



# CROW BUTTE RESOURCES, INC.

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**STEVE MAGNUSON**

Vice President and Manager of Operations

September 29, 2000

Mr. Philip Ting, Chief  
Fuel Cycle Licensing Branch  
Division of Fuel Cycle Safety and Safeguards  
Mail Stop T8A-33  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001.

RE: Docket No. 40-8943  
License No. SUA-1534  
2000 Surety Estimate

Dear Mr. Ting:

Enclosed is the annual update to the surety estimate for the Crow Butte Mine. The year 2001 estimate is \$12,026,303.

Upon approval CBR will provide a secured letter of credit on the renewal date to the State of Nebraska in an amount equal to the updated surety estimate.

If you have any questions regarding this estimate, please contact me.

Sincerely,

Steven D. Magnuson  
Vice President/Manager of Operations

SM/kc

Enclosure

NMSSOI Public

**CROW BUTTE RESOURCES, INC.**  
**CROW BUTTE IN-SITU MINE**  
**9-1-00**  
**2001 RESTORATION/RECLAMATION SURETY COST ESTIMATE**

**SUMMARY**

A.	Groundwater Restoration	\$5,925,411
B.	Wellfield Reclamation	2,621,060
C.	Commercial Plant Reclamation/Decommissioning	374,689
D.	R.O. Building Reclamation/Decommissioning	55,101
E.	Evaporation Pond Reclamation	490,295
F.	Miscellaneous Site Reclamation	62,470
G.	Deep Disposal Well Reclamation	67,599
H.	I - 196 Brule Aquifer Restoration	<u>24,418</u>
	Subtotal	\$ 9,621,043
I.	Contract Administration (10%)	962,104
J.	Contingency (15%)	<u>1,443,156</u>
	<b>TOTAL</b>	<b><u>\$ 12,026,303</u></b>

**BASIS OF COSTS:**

Costs used in the surety bond calculations are based on the following rationale:

1. **Labor Rates:** Labor rates are based on 1999 actual CBR labor for plant and wellfield operations including benefits and payroll taxes. Field labor at \$112/man-day was escalated using the Consumer Price Index (CPI) 12-month unadjusted rate for the period ending July 2000 of 3.5%, resulting in a revised rate of \$116/man-day. The Engineer rate of \$6,526/month was escalated to \$6,754/month and the Radiation Technician rate of \$5,212/month was escalated to \$5,394/month using this CPI rate.
2. **Disposal Costs:** Disposal costs of byproduct material are based on a current disposal agreement held by CBR. Transport costs are escalated over the 2000 surety estimated using the CPI rate of 3.5%.

	<u>Fee</u>	<u>Transport Cost</u>	<u>Total</u>
Packaged Material	\$10.00/cf	\$2.50/cf	\$12.50/cf
Soil, etc.	\$81.00/cy	\$68.30/cy	\$149.31/cy

Disposal of non-byproduct material will be at a licensed landfill per NDEQ permit. \$10 load fee plus transport cost of \$360/20 tons @ 30 miles.

3. **Power Costs** Based on actual 2000 power costs including demand factor, energy charge, taxes, and service fees, \$0.05/Kw-hr.
4. **Equipment Costs:**

<u>Equipment</u>	<u>Base(1) Rental Cost (\$/hr)</u>	<u>Labor Cost (\$/hr)</u>	<u>Oper. Cost (\$/hr)</u>	<u>Fuel(2) Cost (\$/hr)</u>	<u>Mob. &amp;(3) Demob (\$/hr)</u>	<u>Total (\$/hr)</u>
IT12 Loader	16	14	9	4.32	2	45.32
Shredder	12	--	--	incl.	incl.	12
Bulldozer (D8N)	88	14	19	13	2	136
Smeal	42	incl.	incl.	incl.	incl.	42
Mixing Unit	12	--	--	incl.	incl.	12

- (1) From Nebraska Machinery rental rates for IT12 and D8N. Shredder, Smeal, and mixing units are estimates.
- (2) From Caterpillar Handbook, Edition 19 fuel consumption using \$1.08/gal current diesel cost.
- (3) Based on \$2.08/mile at 90 miles one way x 2 trips/176 hours.

**A. GROUNDWATER RESTORATION**

Restoration costs are based on restoring Mine Units (MU) 1, 2, 3, 4, 5, and 6. MU-1, 2, 3, 4, and 5 are based on actual installed information. Construction of MU-6, 7, and 8 is underway.

Mine Unit	Thickness (ft)	No. Patterns	Pattern Size (ft <sup>2</sup> )	Porosity	Pore Volume (gals)	Mine Unit Total Area (Acres)
MU-1	19.6	38	10,624	0.29	17,165,000	9.3
MU-2	16.3	52	9,800	0.29	18,018,500	11.7
MU-3	12.5	57	10,284	0.29	15,894,490	13.4
MU-4	12.9	96	10,765	0.29	28,918,420	23.7
MU-5	14.4	187	7,557	0.29	44,142,110	32.4
MU-6	16.2	187	7,561	0.29	49,686,162	32.5
MU-7	15.0	200	10,000	0.29	65,076,000	45.9
MU-8	15.0	50	10,000	0.29	16,269,000	11.5

**MU-1**

- 1) Remove 1 pore volumes (PV) groundwater transfer/sweep.
- o Produce at 1,150 gpm with (36) 32 gpm downhole pumps (5 HP).
  - o Total horsepower = 180 HP
  - o Time to do work:  
1 PV x 17,165,000 gal/PV x 1 min/1,150 gal x  
1 hour/60 min = 249 hours
  - a. Power Cost:  
249 hours x 180 HP x .75 Kw/HP x \$0.05/Kw-hr = \$1,681
  - b. Labor Cost:  
249 hours x 2 man-day/8 hours x \$116/man-day = 7,221
- \$8,902
- or \$0.52/1000 gal

- 2) Treat 6 PV with R.O. and re-inject permeate using a 400 gpm R.O. unit.
- o 6 PV x 17,165,000 gal/PV x 1 min/400 gal x 1 hr/60 min = 4,291 hours
  - a. Power cost:  
Downhole pump HP 62 HP  
400 gpm/32 gpm/pump x 5 HP/pump 25 HP  
Injection Pump  
R.O. System 164 HP  
R.O. Unit pump 40 HP  
Permeate pump 8 HP  
Waste pump 299 HP
- 4,291 hrs x 299 HP x .75 Kw/HP x \$0.05/Kw-hr = \$48,113
- b. Chemical Cost:  
Antiscalant: \$16/gal x 0.20 gal/hr x 4,291 hrs = 13,731  
Reductant: \$0.275/lb x 0.56 lb Na2S/1000gal x 6PV x 17,165,000 gal/PV = 15,860
  - c. Labor Cost:  
4,291 hrs x 2 man-day/8 hours x \$116/man-day = \$124,439
- \$202,143
- Total or \$1.96/1,000 gal

- 3) Recirculate 1 PV with reductant @ 1,150 gpm.
- a. Power Cost:  
(36) 5 HP downhole pumps = 180 HP  
(1) Injection pump = 30 HP  
Total HP 210 HP  
210 HP x 249 hrs x .75 Kw/HP x \$0.05/Kw-hr = \$ 1,961
  - b. Chemical Cost:  
1 PV x 17,165,000 gal/PV x 0.56 lb Na2S/1000 gal x \$0.275/lb = 2,643
  - c. Labor Cost: (see above) 7,221
- \$11,825
- Total or \$0.69/1000 gal

4) Spare parts, filters, consumables, etc. for items 1-3 above are estimated to be \$16,797/yr.		
o Time to do work is 4,789 hours/24 hours = 199 days		
a. \$16,797/yr x 199/365=		\$9,158
5) Sampling and Monitoring.		
o Number of wells to be sampled are a minimum of 10 per mine unit or 1/acre plus any monitor wells on excursion.		
a. Sample prior to restoration: 10 wells x \$130/well (32 parameter suite) =	\$1,300	
b. Phase I sampling (GW transfer/sweep): 10 wells x \$47/well (6 parameters) x 1 month =	470	
c. Phase 2 sampling (4PV R.O., 1PV reductant): 10 wells x \$130/well x 6 months =	7,800	
d. Phase 3 sampling (stabilization): 10 wells x \$130/well x 6 months =	7,800	
e. Monitor well sampling: 14 wells x 2 samples/month x \$47/well x 13 months =	17,108	
f. Other lab analysis (radon, urinalysis, etc): \$806/month x 5 months =	<u>4,030</u>	
Total sampling and monitoring		\$ 38,508
6) Supervisory labor for restoration work (including 33% overhead factor)		
a. (1) Engineer \$6,474/month x 7 months =	\$45,318	
b. (1) Radiation Technician \$5,394/month x 7 months = (Operator wages included in above calculations)	<u>37,758</u>	
		<u>\$ 83,076</u>
<b>MU-1 TOTAL</b>		<b>\$ 353,612</b>

MU-2

1) Remove 1 PV, gw transfer/sweep.		
o 1 PV x 18,018,500 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 261 hours		
a 1 PV x 18,018,500 gal/PV x \$0.52/1000 gal =		\$9,370
2) Treat 6 PV with R.O. and inject permeate.		
o 6 PV x 18,018,500 gal/PV x 1 min/300 gal x 1 hr/60 min = 4,004 hours		
a 6 PV x 18,018,500 gal/PV x \$1.96/1000 gal =		\$211,898
3) Recirculate 1 PV with reductant.		
o Time = 261 hours		
a 1PV x 18,018,500 gal/PV x \$0.69/1000 gal =		\$12,433
4) Spare parts, etc.		
o Total time to do work = 189 days		
a \$16,797/yr x 189/365 =		\$8,698
5) Sampling and monitoring - 12 restoration wells plus 14 monitor wells.		
a Sample prior to restoration: 12 wells x \$130/well (32 parameter suite) =	\$ 1,560	
b. Phase I sampling (gw transfer/sweep): 12 wells x \$47/well x 1 month (6 parameters) =	564	
c. Phase 2 sampling (4PV R.O., 1PV reductant) 12 wells x \$130/well x 6 months =	9,360	
d. Phase 3 sampling (stabilization): 12 wells x \$130/well x 6 months =	9,360	
e. Monitor well sampling: 13 wells x 2 samples/month x \$47/well x 13 months =	15,886	
f. Other lab analysis (radon, urinalysis, etc) \$806/month x 5 months =	<u>4,030</u>	
		\$ 40,760
7) Supervisory Labor (same as MU-1).		<u>\$ 83,076</u>
<b>MU-2 TOTAL</b>		<b>\$ 366,235</b>

**MU-3**

1)	Remove 1 PV, gw transfer/sweep.		
o	1 PV x 15,894,490 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 230 hours		
a.	1 PV x 15,894,490 gal/PV x \$0.52/1000 gal =		\$8,265
2)	Treat 6 PV with R.O. and inject permeate.		
o	6 PV x 15,894,490 gal/PV x 1 min/300 gal x 1 hr/60 min = 3,532 hours		
a.	6PV x 15,894,490 gal/PV x \$1.96/1000 gal =		\$186,919
3)	Recirculate 1 PV with reductant.		
o	Time = 230 hours		
a.	1PV x 15,894,490 gal/PV x \$0.69/1000 gal =		\$10,967
4)	Spare parts, etc.		
o	Total time to do work = 166 days		
a.	\$16,797/yr x 166/365 =		\$7,369
5)	Sampling and monitoring 18 restoration wells plus 13 monitor wells.		
a.	18 wells x \$130/well =	\$2,340	
b.	18 wells x \$47/well x 1 months =	846	
c.	18 wells x \$130/well x 5 months =	11,700	
d.	18 wells x \$130/well x 6 months =	14,040	
e.	13 wells x 2 samples/month x \$47/well x 12 months =	14,664	
f.	Other lab: \$806/month x 6 months =	<u>4,836</u>	
	Total		\$ 48,426
6)	Supervisory Labor.		
a.	(1) Engineer \$6,474/month x 6 months =	\$38,844	
b.	(1) Radiation Technician \$5,394/month x 6 months = (Operator wages included in above calculations)	<u>32,364</u>	
			<u>\$ 71,208</u>

**MU-3 TOTAL**

**\$ 333,154**

MU-4

1)	Remove 1 PV, gw transfer/sweep.		
o	1 PV x 28,918,420 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 419 hours		
a.	1 PV x 28,918,420 gal/PV x \$0.52/1000 gal =		\$15,038
2)	Treat 6 PV with R.O. and inject permeate.		
o	6 PV x 28,918,420 gal/PV x 1 min/300 gal x 1 hr/60 min = 6,426 hours		
a.	6 PV x 28,918,420 gal/PV x \$1.96/1000 gal =		\$340,080
3)	Recirculate 1 PV with reductant.		
o	Time = 419 hours		
a.	1 PV x 28,918,420 gal/PV x \$0.69/1000 gal =		\$19,953
4)	Spare parts, etc.		
o	Total time to do work = 303 days		
a.	\$16,797/yr x 303/365 =		\$13,944
5)	Sampling and monitoring 43 restoration wells plus 29 monitor wells.		
a.	43 wells x 130/well=	\$5,590	
b.	43 wells x 47/well x 1 months=	2,021	
c.	43 wells x 130/well x 9 months=	50,310	
d.	43 wells x 130/well x 6 months=	33,540	
e.	29 wells x 2 samples/month x 47/well x 16 months =	43,616	
f.	Other lab: \$806/month x 10 months=	<u>8,060</u>	
			\$143,137
6)	Supervisory Labor:		
a.	(1) Engineer: \$6,474/month x 10 months=	\$64,740	
b.	(1) Radiation Technician: \$5,394/month x 10 months (Operator wages included in above calculations)	<u>53,940</u>	
			<u>\$118,680</u>
	<b>MU-4 TOTAL</b>		<b>\$ 650,832</b>

**MU-5**

1)	Remove 1 PV, gw transfer/sweep.		
o	1 PV x 44,142,110 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 640 hours		
a.	1 PV x 44,142,110 gal/PV x \$0.52/1000 gal =		\$22,954
2)	Treat 6 PV with R.O. and inject permeate.		
o	6 PV x 44,142,110 gal/PV x 1 min/300 gal x 1 hr/60 min = 9,809 hours		
a.	6 PV x 44,142,110 gal/PV x \$1.96/1000 gal =		\$519,111
3)	Recirculate 1 PV with reductant.		
o	Time = 640 hours		
a.	1 PV x 44,142,110 gal/PV x \$0.69/1000 gal =		\$30,458
4)	Spare parts, etc.		
o	Total time to do work = 462 days		
a.	\$16,797/yr x 462/365 =		\$21,261
5)	Sampling and monitoring 33 restoration wells plus 52 monitor wells.		
a.	33 wells x \$130/well=	\$4,290	
b.	33 wells x \$47/well x 1 months=	1,551	
c.	33 wells x 130/well x 14 months=	60,060	
d.	33 wells x 130/well x 6 months=	25,740	
e.	52 wells x 2 samples/month x 47/well x 21 months =	102,648	
f.	Other lab: \$806/month x 15 months=	<u>12,090</u>	
			\$206,379
6)	Supervisory Labor:		
a.	(1) Engineer: \$6,474/month x 15 months=	\$97,110	
b.	(1) Radiation Technician: \$5,394/month x 15 months (Operator wages included in above calculations)	<u>80,910</u>	
			<u>\$178,020</u>
	<b>MU-5 TOTAL</b>		<b>\$ 978,183</b>

**MU-6**

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 49,686,162 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 720 hours		
	a. 1 PV x 49,686,162 gal/PV x \$0.52/1000 gal =		\$25,836
2)	Treat 6 PV with R.O. and inject permeate.		
	o 6 PV x 49,686,162 gal/PV x 1 min/300 gal x 1 hr/60 min = 16,562 hours		
	a. 6 PV x 49,686,162 gal/PV x \$1.96/1000 gal =		\$584,309
3)	Recirculate 1 PV with reductant.		
	o Time = 720 hours		
	a. 1PV x 49,686,162 gal/PV x \$0.69/1000 gal =		\$ 34,283
4)	Spare parts, etc.		
	o Total time to do work = 750 days		
	a. \$16,797/yr x 750/365 =		\$34,514
5)	Sampling and monitoring 33 restoration wells plus 60 monitor wells.		
	a. 33 wells x \$130/well=	\$ 4,290	
	b. 33 wells x \$47/well x 1 months=	1,551	
	c. 33 wells x 130/well x 23 months=	98,670	
	d. 33 wells x 130/well x 6 months=	25,740	
	e. 60 wells x 2 samples/month x 47/well x 23 months =	129,720	
	f. Other lab: \$806/month x 24 months=	<u>19,344</u>	
			\$ 279,315
6)	Supervisory Labor:		
	a. (1) Engineer: \$6,474/month x 24 months=	\$ 155,376	
	b. (1) Radiation Technician: \$5,394/month x 24 months (Operator wages included in above calculations)	<u>129,456</u>	
			<u>\$ 284,832</u>
	<b>MU-6 TOTAL</b>		<b><u>\$ 1,243,089</u></b>

MU-7

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 65,076,000 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 943 hours		
	a. 1 PV x 65,076,000 gal/PV x \$0.52/1000 gal =		\$ 33,840
2)	Treat 6 PV with R.O. and inject permeate.		
	o 6 PV x 65,076,000 gal/PV x 1 min/300 gal x 1 hr/60 min = 14,461 hours		
	a. 6 PV x 65,076,000 gal/PV x \$1.96/1000 gal =		\$ 765,293
3)	Recirculate 1 PV with reductant.		
	o Time = 943 hours		
	a. 1PV x 65,076,000 gal/PV x \$0.69/1000 gal =		\$ 44,902
4)	Spare parts, etc.		
	o Total time to do work = 681 days		
	a. \$16,797/yr x 681/365 =		\$31,339
5)	Sampling and monitoring 46 restoration wells plus 41 monitor wells.		
	a. 46 wells x \$130/well=	\$5,980	
	b. 46 wells x \$47/well x 2 months=	4,324	
	c. 46 wells x 130/well x 21 months=	125,580	
	d. 46 wells x 130/well x 6 months=	35,880	
	e. 41 wells x 2 samples/month x 47/well x 29 months =	111,766	
	f. Other lab: \$806/month x 23 months=	<u>18,538</u>	
			\$ 302,068
6)	Supervisory Labor:		
	a. (1) Engineer: \$6,474/month x 23 months=	\$ 148,902	
	b. (1) Radiation Technician: \$5,394/month x 23 months (Operator wages included in above calculations)	<u>124,062</u>	
			<u>\$ 272,964</u>

**MU-7 TOTAL**

**\$ 1,450,406**

**MU-8**

- 1) Remove 1 PV, gw transfer/sweep.
  - o 1 PV x 16,269,000 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 236 hours
  - a. 1 PV x 16,269,000 gal/PV x \$0.52/1000 gal = \$8,460
  
- 2) Treat 6 PV with R.O. and inject permeate.
  - o 6 PV x 16,269,000 gal/PV x 1 min/300 gal x 1 hr/60 min = 5,423 hours
  - a. 6 PV x 16,269,000 gal/PV x \$1.96/1000 gal = \$191,323
  
- 3) Recirculate 1 PV with reductant.
  - o Time = 236 hours
  - a. 1PV x 16,269,000 gal/PV x \$0.69/1000 gal = \$11,226
  
- 4) Spare parts, etc.
  - o Total time to do work = 246 days
  - a. \$16,797/yr x 246/365 = \$11,321
  
- 5) Sampling and monitoring 30 restoration wells plus 55 monitor wells.
  - a. 30 wells x \$130/well= \$3,900
  - b. 30 wells x \$47/well x 1 months= 1,410
  - c. 30 wells x 130/well x 8 months= 31,200
  - d. 30 wells x 130/well x 6 months= 23,400
  - e. 30 wells x 2 samples/month x 47/well x 15 months = 77,550
  - f. Other lab: \$806/month x 15 months= 12,090

**\$149,550**
  
- 6) Supervisory Labor:
  - a. (1) Engineer: \$6,474/month x 15 months= \$97,110
  - b. (1) Radiation Technician: \$5,394/month x 15 months (Operator wages included in above calculations) 80,910

**\$178,020**

**MU-8 TOTAL**

**\$549,900**

**TOTAL MU-1, 2, 3, 4, 5, 6, 7, and 8 RESTORATION COST**

**\$5,925,411**

**B. WELLFIELD RECLAMATION**

Wellfield Reclamation costs are based on removing and disposing of the wellfield pipe at a licensed facility. The soil around the production wells will also be removed and disposed of at a licensed facility.

Mine Unit	2" Prod & Inj. Lines (ft)	#3/8" O2 Hose	4-1/4" Stinger (ft)	2" Prod. Downhole Pipe	Producers	Injectors	SM	CM
MU-1	30,000		43,200	15,200	38	72	3	11
MU-2	34,000		47,400	20,800	52	79	3	10
MU-3	39,520		57,400	22,800	57	96	3	10
MU-4	68,900		101,400	38,400	96	169	11	18
MU-5	106,080	66,300	0	74,800	187	221	25	27
MU-6	128,700		91,200	74,800	187	309	28	32
MU-7	136,500		97,500	80,000	200	325	25	16
MU-8	20,800		30,000	12,000	30	50	25	30

Pipe Volumes:

<u>Normal Pipe Size</u>	<u>Wall Thickness (Inches)</u>	<u>Pipe O.D (Inches)</u>	<u>Volume per Foot (ft<sup>3</sup>/ft)</u>
3/8" O2 Hose		0.375	0.0313
2" Sch. 40 downhole	0.154	2.375	0.0074
1-1/4" Sch. 40 stinger	0.140	1.660	0.0044
2" SDR 13.5 inj. & prod.	0.14815	2.2963	0.0069
4" SDR 35	0.1143	4.2286	0.0103
6" Sch. 40 process pipe	0.280	6.5600	0.0384
6" Trunkline	0.491	6.566	0.0651
8" Trunkline	0.639	8.548	0.1103
10" Trunkline	0.796	10.654	0.1712
12" Trunkline	0.944	12.637	0.2408

**MU-1**

- 1) Removal/disposal of 2" production and injection lines. Piping is rated SDR 13.5 and constructed of HDPE.
- o Two inch lines are buried 18-24" deep and can be pulled up with a loader. A two man crew should remove 450 ft per day. Two additional men will shred the pipe.
  - a. Remove pipe:  
30,000 ft x 2 man-days/450 ft  
x \$116/man-day = \$15,466
  - b. Shred pipe:  
30,000 ft x 2 man-days/450 ft  
x \$116/man-day = 15,466
  - c. Equipment:
    - o IT12 loader, \$45.32/hr x 533 hours = 24,156
    - o Shredder, \$12/hr x 533 hours = 6,396
  - d. Disposal:  
30,000 ft x .0069 ft<sup>3</sup>/ft x  
\$12.50/ft<sup>3</sup> x 1.25(1) = 3,235
- 64,719
- or \$2.16/ft
- (1) 1.25 factor for void spaces.

- 2) Removal/disposal of trunklines, including trunklines to plant buildings. Piping is rated SDR 13.5.
- a. Remove pipe:  
5,400 ft x 2 man-days/200 ft  
x \$116/man-day = \$6,264
  - b. Shred pipe:  
5,400 ft x 2 man-days/200 ft  
x \$116/man-day = 6,264
  - c. Equipment:
    - o IT12 loader, \$45.32/hr x 216 hours = 9,789
    - o Shredder, \$12/hr x 216 hours = 2,592
  - d. Disposal:  
6" - 1000 ft x 0.0651 ft<sup>3</sup>/ft x  
\$12.50/ft<sup>3</sup> x 1.25 = 1,018  
8" - 4,400 ft x 0.1103 ft<sup>3</sup>/ft x  
\$12.50/ft<sup>3</sup> x 1.25 = 7,584
- 33,511

- 3) Removal/disposal of downhole pipe. Downhole pipe is Sch. 40 PVC.
- o From experience, 10 wells of downhole pipe can be removed each day with a 3 man crew and a Smeal.
  - a. Removal of downhole pipe  
43,200 ft stinger x 3 man-days/6,000 ft  
x \$116/man-day = 2,506  
15,200 ft prod. x 3 man-days/6,000 ft

	x \$116/man-day =	882	
b.	Shred pipe:		
	43,200 ft x 2 man-days/4,500 ft		
	x \$116/man-day =	2,227	
	15,200 ft x 2 man-days/4,500 ft		
	x \$116/man-day =	784	
c.	Equipment:		
	Smeal: \$42/hour x 78 hours =	3,276	
	Shredder: \$12/hour x 104 hours =	1,248	
d.	Disposal:		
	43,200 ft x .0044 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 = 2,970		
	15,200 ft x .0074 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 = <u>1,757</u>		
			\$15,650
	or \$0.26/ft (stinger pipe)		
	or \$0.30/ft (2" production pipe)		

4)	Well Plugging.		
	o Assume 700 ft total depth/well average.		
	a. Materials:		
	Cement - 564 lbs x \$100/ton =	\$28	
	Bentonite - 45 lbs x \$190/ton =	4	
	Salt - 33 lbs x \$56/ton =	1	
	Plug Gel	46	
	Well Cap	10	
	b. Labor:		
	2 hours/well x 1 day/8 hours x 2 man-days		
	x \$116/man-day =	58	
	c. Equipment:		
	Backhoe - 1/2 hour/well x \$46/hour =	23	
	Mixing Unit - 2 hours x \$12/hour =	<u>24</u>	
		\$194/well	
	110 production and injection wells		
	x \$194/well =	\$21,340	
	14 monitor wells x \$194/well =	<u>2,716</u>	
			\$24,056

5)	Wellfield surface area reclamation.		
	o Remove and dispose of contaminated soil around well, scarify and seed well locations		
	a. Remove and dispose of contaminated soil:		
	10 ft <sup>3</sup> /well x 110 wells x		
	1 cy/27 ft <sup>3</sup> x \$149.31/cy =	\$6,083	
	20 hours loader x \$45.32/hour =	906	
	20 man-hours x \$116/8 hours =	290	
	or Removal and disposal at \$66/well		
	b. Recontour and seed		
	9.3 acres x \$300/acre =	<u>2,790</u>	
			\$10,069

6) Wellfield house dismantle and disposal.

o Dismantle wellfield house (10'x20'x10')

a. Labor:

2 man-days x \$116/man-day

\$232

b. Equipment (IT12):

2 hours x \$45.32/hour =

91

c. Disposal at landfill

\$370/load x 6,000 lbs/wellhouse

x 1 load/40,000 lbs =

56

Total per wellhouse

\$379

2 Wellhouses x \$379/wellhouse =

\$758

MU-1 Total

\$148,763

**MU-2**

1)	Removal/disposal of 2" production and injection lines		
a.	34,000 ft x \$2.16/ft =		\$73,440
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.		
a.	Remove pipe: 2,900 ft x 2 man-days/200 ft x \$116/man-day =	\$3,364	
b.	Shred pipe: 2,900 ft x 2 man-days/200 ft x \$116/man-day =	3,364	
c.	Equipment: o IT12 loader, \$45.32/hr x 116 hours = o Shredder, \$12/hr x 116 hours =	5,257 1,392	
d.	Disposal: 6" - 1,600 ft x 0.0651 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 = 8" - 1,300 ft x 0.1103 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	1,627 2,240	
			17,244
3)	Removal/disposal of downhole pipe		
a.	47,400 ft stinger x \$0.26/ft =	12,324	
b.	20,800 ft production x \$0.30/ft =	<u>6,240</u>	
			18,564
4)	Well plugging		
o	131 production and injection wells, 14 monitoring wells		
a.	145 wells x \$194/well =		28,130
5)	Surface reclamation		
a.	Removal/disposal of contaminated soil 131 wells x \$66/well =	8,646	
b.	Recontour, seed 11.7 acres x \$300/acre =	<u>3,510</u>	
			12,156
6)	Wellfield house dismantle/disposal		
a.	3 wellfield houses x \$379/wellfield house =	<u>1,137</u>	

**MU-2 Total**

**\$ 150,671**

**MU-3**

1)	Removal/disposal of 2" production and injection lines		
a.	39,520 ft x \$2.16/ft =		\$85,363
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.		
a.	Remove pipe: 2,950 ft x 2 man-days/200 ft x \$116/man-day =	\$3,422	
b.	Shred pipe: 2,950 ft x 2 man-days/200 ft x \$116/man-day =	3,422	
c.	Equipment: o IT12 loader, \$45.32/hr x 118 hours =	5,348	
	o Shredder, \$12/hr x 118 hours =	1,416	
d.	Disposal: 8" - 1,450 ft x 0.1103 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	2,499	
	12" - 1,500 ft x 0.2408 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	<u>5,644</u>	
			21,751
3)	Removal/disposal of downhole pipe		
a.	57,400 ft stinger x \$0.26/ft =	\$14,924	
b.	22,800 ft production x \$0.30/ft =	<u>6,840</u>	
			21,764
4)	Well plugging o (152 production and injection wells, 14 monitor wells)		
a.	166 wells x \$194/well =		32,204
5)	Surface reclamation		
a.	Removal/disposal of contaminated soil 166 wells x \$66/well =	10,956	
b.	Recontour, seed 13.4 acres x \$300/acre =	<u>4,020</u>	
			14,976
6)	Wellfield house dismantle/disposal		
a.	4 wellfield houses x \$379/wellfield house =	<u>1,516</u>	

**MU-3 Total**

**\$ 177,574**

**MU-4**

1)	Removal/disposal of 2" production and injection lines		
a.	68,900 ft x \$2.16/ft=		\$148,824
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.		
a.	Remove pipe: 7,400 ft x 2 man-days/200 ft x \$116/man-day =	\$8,584	
b.	Shred pipe: 7,400 ft x 2 man-days/200 ft x \$116/man-day =	8,584	
c.	Equipment: o IT12 loader, \$45.32/hr x 296 hours =	13,415	
	o Shredder, \$12/hr x 296 hours =	3,552	
d.	Disposal: 8" - 5,400 ft x 0.1103 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	9,571	
	12" - 2,000 ft x 0.2408 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	<u>7,739</u>	
			51,445
3)	Removal/disposal of downhole pipe		
a.	101,400 ft stinger x \$0.26/ft=	26,364	
b.	38,400 ft production x \$0.30/ft=	<u>11,520</u>	
			37,884
4)	Well plugging o (265 production and injection wells, 18 monitor wells)		
a.	283 wells x \$194/well=		54,902
5)	Surface reclamation		
a.	Removal/disposal of contaminated soil 283 wells x \$66/well =	18,678	
b.	Recontour, seed 25 acres x \$300/acre=	<u>7,500</u>	
			26,178
6)	Wellfield house dismantle/disposal		
a.	5 wellfield houses x \$379/wellfield house =	<u>1,895</u>	
	<b>MU-4 Total</b>		<b>\$ 321,128</b>

**MU-5**

1)	Removal/disposal of 2" production and injection lines		
a.	106,080 ft x \$2.16/ft=		\$229,132
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.		
a.	Remove pipe: 17,800 ft x 2 man-days/200 ft x \$116/man-day =	\$20,648	
b.	Shred pipe: 17,800 ft x 2 man-days/200 ft x \$116/man-day =	20,648	
c.	Equipment: o IT12 loader, \$45.32/hr x 712 hours =	32,268	
	o Shredder, \$12/hr x 712 hours =	8,544	
d.	Disposal: 8" - 3,700 ft x 0.1103 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	6,558	
	12" - 14,100 ft x 0.2408 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	<u>53,051</u>	
			141,717
3)	Removal/disposal of downhole pipe		
a.	Dispose: 66,300 ft hose x 0.0313ft <sup>3</sup> /ft x \$12.50/cf x 1.25=	33,345	
	Remove: 66,300 ft x 1 man-day/1,000ft x \$116/man-day=	7,691	
b.	74,800 ft production x \$0.30/ft=	<u>22,440</u>	
			63,476
4)	Well plugging o (408 production and injection wells, 52 monitor wells)		
a.	460 wells x \$194/well=		89,240
5)	Surface reclamation		
a.	Removal/disposal of contaminated soil 460 wells x \$66/well =	30,360	
b.	Recontour, seed 32 acres x \$300/acre=	<u>9,600</u>	
			39,960
6)	Wellfield house dismantle/disposal		
a.	7 wellfield houses x \$379/wellfield house =	<u>2,653</u>	

**MU-5 Total**

**\$ 566,178**

**MU-6**

1)	Removal/disposal of 2" production and injection lines		
a.	128,700 ft x \$2.16/ft=		\$277,992
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.		
a.	Remove pipe: 12,000 ft x 2 man-days/200 ft x \$116/man-day =	\$13,920	
b.	Shred pipe: 12,000 ft x 2 man-days/200 ft x \$116/man-day =	13,920	
c.	Equipment: o IT12 loader, \$45.32/hr x 480 hours = o Shredder, \$12/hr x 480 hours =	21,754 5,760	
d.	Disposal: 8" - 2,000 ft x 0.1103 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 = 12" - 10,000 ft x 0.2408 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	3,545 <u>38,692</u>	
			97,591
3)	Removal/disposal of downhole pipe		
a.	Dispose: 91,200 ft stinger x 0.26/ft =	23,712	
b.	74,800 ft production x \$0.30/ft=	<u>22,440</u>	
			46,632
4)	Well plugging o (495 production and injection wells, 60 monitor wells)		
a.	555 wells x \$194/well=		107,670
5)	Surface reclamation		
a.	Removal/disposal of contaminated soil 432 wells x \$66/well =	28,512	
b.	Recontour, seed 40.2 acres x \$300/acre=	<u>12,060</u>	
			40,572
6)	Wellfield house dismantle/disposal		
a.	7 wellfield houses x \$379/wellfield house =	<u>2,653</u>	

**MU-6 Total**

**\$ 572,630**

**MU-7**

1)	Removal/disposal of 2" production and injection lines		
a.	136,500 ft x \$2.16/ft=		\$294,840
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.		
a.	Remove pipe: 5,000 ft x 2 man-days/200 ft x \$116/man-day =	\$5800	
b.	Shred pipe: 5,000 ft x 2 man-days/200 ft x \$116/man-day =	5,800	
c.	Equipment: o IT12 loader, \$45.32/hr x 200 hours =	9,064	
	o Shredder, \$12/hr x 200 hours =	2,400	
d.	Disposal: 8" - 1,000 ft x 0.1103 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	1,772	
	12" - 5,000 ft x 0.2408 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	<u>19,346</u>	
			44,182
3)	Removal/disposal of downhole pipe		
a.	Dispose: 97,500 ft stinger x 0.26/ft=	25,350	
b.	80,000 ft production x \$0.30/ft=	<u>24,000</u>	
			49,350
4)	Well plugging o (525 production and injection wells, 41 monitor wells)		
a.	566 wells x \$194/well=		109,804
5)	Surface reclamation		
a.	Removal/disposal of contaminated soil 615 wells x \$66/well =	40,590	
b.	Recontour, seed 40.2 acres x \$300/acre=	<u>12,060</u>	
			52,650
6)	Wellfield house dismantle/disposal		
a.	7 wellfield houses x \$379/wellfield house =	<u>2,653</u>	

**MU-7 Total**

**\$ 553,479**

**MU-8**

1)	Removal/disposal of 2" production and injection lines		
a.	20,800 ft x \$2.16/ft=		\$44,928
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.		
a.	Remove pipe: 5000 ft x 2 man-days/200 ft x \$116/man-day =	\$5,800	
b.	Shred pipe: 5000 ft x 2 man-days/200 ft x \$116/man-day =	5,800	
c.	Equipment: o IT12 loader, \$45.32/hr x 200 hours =	9,064	
	o Shredder, \$12/hr x 200 hours =	2,400	
d.	Disposal: 8" - 3000 ft x 0.1103 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	5,170	
	12" - 2000 ft x 0.2408 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25 =	7,525	
			\$35,759
3)	Removal/disposal of downhole pipe		
a.	Dispose: 30,000 ft stinger x 0.26/ft=	7,800	
b.	12,000 ft production x \$0.30/ft=	3,600	
			\$11,400
4)	Well plugging		
o	(80 production and injection wells, 55 monitor wells)		
a.	135 wells x \$194/well=		\$26,190
5)	Surface reclamation		
a.	Removal/disposal of contaminated soil 135 wells x \$66/well =	8,910	
b.	Recontour, seed 11.5 acres x \$300/acre=	3,450	
			\$12,360
6)	Wellfield house dismantle/disposal		
a.	1 wellfield houses x \$379/wellfield house =	379	

MU-8 Total

\$130,637

**TOTAL WELLFIELD RECLAMATION MU-1, 2, 3, 4, 5, 6, 7, and 8**

\$2,621,060

**C. COMMERCIAL PLANT RECLAMATION/DECOMMISSIONING**

The plant interior components; tanks, pumps, steel structure, filters, piping and electrical components are from an in-situ plant that was moved from Texas to the Crow Butte site in 1988. The actual cost to perform this work, escalated to 2000 \$'s, is used for bonding purposes with the breakdown of volumes of equipment and other structural items included.

- 1) Dismantle interior steel, tanks, pumps, filters, piping and electrical components (including labor, equipment, tools, etc.)  
The volumes of components to be dismantled are detailed below:

Interior structural steel - 75 tons

Tanks - 34 each

Pumps - 30 each

Piping - 8,250 feet

Filters - 4 each

Dryer - 1 each

Electrical boxes - 20 each (estimate)

o  $\$66,600 (1988\$) \times 172.6 (July\ 2000\ CPI\ Index) / 118.3 (1988\ average\ CPI\ Index) =$  \$97,170

- 2) Dismantle plant building (including office and lab area)

o  $146\ tons\ of\ steel,\ siding,\ girts\ \times\ \$300 (1988\ dismantle\ cost)/ton \times 172.6 / 118.3 =$  \$63,904

- 3) Decontaminate floor and walls of plant building:

Plant floor area is 30,000 sf, 5,450 sf will be removed and disposed of, and 7,000 sf is in warehouse, shop and water tank areas which will not be contaminated. The remaining floor area is 17,530 sf.

HCl will be sprayed on the floors and walls and recycled in the plant sumps for reuse until neutralized.

Wall area is approximately 24,000 sf.

Use 1 gal HCl/sf for wall area and 2 gal HCl/sf for floors.

- a. Material:

Floors:  $17,530\ sf \times 2\ gal\ HCl/sf \times \$0.64/gal\ HCl =$  \$22,438

Walls:  $24,000\ sf \times 1\ gal\ HCl/sf \times \$0.64/gal\ HCl =$  15,360

- b. Labor:

$2\ men \times 30\ days \times \$116/man-day =$  \$6,960

- c. HCl Disposal (to ponds):

$59,060\ gal\ HCl \times 5\ HP/30\ gpm \times .75\ Kw/HP \times \$0.05/Kw-hr =$  \$370

d.	Decontamination equipment:			
	Sprayer pump	\$500		
	Tank (on hand)			
	Recycle pump	500		
	Sprayer with hose	<u>1,000</u>		
			\$2,000	
				\$47,128
4)	Dispose of concrete			
	o Area which would be potentially contaminated and not decontaminated by HCl is 5,450 ft <sup>2</sup> . The areas are in the trough drains, sumps, yellowcake dryer, belt filter, precipitation cells and eluant tanks. Average concrete thickness is 6".			
	a. Disposal:			
	5,450 ft <sup>2</sup> x 0.5 ft x \$149.31/cy x 1 cy/27 ft <sup>3</sup> = \$15,069			
	b. Removal:			
	5,450 ft <sup>2</sup> x \$2.72/sf =		<u>\$14,824</u>	
				\$29,893
5)	Dismantle/dispose of tanks			
	o There are 27 process tanks to be disposed of at an NRC licensed disposal facility. All of the tanks are fiberglass and will be cut up into pieces for disposal. Seven tanks are chemical storage tanks and will be disposed of at a licensed landfill.			
	a. Labor:			
	34 tanks x 2 man-days/tank x \$116/man-day =		7,888	
	b. Disposal:			
	27 tanks @ (14' dia x 14' high x 1/4" wall thickness)			
	27 tanks x 19.3 ft <sup>3</sup> /tank x 1.20(1) x \$12.50/ft <sup>3</sup> =		8,038	
	c. Clean and haul chemical tanks: 7 chemical storage tanks will be disposed of in a licensed landfill (1) truckload			
	\$10 fee + \$360 =		370	
	7 tanks x 1 man-day cleaning/tank x \$116/man-day =		812	
	d. Equipment:			
	Saws, scaffolding, tools, etc. =		<u>5,708</u>	
				\$22,816
	(1) void space factor			
6)	Dispose of pumps			
	o 30 process pumps are in the commercial plant plus 78 downhole pumps. Plant pumps are approximately 5 ft <sup>3</sup> each, downhole pumps are 0.5 ft <sup>3</sup> each			
	a. 30 pumps x 5 ft <sup>3</sup> /pump x \$12.50/ft <sup>3</sup> =		\$1,928	
	b. 350 downhole pumps x 0.5 ft <sup>3</sup> /pump x \$12.50/ft <sup>3</sup> =		<u>2,250</u>	
				\$4,178

7)	Dispose of filters; (2) injection filters, (1) backwash filter and (1) yellowcake filter		
a.	4 filters x 100 ft <sup>3</sup> /filter x \$12.50/ft <sup>3</sup> =		\$5,142
8)	Dispose of yellowcake dryer		
o	yellowcake dryer system is approximately 400 ft <sup>3</sup> in volume		
a.	400 ft <sup>3</sup> x \$12.50/ft <sup>3</sup> =		\$5,142
9)	Dispose of piping		
o	There is a total of 8,250 ft of process piping in the plant with an average diameter of approximately 6". Of the 8,250 ft, roughly 50% is used for yellowcake process. The other pipe is for chemical make-up, raw and potable water.		
a.	NRC licensed disposal: 4,125 ft x 0.04 ft <sup>3</sup> /ft x \$12.50/ft <sup>3</sup> x 1.25(1) =	\$2,652	
b.	Landfill disposal: 1 load @ \$10 fee + \$360 =	<u>370</u>	
	(1) void space factor		\$3,022
10)	Reclaim plant site		
a.	Dirt work: 20,000 cy x 1 hour/700 cy x \$136/hour = \$3,886		
b.	Seed: 4 acres x \$300/acre =	<u>1,200</u>	
			\$5,086
11)	Supervisory labor for plant reclamation		
a.	(1) Engineer \$6,474/month x 6 months =	\$38,844	
b.	(1) Radiation Technician \$5,374/month x 6 months (operator wages included in above calculation) =	<u>32,364</u>	
			<u>\$71,208</u>

**TOTAL COMMERCIAL PLANT RECLAMATION/DECOMMISSIONING**

**\$ 374,689**

**D. R.O. BUILDING RECLAMATION/DECOMMISSIONING**

Use a factor based on square footage of commercial plant  
for total reclamation/decommissioning of R.O. building

a.  $\$374,689 \times 5,000 \text{ ft}^2 / 34,000 \text{ ft}^2 =$

\$55,101

**TOTAL R.O. BUILDING RECLAMATION/DECOMMISSIONING**

\$55,101

**E. EVAPORATION POND RECLAMATION**

Pond reclamation consists of removal and disposal of the pond liners, piping, and sludge to an NRC licensed disposal facility. The pond earthen embankments will be leveled, top soiled and seeded. The liner will be cut in sections and stacked for shipment.

- 1) Removal and disposal of pond liner systems
  - a. Three solar evaporation ponds at 250,000 ft<sup>2</sup>/each at commercial plant  
 Total thickness of liners is 100 mils.  
 3 ponds x 250,000 ft<sup>2</sup>/pond x 0.00833 ft thick x 1.25(1) x \$12.50/ft<sup>3</sup> = **\$97,617**
  - b. Two solar evaporation ponds at R&D plant  
 Total liner thickness is 36 mils.  
 2 ponds x 50,000 ft<sup>2</sup> x 0.0030 ft thick x 1.25 x \$12.50/ft<sup>3</sup> = **\$4,820**
  - c. Labor for liner and pipe removal  
 Cut and stack 40,000 ft<sup>2</sup>/day with a four man crew.(3 ponds x 250,000 ft<sup>2</sup>/pond + 2 ponds x 50,000 ft<sup>2</sup>/pond) x 4 man-days/40,000 ft<sup>2</sup> x \$116/man-day = **\$9,860**
  - d. Equipment for liner and pipe removal  
 Loader:  
 176 hours x \$45.32/hour = **\$7,976**

**\$120,273**

(1) void space factor
  
- 2) Removal/Disposal of leak detection pipe, SDR 35 pipe.
  - a. Commercial pond pipe removal:  
 3 ponds x 2,100 ft of 4" pipe/pond x .0103 ft<sup>3</sup>/ft x 1.25 x \$12.50/ft<sup>3</sup> = **\$1,042**
  - b. R&D pond pipe removal:  
 2 ponds x 600 ft of 3" pipe/pond x .0069 ft<sup>3</sup>/ft x 1.25 x \$12.50/ft<sup>3</sup> = **134**
  - c. Pipe disposal:  
 71.2 ft<sup>3</sup> x \$12.50/ft<sup>3</sup> x 1.25 = **1,144**

**\$2,320**
  
- 3) Removal/disposal of pond sludge.
  - o Pond sludge removal is based on removal of sludge in R&D ponds after operation and restoration.
  - a. Sludge disposal:  
 38 barrels x 55 gallons/barrel x 1 cf/7.48 gallons x 1 cy/27 cf = 10.4 cy  
 Flow through R&D plant was 101,625,362 gallons, therefore, 1 cy of sludge per 9,772,000 gallons processed. Total flow for 1991 to 2001 will be approximately 15,159,580,000 gallons. 15,159,580,000 gallons x 1 cy/9,772,000 gallons x \$149.31/cy = **\$231,629**

b. Labor:		
1,314 cy x 3 man-days/25 cy x \$116/man-day =	18,291	
c. Equipment (TT12):		
\$45.32/hour x 200 hours =	<u>9,064</u>	
		\$258,984

4) Reclaim ponds.

o Dirt work volume per pond is approximately 60,000 cy/pond at commercial and 30,000 cy total at R&D based on post construction surveys.		
o Total earthwork volume is 330,000 cy.		
o Average dozing distance is 150 ft. A D8 will get 700 cy per hour(1).		
a. Dirtwork:		
330,000 cy x 1 hour/700 cy x \$136 (including operator)/hour =	\$64,114	
b. Topsoil placement and seed:		
30 acres x \$300/acre =	<u>9,000</u>	
		\$73,114

(1) Caterpillar Handbook, Edition 19

5) Supervisory labor for pond reclamation.

a. (1) Engineer		
\$6,474/month x 3 months =	\$19,422	
b. (1) Radiation Technician		
\$5,394/month x 3 months (operator wages included in above calculation) =	<u>16,182</u>	
		<u>\$35,604</u>

**TOTAL EVAPORATION POND RECLAMATION**

**\$ 490,295**

**F. MISCELLANEOUS SITE RECLAMATION**

1)	Reclaim/seed main access road.		
a.	Road dirtwork: 4,000' long x 25' wide x 1' deep x 1 cy/27 ft <sup>3</sup> = 3,704 cy 3,704 cy x 1 hour/200 cy x \$136/hour =	\$2,519	
b.	Wellfield road dirt work: 25,000' long x 12' wide x 1/2' deep x 1cy/27 ft <sup>3</sup> = 5,556 cy 5,556 cy x 1hour/200cy x \$136/hour=	3,778	
c.	Seed roadway: 9.2 acres x \$300/acre =	<u>2760</u>	\$9,057
2)	Remove/dispose of pipe from commercial plant to ponds and from commercial plant to R.O. building.		
o	Pond pipeline (2) at 2,000' = 4,000 ft		
o	Pipe to R.O. (4) at 300' = 1,200 ft		
o	5,200' average size 4" Sch. 40		
a.	Disposal: 5,200 ft x .021 ft <sup>2</sup> x \$12.50/ft <sup>3</sup> x 1.25 =	\$1,754	
b.	Removal labor: 5,200 ft x 3 man-days/200 ft x \$116/man-day =	9,048	
c.	Equipment:		
o	Loader: 5 days x \$45.32/hour x 8 hours/day =	1,812	
o	Shredder: 5 days x \$12/hour x 8 hours/day =	<u>480</u>	\$13,094
3)	Remove electrical facilities.		
a.	Remove HV lines: 6,000 ft of HV line at \$0.59/ft =	\$3,540	
b.	Remove substations:	<u>1,175</u>	\$4,715
4)	Supervisory Labor.		
a.	(1) Engineer \$6,474/month x 3 months =	\$19,422	
b.	(1) Radiation Technician \$5,394/month x 3 months (Operator wages included in above calculations) =	<u>16,182</u>	\$35,604

**TOTAL MISCELLANEOUS SITE RECLAMATION**

**\$62,470**

**G. DEEP DISPOSAL WELL RECLAMATION**

Attachment A includes the cost estimate for the deep well plugging, abandonment, and site reclamation. This information is from the June 6, 1996 Completion of Construction Report - Crow Butte Resources, Inc., Class 1 UIC Well submitted to the DEQA. A summary of the cost is given below, escalated to 2000 \$.

$$\frac{\$59,026 \text{ (1996\$)} \times 172.6 \text{ (July 2000 CPI Index)}}{156.7 \text{ (June 1996 CPI Index)}} = \$65,015$$

1) Plugging and Abandonment  $\$59,026 \times 172.6/156.7 =$  **\$65,015**

2) Site Reclamation  $\$2,346 \times 172.6/156.7 =$  **2,584**

**TOTAL DEEP DISPOSAL WELL RECLAMATION** **\$ 67,599**

**H. I - 196 BRULE AQUIFER RESTORATION**

The following estimate is based on the May 28, 1996 Remediation Plan using six pore volumes (pv) as the total water extracted.

1) Pump Wells 196a, j & n (Ground Water Sweep)

a. Power:

$$337,758 \text{ gals/pv} \times 3 \text{ pv} \times 1 \text{ min/3gal} \times 1 \text{ hour/60min} \\ \times 3 \text{ kw} \times \$0.05/\text{kwhr} = \$844$$

b. Manpower:

$$234 \text{ days} \times 0.13 \text{ man-day/day} \times \$116/\text{man-day} = \underline{3,529}$$

4,373

2) Bi-weekly sampling (in-house analyses):

$$234 \text{ days} \times 1 \text{ man-day/14days} \times \$116/\text{man-day} = 1,939$$

3) Bi-weekly I - 196i, m, l sampling:

(Same as # 2) 1,939

4) Pump additional wells:

a. Pump from additional wells:

(Same as 1-3 above) 8,251

b. Drill four additional wells:

$$4 \text{ wells} \times 50 \text{ ft} \times \$26 = \underline{5,200}$$

13,451

5) Well Abandonment:

a. 14 wells x \$194/well = **2,716**

**TOTAL I-196 RESTORATION** **\$ 24,418**