hour
Disposal		
Volume of DDW Pump	240	ft ³
ByProduct Disposal	\$7.32	per ft ³
DDW Pump Dismantling and Disposal	\$2,995	per pump
WELLFIELD RECLAMATION COSTS		
Wellfield Piping Removal		
Equipment		
Trackhoe	1	per day
Trackhoe Cost	\$78.96	per hour
Loader	1	per day
Loader Cost	\$48.77	per hour
Pickup Truck	1	per day
Pickup Cost	\$21.37	per hour
Chipper Cost	\$39.04	per hour

Unit Costs

	Qty	Units
Labor		
Backhoe Operator	\$38.67	per hour
Loader Operator	\$38.67	per hour
Laborer	\$38.67	per hour
Hours Per Day	8	per day
Productivity	1500	ft/day
Piping Removal Cost	\$1.62	per foot of pipe
Piping Reduction		
2" Pipe	0.0107	
3" Pipe	0.0233	
4" Pipe	0.0385	
6" Pipe	0.0834	
8" Pipe	0.1413	
10" Pipe	0.2196	
12" Pipe	0.3088	
14" Pipe	0.3723	
16" Pipe	0.4864	
18" Pipe	0.6155	
20" Pipe	0.7200	
Production Pump Volume		
Length	66	inches
Diameter	3.8	inches
Cubic Inch to Cubic Foot Conversion	0.0006	
Production Pump Volume	0.43	cubic feet
Trunk Line Removal		
Equipment		
Trackhoe	1	per day
Trackhoe Cost	\$78.96	per hour
Loader	1	per day
Loader Cost	\$48.77	per hour
Pickup Truck	1	per day
Pickup Cost	\$21.37	per hour
Chipper Cost	\$39.04	per hour
Labor		
Trackhoe Operator	\$38.67	per hour
Loader Operator	\$38.67	per hour
Laborer	\$38.67	per hour
Hours Per Day	8	per day
Productivity	750	ft/day
Buried Piping Removal Cost	\$3.24	per foot of pipe
Remove Well Head Covers		
Volume of Well Head Cover (ft ³)	1.86	cubic feet
<u>Demolition Cost</u>	\$0.293	per cubic ft
Decontamination		
Acid Usage	4.1	pounds per wellhead cover
Acid Cost	\$0.163	per lbs
Labor		
Radiation Tech	\$44.62	per hour
Operator	\$38.67	per hour
Productivity	10	wellheads per hour
Disposal		
Void space	10%	
<u>Transportation and Disposal Cost</u>	\$2	per ft ³
Well Head Cover Removal	\$13	per well

Unit Costs

	Qty	Units
Header House Decontamination		
Decontamination		
Acid Usage	20	pounds per header house
Acid Cost	\$0.163	per pound
Labor		
Radiation Tech	\$44.62	per hour
Number of Operators	2	per day
Operator	\$38.67	per hour
Hours Per Day	8	per day
Productivity	1	header house per day
Header House Decontamination Cost	\$667	per header house
WELLFIELD, SATELLITE, AND SURFACE RECLAMATION		
Wellfield Road Reclamation		
Gravel Road Base		
Average Depth	0.25	feet
Average Width	10	feet
<u>Material Moved (0% Grade)</u>	\$0.95	bcy
Cubic Yard to Cubic Feet Conversion	0.04	
Scarification of Road		
Scarification Costs	\$55	per acre
Average Width	25	feet
Acre to Sq. Foot Conversion	2.29568E-05	
Grading Cost	\$60	per acre
Topsoil Depth	0.67	feet
<u>Discing/Seeding Costs</u>	\$330	per acre
Linear Feet for Unit Cost	1000	feet
Wellfield Road Reclamation Cost	\$930	per 1000 feet
EQUIPMENT REMOVAL COSTS		
Tank Removal		
Equipment		
Loader	\$48.77	per hour
Trackhoe	\$78.96	per hour
Manlift	\$45.73	per hour
Pickup	\$21.37	per hour
Lift Truck	\$53.19	per hour
Labor		
Number of Operators	4	
Operator Cost	\$38.67	per hour
Hours Per Day	8	per day
Productivity	25	ft ³ /day
Tank Removal Cost	\$129	per ft³
Pipe Removal		
Equipment		
Manlift	\$45.73	per hour
Pickup	\$21.37	per hour
Lift Truck	\$53.19	per hour
Chipper	\$39.04	per hour
Labor		
Number of Operators	4	
Operator Cost	\$38.67	per hour
Hours Per Day	8	per day
Productivity	300	ft/day
Pipe Removal Cost (Inside Buildings)	\$8.37	per ft

Unit Costs

	Qty	Units
Pump Removal		
Equipment		
Truck	\$21.37	per hour
Skid Steer	\$25.83	per hour
Labor		
Number of Operators	2	
Operator Cost	\$38.67	per hour
Hours Per Day	8	per day
Productivity	10	ft ³ /day
Pump Removal	\$100	per ft³
RO and Degasser Removal		
Equipment		
Truck	\$21.37	per hour
Lift Truck	\$53.19	per hour
Labor		
Number of Operators	2	
Operator Cost	\$38.67	per hour
Hours Per Day	8	per day
Productivity	250	ft ³ /day
RO and Degasser Removal Cost	\$4.86	per ft³
BUILDING REMOVAL COSTS		
Acid Wash Walls		
Acid		
Acid Usage	0.05	per square foot
Acid Cost	\$0.163	per pound
Equipment		
Manlift	\$45.73	per hour
Labor		
Laborer	2	people
Laborer Cost	\$38.67	per hour
Productivity	125	square feet per hour
Acid Wash Walls Cost	\$0.993	per square foot
Acid Wash Floors		
Acid		
Acid Usage	0.05	per square foot
Acid Cost	\$0.163	per pound
Labor		
Laborer	2	people
Laborer Cost	\$38.67	per hour
Productivity	125	square feet per hour
Acid Wash Floors Cost	\$0.627	per square foot
MISCELLANEOUS RECLAMATION AND RESTORATION COSTS		
Liner and Subsoil Removal Costs		
Equipment		
Trackhoe Cost	\$ 78.96	per hour
Loader Cost	\$48.77	per hour
Labor		
Operator	38.67	per hour
Productivity	40	cubic yards/hour
Total Removal	\$4.16	per cubic yard

Master Costs

2013 Rate	Exc Rate (\$)	Net Benefits*	Units	Source	CPI Escalators (CPI-U, U.S. City Average)							
Labor Costs												
Radiation Safety Officer	\$46.00	\$48.87	hour	2013 MSEC rates plus CPI Half 2016	Denver CPI (2013 Annual) 230.8							
Restoration Manager	\$40.00	\$42.49	hour	2013 MSEC rates plus CPI Half 2016	Denver CPI (HALF 2016) 245.2							
Operator/Laborer	\$26.00	\$27.62	hour	2013 MSEC rates plus CPI Half 2016	2016 Escalator Factor (2013 to 2016) 1.06							
Environmental Tech/HPT	\$30.00	\$31.87	hour	2013 MSEC rates plus CPI Half 2016	Denver CPI (2014 Annual) 237.2							
Maintenance Tech	\$23.00	\$24.43	hour	2013 MSEC rates plus CPI Half 2016	Denver CPI (HALF 2016) 245.2							
*Includes additional 40% net benefits based on InfoMine USA cost data for Surface Metal and Industrial Mineral Mines - Western U.S. (Table 5)												
Utility Costs												
Electrical Costs		Rate (\$)	Profit + Overhead	Units	Source							
Kilowatt to Horsepower		\$0.0625	included	kWhr	Actual Costs-2016							
Efficiency - Downhole Pumps		0.746	included	Kw/HP	N/A							
Efficiency - Surface Pumps		80%	included	Percent	N/A							
Propane - North Butte		\$31.865	included	year	Actual Costs-2016							
Chemical & Materials Costs												
Antiscalant for RO (Hypersperse)		Rate (\$)	Profit + Overhead	Units	Source							
Antiscalant for RO (ScaleTrol)		\$2.7800	included	pound	Actual Costs-2016							
EDTA Tetrasodium Dihydrate		\$1.7614	included	pound	2014 quote, no purchases.							
Hydrochloric Acid		\$0.1627	included	pound	2015 cost							
Pea Gravel		\$0.0135	included	pound	2015 cost							
Silica Sand		\$0.1770	included	pound	Actual Costs-2016							
Sodium Sulfide		\$0.5300	included	pound	Actual Costs-2016							
Sodium Tripolyphosphate		\$1.0710	included	pound	2014 quote, no purchases.							
Analytical Costs												
Guideline 8		Rate (\$)	Profit + Overhead	Units	Source*							
Excursion Parameters (UCL)		\$372.00	included	analysis	Actual Costs-2016							
Restoration Progress Parameters (UCL + U + Se)		\$30.00	included	analysis	Actual Costs-2016							
		\$65.00	included	analysis	Actual Costs-2016							
Other Lab Costs (Radon, Bioassay, DDW, PWS, etc.)		\$200.00	\$220.00	analysis	Cost Estimate per month							
*over life of mine plan												
**Energy Laboratories, Inc., Casper, WY quotes, fee schedules and actual costs.												
Equipment Costs												
Bandit 1200XP Trailer Mounted Brush Chipper		2014 Rate	Rate (\$)	Profit + Overhead*	Units	Source	date					
Bobcat S250 Skid Steer Loader		\$35.49	\$39.04	included	hour	Equipment Watch** plus CPI 2014 to 2016						
Cat 320C L Tractor - 1.25 cu yd bucket		\$22.72	\$23.49	included	hour	Equipment Watch** plus CPI 2014 to 2016						
Cat 416E Backhoe		\$69.44	\$71.78	included	hour	Equipment Watch** plus CPI 2014 to 2016						
Cat 924H Loader - 2.4 cu yd bucket		\$27.17	\$28.09	included	hour	Equipment Watch** plus CPI 2014 to 2016						
Concrete Jaws Labourey - CP-60	2013 Rate	\$42.89	\$44.34	included	hour	Equipment Watch** plus CPI 2014 to 2016						
GEHL DL-8 Rough Terrain Lift Truck		\$18.51	\$19.66	included	hour	Equipment Watch + CPI Escalator 2013 to 2016						
Manlift		\$46.78	\$48.36	included	hour	Equipment Watch** plus CPI 2014 to 2016						
MIT Unit	2013 Rate	\$39.13	\$41.57	included	hour	Equipment Watch** plus CPI 2014 to 2016						
Pick-up Truck 3/4 ton 4X4		\$30.09	\$31.10	included	hour	Equipment Watch + CPI Escalator 2013 to 2016						
Pulling Unit***	2013 Rate	\$18.79	\$19.42	included	hour	Equipment Watch** plus CPI 2014 to 2016						
		\$35.32	\$37.52	included	hour	Equipment Watch + CPI Escalator 2013 to 2016						
*Includes additional 10% Profit & Overhead per WDEQ/LQD Guideline No. 12, Section 12(b)												
**Equipment Watch Rental Rate Blue Book: Volume 1												
***1 3/4 Ton 4x4 Truck with Hoist												
Quoted Costs												
Deep Disposal Well - Plug & Abandonment Costs 2015 estimate		\$13.62	\$13.92	included	foot	2015 estimate plus 2015 to 2016 CPI Escalator						
Deep Disposal Well - MIT Costs 2015 average cost		\$17,051.00	\$17,420.00	included	well	Ave Actual Costs-2015 + CPI Esc. 2015 to 2016						
Well Replacements (Restoration) 2014 actual cost		\$15,600.00	\$16,126.00	included	well	Actual Costs-2014 plus CPI Escalator 2014 to 2016						
Bellhole Refurbishment 2014 estimate		\$5,500.00	\$5,685.00	included	bellhole	Estimate cost 2014 plus CPI Escalator 2014 to 2016						
Header House Refurbishment 2014 estimate		\$10,000.00	\$10,337.00	included	header house	Estimate cost 2014 plus CPI Escalator 2014 to 2016						
WDEQ/LQD Guideline No. 12: Draft October 2015												
Moving Materials w. Scraper: 1-Way Distance 500 feet, 0% grade	Appendix C	\$0.720	\$0.792	included	bcy	Guideline 12 (5/2016)						
Moving Materials w. Scraper: 1-Way Distance 1,000 feet, 0% grade	Appendix C	\$0.860	\$0.946	included	bcy	Guideline 12 (5/2016)						
Moving Materials w. Scraper: 1-Way Distance 2,000 feet, 0% grade	Appendix C	\$1.115	\$1.227	included	bcy	Guideline 12 (5/2016)						
Moving Materials w. Dozer: 1-Way Distance 50 feet, 0% grade	Appendix E	\$0.107	\$0.118	included	ley	Guideline 12 (5/2016)						
Moving Materials w. Dozer: 1-Way Distance 100 feet, 0% grade	Appendix E	\$0.182	\$0.200	included	ley	Guideline 12 (5/2016)						
Moving Materials w. Dozer: 1-Way Distance 150 feet, 0% grade	Appendix E	\$0.236	\$0.260	included	ley	Guideline 12 (5/2016)						
Grading Operating Costs	Appendix G	\$54.33	\$59.76	included	acre	Guideline 12 (5/2016)						
Fencing Removal	Appendix H	\$0.38	\$0.42	included	foot	Guideline 12 (5/2016)						
Ripping Operating Costs (Asphalt)	Appendix I	\$592.58	\$651.84	included	acre	Guideline 12 (5/2016)						
Ripping Operating Costs (Overburden)	Appendix II	\$837.00	\$920.70	included	acre	Guideline 12 (5/2016)						
Building Demolition - Mixture of Types	Appendix K	\$0.266	\$0.293	included	ft3	Guideline 12 (5/2016)						
Building Demo Disposal (Average)	Appendix K	\$9.71	\$10.68	included	cy	Guideline 12 (5/2016)						
Concrete (Floor) Demolition - 6" Thick with Rebar	Appendix K	\$0.76	\$0.84	included	ft2	Guideline 12 (5/2016)						
Concrete (Footing) Demolition - 2" Thick, 3' Wide	Appendix K	\$15.67	\$17.24	included	linear foot	Guideline 12 (5/2016)						
Concrete Disposal On-Site	Appendix G	\$8.63	\$9.49	included	cy	Guideline 12 (5/2016)						
Drill Hole Abandonment: Wet Exploration Holes >25 holes	Appendix L	\$3.00	\$3.30	included	foot	Guideline 12 (5/2016)						
Well Abandonment: Monitor, Production, and Injection Wells	Appendix L	\$2.50	\$2.75	included	foot	Guideline 12 (5/2016)						
Incidental Costs: Small Site Grading and Seeding (<1000 sq. feet)	Appendix L	\$50	\$55	included	site	Guideline 12 (5/2016)						
Incidental Costs: Capping	Appendix L	\$10	\$11	included	each	Guideline 12 (5/2016)						
Incidental Costs: Site Location	Appendix L	\$10	\$11	included	hole	Guideline 12 (5/2016)						
Incidental Costs: Remove Pump, Wiring, and Drop Pipe	Appendix L	\$0.40	\$0.44	included	foot	Guideline 12 (5/2016)						
Incidental Costs: Remove and Dispose Casing (top few feet)	Appendix L	\$30	\$33	included	well	Guideline 12 (5/2016)						
Incidental Costs: Monitoring Well Concrete Pedestal Disposal	Appendix L	\$100	\$110	included	each	Guideline 12 (5/2016)						
Mobilization Fee	Appendix L	\$1,000	\$1,100	included	Project	Guideline 12 (5/2016)						
Scarification Costs	Appendix P	\$49.83	\$54.81	included	acre	Guideline 12 (5/2016)						
Demolition and Removal of Meteorological/Air Monitoring Station	Appendix O	\$743.20	\$818.00	included	each	Guideline 12 (5/2016)						
Revegetation Costs-Total	Guideline 12A.II.i	\$300	\$330.00	included	acre	Guideline 12A (2/2016)						
*Includes additional 10% Profit & Overhead per WDEQ/LQD Guideline No. 12, Section 12(b)												
Construction & Demolition Debris Transportation & Disposal Costs												
Building Volume for Disposal		0.33										
Void Factor (for disposal)		1.1										
C&D Debris (county landfill)	Disposal (\$/ton)	\$62.00	C&D (cy/ton)	2	Transport (\$/load)	\$335	C&D (cy/load)	30	Total (\$/cy)	\$42.17	Total (\$/ft3)	\$2
*Transportation and disposal costs based on actual costs (2013). Transportation and disposal costs include profit and overhead of service provider. Conversion factors of 2 cy/ton and 0.33 to account for air space in buildings based on FEMA - Debris Estimating Field Guide, FEMA 320, September 2010.												
11e.(2) Byproduct Material Transportation & Disposal												
Load Correction Factor: Soil, sand, etc.		1.1										
Load Correction Factor: Process materials, etc.		0.42										
White Mesa	Disposal (\$/ton)	\$138.97	Disposal (\$/cy)	\$152.87	Volume (cy)	13.0	Transport (\$/cy)	\$247.95	Total (\$/cy)	\$400.82	Total (\$/ft3)	\$14.85
Type I: Soil, sand, gravel, rock, concrete rubble, etc.		\$160.08	\$67.23	24.7		\$130.50	\$197.73		\$7.32			
Type II: Chipped piping		\$160.08	\$67.23	36.4		\$88.55	\$155.78		\$5.77			
Pathfinder												
Type I: Soil, sand, rock, gravel, demolition masonry, concrete rubble	N/A	\$130.00	13.0	\$26.73		\$156.73			\$5.80			
Type II: Other process waste, process equipment, etc.	N/A	\$378.00	24.7	\$14.07		\$392.07			\$14.52			
Type II: Chipped piping	N/A	\$378.00	36.4	\$9.55		\$387.55			\$14.35			
*Transportation and disposal costs based on contract amounts as adjusted annually. Transportation and disposal costs include profit and overhead of service provider and include all unloading and dewatering fees, waste tax, fuel surcharges, etc. Transportation costs assume 1) one truck transports one 13-cy bin of Type I waste, 2) one truck transports one 24-cy bin of Type II process waste (including pumps, motors, etc.) and 3) one truck transports one 36.4-cy bin of Type II chipped piping waste.												