

# **HRI Churchrock Project** **Section 8 Wellfield Equipment Tabulation**

# H. Houses	# Injectors	# Extractors	# Feet 2"	# Feet 10"	# Feet 14"	Gravel Road
1	21	18	6690	540		
2	21	18	6950	440		
3	19	21	7010	460		
4	23	26	6370	360		
5	16	30	6770	500		
6	13	18	4070	260		
7	9	11	4500	1400		
8	30	28	9030	460		
9	27	28	8460	400		
10	15	13	4690	380		
11	21	15	6580	500		
Totals	215	226	71120	5700	7200	3600

## Pipe Wall Volume Data

<u>Outside Diameter (in)</u>	<u>Area Inside OD (ft2)</u>	<u>Wall Volume SDR17 (ft3/ft)</u>
2	0.022	0.012
2.5	0.034	
3	0.049	0.018
3.5	0.067	
4	0.087	
4.5	0.110	
5	0.136	
5.5	0.165	
6	0.196	
6.5	0.230	
7	0.267	
7.5	0.307	
8	0.349	
8.5	0.394	
9	0.442	
9.486	0.491	
9.5	0.492	
10	0.545	0.140
10.5	0.601	
10.75	0.630	
11	0.660	
11.5	0.721	
12	0.785	
12.353	0.832	
12.5	0.852	
13	0.922	
13.5	0.994	
14	1.069	0.237
14.5	1.147	
15	1.227	
15.5	1.310	
Wall Tk		
14 " SDR 17		0.824
10 " SDR 17		0.632

**PROGRAM TO CALCULATE THE VOLUME CONTAINED WITHIN  
A RECTANGULAR POND WITH KNOWN SLOPE AND DEPTH**

ALL DIMENSIONS ARE IN FEET

THE TOP OF THE POND MEASUREMENTS ARE:

LENGTH	350
WIDTH	350
DEPTH	20
SLOPE	3

W= BOTTOM WIDTH	230
L= BOTTOM LENGTH	230

DEPTH	GALLONS	CUBIC FEET	CUBIC YARDS
0.50	200,438	26,797	992
1.00	406,104	54,292	2,011
1.50	617,066	82,496	3,055
2.00	833,392	111,416	4,127
2.50	1,055,148	141,063	5,225
3.00	1,282,401	171,444	6,350
3.50	1,515,220	202,570	7,503
4.00	1,753,671	234,448	8,683
4.50	1,997,822	267,089	9,892
5.00	2,247,740	300,500	11,130
5.50	2,503,492	334,692	12,396
6.00	2,765,147	369,672	13,692
6.50	3,032,770	405,451	15,017
7.00	3,306,429	442,036	16,372
7.50	3,586,193	479,438	17,757
8.00	3,872,127	517,664	19,173
8.50	4,164,299	556,725	20,619
9.00	4,462,777	596,628	22,097
9.50	4,767,629	637,384	23,607
10.00	5,078,920	679,000	25,148

Liner Size	375X375
------------	---------

**PROGRAM TO CALCULATE THE VOLUME CONTAINED WITHIN  
A RECTANGULAR POND WITH KNOWN SLOPE AND DEPTH**

ALL DIMENSIONS ARE IN FEET

THE TOP OF THE POND MEASUREMENTS ARE:

LENGTH	120
WIDTH	120
DEPTH	10
SLOPE	3

W= BOTTOM WIDTH	60
L= BOTTOM LENGTH	60

DEPTH	GALLONS	CUBIC FEET	CUBIC YARDS
0.50	14,148	1,892	70
1.00	29,711	3,972	147
1.50	46,754	6,251	232
2.00	65,345	8,736	324
2.50	85,553	11,438	424
3.00	107,443	14,364	532
3.50	131,083	17,525	649
4.00	156,541	20,928	775
4.50	183,885	24,584	911
5.00	213,180	28,500	1,056
5.50	244,495	32,687	1,211
6.00	277,897	37,152	1,376
6.50	313,453	41,906	1,552
7.00	351,231	46,956	1,739
7.50	391,298	52,313	1,938
8.00	433,720	57,984	2,148
8.50	478,567	63,980	2,370
9.00	525,904	70,308	2,604
9.50	575,799	76,979	2,851
10.00	628,320	84,000	3,111

Liner Size

150X150

## CHEMICAL REDUCTANT

### Assumptions:

1. H<sub>2</sub>S introduced to RO permeate at concentration of 400 mg/L for final pore volume.
2. Chemical costs = \$0.5/lb, includes tank rental and safety equipment.

### Costs for one Pore Volume

	P.V. Gal.	P.V. L	MG H <sub>2</sub> S P.V	Lbs H <sub>2</sub> S P.V.	Cost Dollars
Churchrock Section 8	147,814,123	559,476,455	223,790,582,048	493,458	\$246,729.12

Ground Water Restoration

PV Assumptions - 9 pore volumes required pursuant to license condition 9.5

ZONE	Area (ft2)	Tk (ft)	Vol (ft3)	Por	gal/ft3	PV (gal)	H-PIF	V-PIF	CPV (gal)	9 X CPV
UA	318,700	8.6	2,740,820	0.25	7.48	5,125,333	1.5	1.3	9,994,400	89,949,601
LA	404,500	12.2	4,934,900	0.25	7.48	9,228,263	1.5	1.3	17,995,113	161,956,016
UB	329,500	10.5	3,459,750	0.25	7.48	6,469,733	1.5	1.3	12,615,978	113,543,805
LB	555,300	11.6	6,441,480	0.25	7.48	12,045,568	1.5	1.3	23,488,857	211,399,711
UC	658,700	14.9	9,814,630	0.25	7.48	18,353,358	1.5	1.3	35,789,048	322,101,435
ULC	378,200	10.5	3,971,100	0.25	7.48	7,425,957	1.5	1.3	14,480,616	130,325,545
LLC	321,900	12.3	3,959,370	0.25	7.48	7,404,022	1.5	1.3	14,437,843	129,940,584
UD	124,600	10.4	1,295,840	0.25	7.48	2,423,221	1.5	1.3	4,725,281	42,527,525
MD+LD	326,500	12	3,918,000	0.25	7.48	7,326,660	1.5	1.3	14,286,987	128,582,883
TOTALS	3,417,900		40,535,890			75,802,114			147,814,123	1,330,327,106

Area - Area of cut off grade mineralization  
 Tk - Thickness of cut off grade mineralization  
 Por - Estimated porosity of the rock  
 PV - Straight pore volume without any correction  
 H-PIF - Horizontal pore volume increase factor  
 V-PIF - Vertical pore volume increase factor  
 CPV - Corrected pore volume

Number of Wells

Extraction Wells

Header House 1	18
Header House 2	18
Header House 3	21
Header House 4	26
Header House 5	30
Header House 6	18
Header House 7	11
Header House 8	28
Header House 9	28
Header House 10	13
Header House 11	15
Total	226

Injection Wells

Header House 1	21
Header House 2	21
Header House 3	19
Header House 4	23
Header House 5	16
Header House 6	13
Header House 7	9
Header House 8	30
Header House 9	27
Header House 10	15
Header House 11	21
Total	215

## MAIN PIPELINE REMOVAL

### Assumptions:

1. Trenching with trackhoe at 1,500 ft/day
2. Pipeline extraction and backfilling with trackhoe at 1500 ft/day
3. Trackhoe rental: \$1600/week
4. Fuel cost: \$9/operating hour
5. Trackhoe operation requires one worker at \$15/hour
6. Pipeline extraction requires 2 workers at \$15/hour (in addition to trackhoe operator)
7. Pipelines removed simultaneously
8. Includes removal of manholes
9. Operating schedule: 8 hours/day, 5 days/week

### Main Pipeline Removal Costs per ft of Pipe

#### Equipment & Fuel

	<u>Weekly</u>	<u>Daily</u>	<u>Hourly</u>	<u>Per Foot</u>
Trackhoe	\$1,200.00	\$240.00	\$30.00	\$0.16
Fuel		\$72.00	\$9.00	\$0.05

#### Labor

Trackhoe operator	\$120.00	\$15.00	\$0.08
Pipeline extractors (2)	\$240.00	\$30.00	\$0.16

**Total Per Foot Cost** \$0.45

26800 feet of pipe removed. \$12,006



rator)

## WELLFIELD PIPING REMOVAL

### Assumptions:

1. Trenching with backhoe at 1500 ft/day
2. Pipeline extraction and backfilling with backhoe at 1500 ft/day
3. Backhoe rental: \$750/week
4. Fuel cost: \$9/operating hour
5. Backhoe operation requires 1 worker at \$15/hour
6. Pipeline extraction requires 2 workers at \$15/hour (in addition to backhoe operator)
7. Operating schedule: 8 hrs/day, 5 days/week

### Wellfield Pipeline Removal Costs per ft of Pipe

#### Equipment & Fuel

	<u>Weekly</u>	<u>Daily</u>	<u>Hourly</u>	<u>Per Foot</u>
Backhoe	\$550.00	\$110.00	\$13.75	\$0.07
Fuel		\$72.00	\$9.00	\$0.05

#### Labor

Backhoe operator		\$120.00	\$15.00	\$0.08
Pipeline extractors (2)		\$240.00	\$30.00	\$0.16

Totals			\$67.75	
--------	--	--	---------	--

<b>Total Per Foot Cost</b>				<b>\$0.36</b>
----------------------------	--	--	--	---------------

71120 feet of pipe removed.				\$25,698.03
-----------------------------	--	--	--	-------------

## WELLFIELD ROAD RECLAMATION

### Assumptions:

1. Gravel road base removed at cost of \$0.60/cy/1000 ft (WDEQ Guideline No. 12, Appendix C)
2. Gravel road base: average depth = 0.5 ft, average width = 15 ft
3. Roads scarified prior to topsoil application at cost of \$30.51/acre (WDEQ Guideline No. 12, Appendix P)
4. Grading of scarified roads prior to topsoil application at cost of \$33.27/acre (WDEQ Guideline No. 12, Appendix G)
5. Topsoil applied at cost or \$0.60/cy/1000 ft (WDEQ Guideline No. 12, Appendix C, surface grade: level ground)
6. Stripped topsoil: average depth = 0.67 ft, average width = 25 ft
7. Discing/seeding cost of \$200/acre

### Costs per 1000 ft of road

	<u>Width (ft)</u>	<u>Thick (ft.)</u>	<u>Yd3</u>	<u>\$/Yd3</u>	<u>Total</u>
Road base removal	15	0.5	278	\$0.60	\$166.67
Topsoil application	25	0.67	620	\$0.60	\$372.22

	<u>Width (ft)</u>	<u>Acres</u>	<u>\$/Acres</u>	<u>Total</u>
Scarification	25	0.6	\$30.51	\$17.51
Grading	25	0.6	\$33.27	\$19.09
Disking/seeding	25	0.6	\$200.00	\$114.78

**TOTAL WELLFIELD ROAD RECLAMATION** \$690.28

Section 8 wellfield road 3600 feet long. 2485.00

## **DISKING/SEEDING**

Assumption:

1. Based on actual contractor costs

TOTAL DISKING/SEEDING COSTS PER ACRE     =     \$200.00

## TRANSPORTATION AND DISPOSAL

### 11.e.2 By-Product Material Transportation Disposal Costs per Ft3

Assumptions:

1. Based on contract costs for transportation to and disposal at the IUC White Mesa Mill near Blanding Utah
2. Transportation assumed a 200 mile trip at \$4.76 per mile, \$952 per trip. Bulk truck capacity 30 yds<sup>3</sup>. Drum truck capacity 64 yds<sup>3</sup>.
3. All 11.e.2 disposal fees are based upon actual current contract rates at Texas ISR facilities as itemized in 4 & 5 below
4. Drummed waste. \$2,866 per shipment of 64 drums, 7.35 cu. ft. per drum, \$6.09 per cubic foot.
5. Bulk waste. \$1975.45 per shipment of 30 cu. yds. , \$2.44 per cu. ft.
6. Per truck site unloading (\$135.00) and decontamination (\$150.00) amounts are specified in URI's current disposal site

Type of Waste: Sludge, resin, and other by-product type wastes shipped in drums.

	<u>Unit Shipment</u>			
	<u>Cost</u>	<u>Units/Drum</u>	<u>Drums/Truck</u>	<u>Total \$/ft3</u>
Disposal fee	\$2,866.00	7.35	64	\$6.09
Shipping	\$952.00			\$2.02
Site unloading	\$135.00			\$0.28
Site scanning	\$150.00			\$0.31
Total shipping and disposal				\$8.71

Type of waste: Soil, sand, demolished concrete and other bulk wastes

	<u>Unit Shipment</u>			
	<u>Cost</u>		<u>Ft3/Truck</u>	<u>Total \$/ft3</u>
Disposal fee	\$1,975.45		810	\$2.44
Shipping	\$952.00		810	\$1.18
Site unloading	\$45.00		810	\$0.06
Site scanning	\$150.00		810	\$0.19
Total shipping and disposal				\$3.85

### Unrestricted Material Transportation Disposal Costs per ton

Assumptions:

1. Based on public costs disposal at the Waste Management Red Rocks Landfill. 24 \$/ton
2. 1 ton is equal to 1 yd<sup>3</sup>
2. Transportation assumed a 30 mile trip at \$2.00 per mile. Bulk truck capacity 20 yds<sup>3</sup>.

	<u>Unit Cost</u>	<u>Total \$/yds3</u>
Disposal fee (ton)	\$24.00	\$24.00
Shipping (truck trip)	\$60.00	\$3.00
Total shipping and disposal (yd3)		\$27.00

	A	B	C	D	E	F	G	H	I	J
1	<div> <div>LABOR SUMMARIES</div> <div>Rev. March 16, 2001</div> </div>									
2										
3										
4										
5										
6						Number	Hourly Rate	Yearly Salary	Annual	Monthly
7										
8	<b>Management and Accounting</b>									
9	Salaried	Operations Manager				1	-	\$120,000	\$120,000	\$10,000
10	Salaried	Environmental Manager				1	-	\$105,000	\$105,000	\$8,750
11	Salaried	Accounting Manager						\$105,000	\$105,000	\$8,750
12	Salaried	Accountant					-	\$65,000	\$65,000	\$5,417
13	<b>Plant Personnel</b>									
14	Salaried	Plant Superintendent					-	\$85,000	\$85,000	\$7,083
15	Salaried	Plant Engineer					-	\$45,000	\$45,000	\$3,750
16	Salaried	Radiation Officer				1	-	\$30,000	\$30,000	\$2,500
17	Salaried	Chemist				1	-	\$46,000	\$46,000	\$3,833
18	Salaried	Plant Foreman					-	\$28,000	\$28,000	\$2,333
19	Salaried	Maintenance Foreman					-	\$28,000	\$28,000	\$2,333
20	Wage	Lab Technicans					\$9.62	-	\$20,010	\$1,667
21	Wage	Secretary					\$9.62	-	\$20,010	\$1,667
22	Wage	Electrician				1	\$14.43	-	\$30,014	\$2,501
23	Wage	Apprentice Electrician					\$12.01	-	\$24,981	\$2,082
24	Wage	Plant Operator				1	\$11.54	-	\$24,003	\$2,000
25	Wage	Assistance Plant Operator					\$11.54	-	\$24,003	\$2,000
26	Wage	Dryer Operator					\$11.54	-	\$24,003	\$2,000
27	Wage	Maintenance					\$11.54	-	\$24,003	\$2,000
28	<b>Wellfield Personnel</b>									
29	Salaried	Wellfield Superintendent					-	\$41,200	\$41,200	\$3,433
30	Salaried	Drilling Engineer					-	\$40,500	\$40,500	\$3,375
31	Salaried	Foreman				1	-	\$28,000	\$28,000	\$2,333
32	Wage	Truck Driver				1	\$11.54	-	\$24,003	\$2,000
33	Wage	Electrician					\$14.43	-	\$30,014	\$2,501
34	Salaried	Data Entry Clerk					-	\$20,000	\$20,000	\$1,667
35	Wage	Secretary						\$20,000	\$20,000	\$1,667
36	Wage	Logger					\$12.01	-	\$24,981	\$2,082
37	Wage	Wellfield Operators				1	\$11.50	-	\$23,920	\$1,993
38	Wage	Assistant Wellfield Operator					\$11.50	-	\$23,920	\$1,993
39	Wage	Balancer					\$11.50	-	\$23,920	\$1,993
40	Wage	Environmental Sampler					\$11.50	-	\$23,920	\$1,993
41	Wage	Pump Hoist Operators				1	\$11.50	-	\$23,920	\$1,993
42	Wage	Backhoe Operator					\$10.49	-	\$21,819	\$1,818
43	Wage	Maintenance					\$11.50	-	\$23,920	\$1,993
44	Wage	Casing Crew					\$11.50	-	\$23,920	\$1,993
45	<b>Engineering &amp; Geologic Personnel</b>									
46	Salaried	Chief Engineer					-	\$66,000	\$66,000	\$5,500
47	Salaried	RESERVOIR ENGINEER					-	\$60,000	\$60,000	\$5,000
48	Salaried	Senior Geologist				1	-	\$58,000	\$58,000	\$4,833
49	Salaried	Geologist					-	\$48,800	\$48,800	\$4,067
50	Salaried	Logging Supervisor					-	\$35,000	\$35,000	\$2,917
51	Wage	Secretary						\$20,000	\$20,000	\$1,667
52	Wage	Surveyor					\$12.02	-	\$25,002	\$2,083
53	Wage	Assistant Surveyor					\$12.02	-	\$25,002	\$2,083
54	Wage	Logger					\$10.49	-	\$21,819	\$1,818
55										
56	Total #					11				

**Calculation of BC Solids Produced**

Flow (g/min)	580
Flow (l/min)	2,195
Flow (l/d)	3,161,232
Solids (g/l)	4
Solids (g/d)	12,644,928
Solids (g/mo)	384,616,560
Solids (kg/mo)	384,617
Solids (lb/mo)	174,429
Solids (yd3/mo)*	87
Solids (ft3/mo)	2,355
Unit disposal cost (\$/ft3)	<b>\$4.21</b>
Monthly disposal cost (\$)	<b>\$9,905</b>

\*1 yd3 ~ 1 ton

**CHURCHROCK SECTION 8 GROUNDWATER RESTORATION AND DECOMMISSIONING COSTS**  
**COSTS ASSOCIATED WITH RO AND BRINE CONCENTRATION OPERATION AND MAINTENANCE**

Rev. March 16, 2001

Period	1/5	2/5	3/5	4/5	5/5	6/5	7/5	8/5	9/5	10/5	11/5	12/5
<b>1 Management and Accounting</b>												
2 Operations Manager	1	1	1	1	1	1	1	1	1	1	1	1
3 Environmental Manager	1	1	1	1	1	1	1	1	1	1	1	1
<b>4 Plant Personnel</b>												
5 Radiation Officer	1	1	1	1	1	1	1	1	1	1	1	1
6 Chemist	1	1	1	1	1	1	1	1	1	1	1	1
7 Electrician	1	1	1	1	1	1	1	1	1	1	1	1
8 Plant Operator	1	1	1	1	1	1	1	1	1	1	1	1
<b>9 Wellfield Personnel</b>												
10 Foreman	1	1	1	1	1	1	1	1	1	1	1	1
11 Truck Driver	1	1	1	1	1	1	1	1	1	1	1	1
12 Wellfield Operators	1	1	1	1	1	1	1	1	1	1	1	1
13 Pump Hoist Operators	1	1	1	1	1	1	1	1	1	1	1	1
<b>14 Engineering &amp; Geologic Personnel</b>												
15 Senior Geologist	1	1	1	1	1	1	1	1	1	1	1	1
<b>16 Total Employees</b>	11	11	11	11	5	5	5	5	5	5	5	5
<b>17 Operations Statistics</b>												
<b>20 Reverse Osmosis Treatment</b>												
21 GPM RO Capacity	580	580	580	580								
22 GPM RO Product	464	464	464	464								
23 GPM RO Reject	116	116	116	116								
24 MM Gals, RO Processed - Month	25,891,200	24,220,800	25,891,200	25,056,000								
25 MM Gals, RO Permeate - Month	20,712,960	19,376,640	20,712,960	20,044,800								
26 MM Gals, RO Reject - Month	5,178,240	4,844,160	5,178,240	5,011,200								
<b>27 Brine Concentration</b>												
28 GPM BC Capacity	125	125	125	125								
29 GPM Distillate	113.5	113.5	113.5	113.5								
30 GPM Brine	2.5	2.5	2.5	2.5								
31 MM Gals, BC Capacity - Month	5,580,000	5,220,000	5,580,000	5,400,000								
32 MM Gals, Distillate - Month	5,066,640	4,739,760	5,066,640	4,903,200								
33 MM Gals, Brine - Month	111,600	104,400	111,600	108,000								
<b>34 Process Results</b>												
35 Beginning Gallons (9 PV Eq.)	112,864,706	87,085,106	62,968,706	37,189,106								
36 Beginning PV	0.76	0.59	0.43	0.25								
37 Gallons Processes Month	25,779,600	24,116,400	25,779,600	24,948,000								
38 PV Processed Month	0.17	0.16	0.17	0.17								
39 Cumulative Gallons Processed	1,243,242,000	1,267,358,400	1,293,138,000	1,318,086,000								
40 Cumulative PV Processed	8.41	8.57	8.75	8.92								
41 Remaining Gallons to Process	87,085,106	62,968,706	37,189,106	12,241,106								
42 Remaining PV to Process	0.59	0.43	0.25	0.08								
<b>43 ESTIMATED COST DETAIL</b>												
<b>44 Description</b>												
<b>45 -----Final Decontamination, Decomissioning and Reclamation-----</b>												
46												
47 Salaries-Direct	\$32,250	\$32,250	\$32,250	\$32,250	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417	\$27,417
48 Wages-Direct	\$10,487	\$10,487	\$10,487	\$10,487	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
49 Insurance-Workmans Compensation	\$1,368	\$1,368	\$1,368	\$1,368	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
50 Payroll Taxes	\$2,992	\$2,992	\$2,992	\$2,992	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
51 Medical Insurance	\$4,274	\$4,274	\$4,274	\$4,274	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
52 401K Contributions	\$1,068	\$1,068	\$1,068	\$1,068	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
53 Telephone/Telegraph	\$1,250	\$1,250	\$1,250	\$1,250	\$950	\$950	\$950	\$950	\$950	\$950	\$950	\$950
54 Postage/Freight	\$150	\$150	\$150	\$150	\$175	\$175	\$175	\$175	\$175	\$175	\$175	\$175
55 Copy Equipment	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
56 Other Equipment & Rental	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
57 Office Supplies	\$250	\$250	\$250	\$250	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150
58 Office Equipment Maintenance	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
59 Data Processing	\$150	\$150	\$150	\$150								
60 Maps	\$50	\$50	\$50	\$50					\$1,000	\$1,000	\$1,000	\$1,000
61 Drafting & Printing	\$50	\$50	\$50	\$50					\$2,500	\$2,500	\$2,500	\$2,500
62 Transportation - Air & Car	\$850	\$850	\$850	\$850	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
63 Meals & Entertainment	\$200	\$200	\$200	\$200	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
64 Misc. Travel Expense	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
65 Env-Depreciable Equipment	\$100	\$100	\$100	\$100								
66 Env-Operational Analyses	\$2,000	\$2,000	\$2,000	\$2,000								
67 Environmental - Miscellaneous	\$200	\$200	\$200	\$200								
68 Safety	\$250	\$250	\$250	\$250								
69 Backhoe Maintenance	\$700	\$700	\$700	\$700								
70 Misc. Chemicals	\$2,450	\$2,450	\$2,450	\$2,450								
71 Utilities - Electric, Wellfield	\$12,053	\$12,053	\$12,053	\$12,053								
72 Utilities - Electric, Brine Concentrator	\$32,850	\$32,850	\$32,850	\$32,850								
73 Utilities - Electric, Plant and RO	\$5,896	\$5,896	\$5,896	\$5,896								
74 Submersible Pumps	\$500	\$500	\$500	\$500								
75 Submersible Motors	\$500	\$500	\$500	\$500								
76 Field Piping & Valves	\$400	\$400	\$400	\$400								
77 Meters	\$50	\$50	\$50	\$50								
78 Misc. Field	\$100	\$100	\$100	\$100								
79 Handtools	\$100	\$100	\$100	\$100								
80 Plant Piping & Valves	\$200	\$200	\$200	\$200								
81 Plant Brine Conc Inst.	\$50	\$50	\$50	\$50								
82 Pumps	\$500	\$500	\$500	\$500								
83 Plant Electrical	\$100	\$100	\$100	\$100								
84 Filters	\$1,100	\$1,100	\$1,100	\$1,100								
85 Evaporation Ponds	\$50	\$50	\$50	\$50								
86 Roads	\$100	\$100	\$100	\$100								
87 Gas, Oil, Grease	\$1,150	\$1,150	\$1,150	\$1,150								
88 Disposal - B.C. Solids	\$6,541	\$6,541	\$6,541	\$6,541								
89 RO Unit	\$250	\$250	\$250	\$250								
90 Lab Supplies	\$100	\$100	\$100	\$100								
91 RO Membrane	\$3,000	\$3,000	\$3,000	\$3,000								
92 Field Equip. Repairs & Maint.	\$150	\$150	\$150	\$150								
93 Vehicle Repairs & Maint.	\$550	\$550	\$550	\$550								
94 Vehicles - Pickups	\$500	\$500	\$500	\$500								
95 Vehicles - Tractors & Trucks	\$1,000	\$1,000	\$1,000	\$1,000								
96 Vehicles - Automobiles	\$500	\$500	\$500	\$500								
97												
98 Monthly Total	\$130,228	\$130,228	\$130,228	\$130,228	\$43,242	\$43,242	\$43,242	\$43,242	\$46,742	\$46,742	\$46,742	\$46,742
99 Cumulative Total	\$6,381,191	\$6,511,420	\$6,641,648	\$6,771,877	\$6,815,119	\$6,858,361	\$6,901,603	\$6,944,845	\$6,991,587	\$7,038,329	\$7,085,071	\$7,131,813
100 Period Days	31	29	31	30	31	30	31	31	30	31	30	31

**D & D COSTS ARE ITEMIZED ON A TASK BASIS**



**GROUND WATER RESTORATION Sampling**

Units      Sub Total      Total

**Assumptions:**

Labor from staff  
Routine monitoring is covered in the restoration budget  
One baseline well sampled per acre of wellfield (40)  
One sample taken before restoration starts  
Baseline wells sampled once per year during restoration  
Stability samples taken every 2 months for six months

**I      Monitoring and sampling costs****A.      Restoration well sampling**

Estimated restoration period (years)	4.4		
1      Well Sampling prior to restoration start			
# of wells	40		
\$/sample	\$380	\$15,200	
2      Restoration progress sampling			
# of wells	40		
\$/sample	\$120		
Samples/year	1	\$19,200	

**B.      Stability**

Estimated stabilization period (months)	6		
# of wells	40		
Sample freq. mos.	2		
\$/sample	\$380		
Total		\$45,600	

**Total monitoring and sampling costs****\$80,000**

1. Cement shrinkage	120%
2. Cement cost per 94 pound sack	\$6.83
3. Cost for Gel per 50 pound sack	\$5.60
4. Holes Plugged per day	6
5. Engineer/gelogist - per year (assume 20% time for this project)	\$50,000.00
6. Backhoe & operator - per hour	\$37.75
8. Cementer Contractor per well for cementing 800 ft hole	\$450.00
9. Pump Hoist Contractor per well for cementing 800 ft hole	\$375.00
10. Wellfield acreage fully developed	40 ac.
11. Assume Cement Mixture will be 12.5 ppg with 2% gel	
12. SX required for 800 ft (6" csg) of 12.5 ppg cement with 2% Gel (without shrinkage factor)	75.3
13. SX gel required for 75.3 SX Cmt (without shrinkage factor)	2.8
14. SX required for 800 ft (5" csg) of 12.5 ppg cement with 2% Gel (without shrinkage factor)	52.3
15. SX gel required for 52.3 SX Cmt (without shrinkage factor)	1.9

[illegible]

	1	Labor				
		Number of persons	3			
		Ft³/day	200			
		Number of days	5			
		\$/day/person	\$120			
		Total RO dismantling and loading cost	\$1,800		\$1,800	
F		Brine concentration equipment				
		BC (ft³)	4000			
	1	Labor				
		Number of persons	3			
		Ft³/day	200			
		Number of days	20			
		\$/day/person	\$120			
		Total BC dismantling and loading cost	\$7,200		\$7,200	\$52,386
		Total process equipment removal and loading costs				
II.		<b>Transportation and Disposal Costs (NRC-Licensed Facility)</b>				
A.		Tankage (plastic and fiberglass)				
		Volume of tank construction material (ft³)	1300	405		
		Volume of disposal assuming 50% void space (ft³)	1950	607.5		
		Transportation and disposal unit cost (\$/ft³)	\$3.85	\$3.85		
		Subtotal tankage transportation and disposal costs	\$7,508	\$2,339	\$9,846	
B.		PVC pipe				
		Volume of crushed PVC pipe (ft³)	108	108		
		Volume of disposal assuming 50% void space (ft³)	162	162		
		Transportation and disposal unit cost (\$/ft³)	\$3.85	\$3.85		
		Subtotal PVC pipe transportation and disposal costs	\$624	\$624	\$1,247	
C.		Pumps				
		Volume of pumps (ft³)	145	45		
		Volume of disposal assuming 50% void space (ft³)	217.5	93		
		Transportation and disposal unit cost (\$/ft³)	\$3.85	\$3.85		
		Total dryer transportation and disposal costs per facility	\$837	\$358	\$1,195	
D.		Dryer				
		Dryer volume (ft³)		2000		
		Volume for disposal assuming dryer remains intact (ft³)		2000		
		Transportation and disposal unit cost (\$/ft³)		\$3.85		
		Total tryer transportation and disposal costs per facility		\$7,700	\$7,700	
E		Reverse osmosis unit				
		RO volume (ft³)	1000			
		Volume for disposal assuming RO remains intact (ft³)	1000			
		Transportation and disposal unit cost (\$/ft³)	\$3.85			
		Total dryer transportation and disposal costs	\$3,850		\$3,850	
F		Brine concentrator				
		BC volume (ft³)	4000			
		Volume for disposal assuming BC remains intact (ft³)	4000			
		Transportation and disposal unit cost (\$/ft³)	\$3.85			
			\$15,400		\$15,400	
		Total equipment transportation and disposal costs				\$19,989
III.		<b>Health and Safety Costs</b>				
		Radiation safety equipment	1000	1000	\$2,000	
		Total health and safety costs				\$2,000
<b>TOTAL EQUIPMENT REMOVAL AND DISPOSAL COSTS</b>						<b>\$74,375</b>

**VI. Header Houses**

Total quantity	11	
Average header house volume (ft <sup>3</sup> )	1600	
A. Removal		
Total volume (ft <sup>3</sup> )	17600	
Demolition unit cost per WDEQ Guideline No. 12 (\$/ft <sup>3</sup> )	\$0.15	
Subtotal building demolition costs	\$2,675	
B. Survey and decontamination		
Assumptions:		
Cost per header house	\$200	
Subtotal survey and decontamination costs	\$2,200	
C. Disposal		
Total volume (cy) assume 10% building volume	65	
Volume for disposal assuming 10% void space (cy)	72	
Unrestricted disposal cost of 26.7 \$/yd <sup>3</sup>	\$27.00	
Subtotal on-site disposal costs	\$1,936	
Header house removal and disposal costs per wellfield		\$6,811

**V. Soil**

Assumptions:		
Acres of wellfield.	40	
Surveys by staff.		
Depth of contaminated soil (in)	2	
Percent of wellfield contaminated	1	
Soil analysis each	\$100	
A. Survey costs		
100 soil sample analysis	\$10,000	
Flags, and supplies	\$1,000	
Subtotal survey costs	\$11,000	
B. Disposal costs		
Backhoe one week	\$1,510	
Volume to disposal	2904	
NRC disposal unit cost (ft <sup>3</sup> )	<b>\$3.85</b>	
Subtotal NRC-licensed facility disposal costs	<b>\$11,180</b>	
Wellfield soil D & D costs		<b>\$22,180</b>

**TOTAL WELLFIELD BUILDINGS AND EQUIPMENT  
REMOVAL AND DISPOSAL COSTS**

**\$120,402**

## Building and Demolition and Disposal

## Assumptions:

Churchrock offices will be of modular design and sold

Crownpoint offices will be left intact after the project ends

	<u>Description</u>	<u>CR Satellite</u>	<u>Central Plant</u>	<u>Dryer</u>	<u>Combined</u>
<b>I.</b>	<b>Decontamination Costs</b>				
A.	Wall decontamination				
	Area to be decontaminated (ft <sup>2</sup> )	12167	9600	3400	
	Application rate (gallons/ft)	1	1	1	
	HCl acid wash, including labor (\$/gallon)	\$0.50	\$0.50	\$0.50	
	Subtotal wall decontamination costs	\$6,083	\$4,800	\$1,700	\$12,583
B.	Concrete floor decontamination				
	Area to be decontaminated (ft <sup>2</sup> )	10491	6400	2500	
	Application rate (gallons/ft)	4	4	4	
	HCl acid wash, including labor (\$/gallon)	\$0.50	\$0.50	\$0.50	
	Subtotal concrete floor decontamination costs	\$20,982	\$12,800	\$5,000	\$38,782
<b>II.</b>	<b>Demolition Costs</b>				
A.	Building				
	Dryer bldg. demolition unit cost of \$0.75/ft <sup>3</sup> for additional radiation safety precautions.				
	Volume of building (ft <sup>3</sup> )	209820	192000	42500	
	Demolition unit cost per WDEQ Guideline No. 12 (\$/ft <sup>3</sup> )	\$0.15	\$0.15		
	Dryer building demolition unit cost (\$/ft <sup>3</sup> )			\$0.75	
	Subtotal building demolition costs	\$31,893	\$29,184	\$31,875	\$92,952
B.	Concrete floor				
	Area of concrete floor (ft <sup>2</sup> )	10491	6400	2500	
	Demolition unit cost (ft <sup>3</sup> ) per local estimate	\$1.20	\$1.20	\$1.20	
	Subtotal concrete floor demolition costs	\$12,589	\$7,680	\$3,000	\$23,269
<b>III.</b>	<b>Disposal Costs</b>				
A.	Building				
	Volume of building (cy)	7771	7111	1574	
1	Unrestricted				
	Unrestricted disposal cost of 26.7 \$/yd <sup>3</sup>	\$27.00	\$27.00	\$27.00	
	Building will collapse to 10% of standing volume	777	711	157	
	Percentage (%) on site	100	100	90	
	Subtotal unrestricted disposal costs	\$20,982	\$19,200	\$3,825	\$44,007
2	Restricted				
	Percentage (%)			10	
	Volume for disposal (ft <sup>3</sup> )			425	
	Volume for disposal assuming 10% void space (ft <sup>3</sup> )			467.5	
	Transportation and disposal unit cost (\$/ft <sup>3</sup> )			\$3.85	
	Subtotal NRC-licensed facility disposal costs			\$1,800	\$1,800
	Subtotal building disposal costs				
B.	Concrete floor				

**IV. Pond Decommissioning (350')**

## Assumptions:

	Sediment disposal of 6 inches (ft3)	26797	
	Pond dimension are 350 ft x 350 ft. x 20 ft. or 3 acres	3	
	Disposal of inner and outer liners		
	Soil below the liners is not contaminated		
	Folded liner volume each (ft3).	2700	
	Backhoe hourly rate (w/operator)	\$37.75	
	Buldozer hourly rate (w/operator)	\$37.75	
A.	Removal and loading		
1	Equipment		
	Number of backhoes	1	
	Number of hours	40	
	Number of bulldozers	1	
	Number of hours	40	
2	Labor		
	Number of persons	3	
	Number of hours	40	
	\$/hr/person	\$15.00	
	Total removal and loading costs	\$4,820.00	
B.	Transportation and disposal		
	Transportation and disposal unit costs (\$/ft3)	\$3.85	
	Total transportation and disposal costs (sediment and 1 liner)	\$113,563	
	Subtotal pond reclamation costs (1 ponds)		\$118,383

**V. Soil**

## Assumptions:

	Acres of plant area	6	
	Surveys by staff		
	Depth of contaminated soil (in)	2	
	Percent of wellfield contaminated	1	
	Soil analysis each	\$100	
A.	Survey costs		
	50 soil sample analysis	\$5,000	
	Flags, and supplies	\$250	
	Subtotal survey costs	\$5,250	
B.	Disposal costs		
	Backhoe one week	\$1,510	
	Volume to disposal	436	
	NRC disposal unit cost (ft3)	\$3.85	
	Subtotal NRC-licensed facility disposal costs	\$1,677	
	Plant area soil D & D costs		\$6,927

**VI Final Satellite Area Reclamation**

## Assumptions:

	Area of disturbance (acres)	10	
A.	Ripping overburden with dozer		
	Ripping unit cost per WDEQ Guideline No. 12, App.11 (\$/acre)	\$581.67	
	Subtotal ripping costs	\$5,817	
B.	Disking and seeding		
	Disking/seeding unit cost (\$/acre)	\$200.00	
	Subtotal disking/seeding costs	\$2,000	
	Subtotal surface reclamation costs		\$7,817

**TOTAL WELLFIELD AND SATELLITE SURFACE RECLAMATION COSTS****\$185,846**

Revised October 15, 2010

**HRI CROWNPOINT URANIUM PROJECT**  
**Financial Assurance Plan for Churchrock Section 8 and the Crownpoint Central Plant**  
**Summary**

Category	Project Total	Contingency/ Profit 15%	Contingency/ Profit 25%	Initial Surety	Contingency/ Profit 15%	Contingency/ Profit 25%
Groundwater Restoration	\$7,131,813	\$1,069,772		\$2,377,271	\$356,591	
Groundwater Stability Analysis	\$80,000	\$12,000		\$80,000	\$12,000	
Well Plugging	\$745,512	\$111,827		\$248,504	\$37,276	
Equipment Removal	\$74,375	\$11,156		\$74,375	\$11,156	
Wellfield D & D	\$120,402		\$30,100	\$120,402		\$30,100
Building D & D	\$255,847		\$63,962	\$255,847		\$63,962
Surface Reclamation	\$185,846		\$46,461	\$185,846		\$46,461
<b>Totals</b>	<b>\$8,593,794</b>	<b>\$1,204,755</b>	<b>\$140,524</b>	<b>\$3,342,244</b>	<b>\$417,023</b>	<b>\$140,524</b>
<b>Contingency/Profit</b>			<b>\$1,345,278</b>			<b>\$557,546</b>
<b>Total Surety</b>			<b>\$9,939,072</b>			<b>\$3,899,790</b>

Rev. October 15, 2010

## ABBREVIATIONS/ACRONYMS

\$	Dollars
\$/Kgal	Dollars per 1000 gallons
avg	average
BBLs	42 Gallon Barrel
ft	feet
ft <sup>2</sup>	square feet
ft <sup>3</sup> /CU FT	cubic feet
gal	gallons
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
HaOH	Caustic Soda
OD	Outside Diameter
PPE	personal protective equipment
PV	Pore Volume
reqm't	requirement
RO	Reverse Osmosis
SXS	sacks (94 lbs. cement, 50 lbs. gel)
WDEQ	Wyoming Department of Environmental Quality
WDW	Waste Disposal Well



yd<sup>3</sup>/CU YD

cubic yards

yr

year