CROW BUTTE RESOURCES, INC.
216 SIXTEENTH STREET, SUITE 810 **(303) 825-2266**
DENVER, COLORADO 80202 **(303) 825-1544 FAX**

October 31, 1997

Mr. Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management,
NMSS (T-7-J9)
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20850

RE: Docket No. 40-8943
License No. SUA-1534
1998 Surety Estimate - Revision 2

Dear Mr. Holonich:

Enclosed is Revision 2 of the annual surety estimate for the Crow Butte Mine. The revised estimate includes a change to the flow capacity of the reverse osmosis unit in the Groundwater Restoration section. The change was noted during the review process by the Nebraska Department of Environmental Quality.

The revised surety estimate amount for Revision 2 is $8,767,763.

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

Sincerely,

Stephen P. Collings

Stephen P. Collings
President

SPC/sm
Enclosure
cc: Mr. Ross Scarano
Mr. Frank Mills, NDEQ

DLOS

CROW BUTTE RESOURCES, INC.
CROW BUTTE IN-SITU MINE
10-31-97 (Revision 2)
1998 RESTORATION/RECLAMATION SURETY COST ESTIMATE

SUMMARY

A.	Groundwater Restoration	$4,159,728
B.	Wellfield Reclamation	1,908,992
C.	Commercial Plant Reclamation/Decommissioning	338,182
D.	R.O. Building Reclamation/Decommissioning	49,733
E.	Evaporation Pond Reclamation	407,080
F.	Miscellaneous Site Reclamation	60,816
G.	Deep Disposal Well Reclamation	63,213
H.	I - 196 Brule Aquifer Restoration	26,466
	Subtotal	$7,014,210
I.	Contract Administration (10%)	701,421
J.	Contingency (15%)	1,052,132
	TOTAL	**$8,767,763**

BASIS OF COSTS:

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

1. Labor Rates: Labor rates are based on 1997 actual CBR labor for plant and wellfield operations including benefits and payroll taxes, plus 20% for contractors overhead and profit.

2. Disposal Costs: Disposal costs of byproduct material are based on a current disposal agreement held by CBR.

	Fee	Transport Cost	Total
Packaged Material	$10.00/cf	$2.42/cf	$12.42/cf
Soil, etc.	$81.00/cy	$66.00/cy	$147.00/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 1997 power costs including demand factor, energy charge, taxes, and service fees, $0.05/Kw-hr.

4. Equipment Costs:

Equipment	Base(1) Rental Cost ($/hr)	Labor Cost ($/hr)	Oper. Cost ($/hr)	Fuel(2) Cost ($/hr)	Mob. &(3) Demob ($/hr)	Total ($/hr)
IT12 Loader	20	17	9	4	2	52
Shredder	12	--	--	incl.	incl.	12
Bulldozer (D8N)	83	17	19	12	2	133
Smeal	41	incl.	incl.	incl.	incl.	41
Mixing Unit	12	--	--	incl.	incl.	12

(1) From Nebraska Machinery rental rates for IT12 and D8N. Shredder and mixing units are estimates.
(2) From Caterpillar Handbook, Edition 19 fuel consumption using $1.00/gal for 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 is underway.

Mine Unit	Thickness (ft)	No. Patterns	Fattern Size (ft^2)	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	12.8	57	10,284	0.29	15,447,280	13.4
MU-4	13.0	96	10,765	0.29	29,142,600	23.7
MU-5	15.0	183	7,557	0.29	44,997,809	31.8
MU-6	20.0	175	10,000	0.29	75,922,000	40.2

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 $136/man-day = 8,466

      $10,147

      or $0.59/1000 gal

2) Treat 4 PV with R.O. and re-inject permeate using a 300 gpm R.O. unit.
   - o 4 PV x 17,165,000 gal/PV x 1 min/300 gal x 1 hr/60 min = 3,814 hours

   a. Power cost:
      Downhole pump HP
      300 gpm/32 gpm/pump x 5 HP/pump 47 HP
      Injection Pump 25 HP
      R.O. System
      R.O. Unit pump 123 HP
      Permeate pump 40 HP
      Waste pump 8 HP
      243 HP

      3,814 hrs x 243 HP x .75 Kw/HP x $0.05/Kw-hr = $34,755

   b. Chemical Cost:
      Antiscalant: $31/gal x 0.20 gal/hr x 3,814 hrs = 23,647
      Reductant: $0.35/lb x 0.56 lb Na2S/1000gal x 4PV
      x 17,165,000 gal/PV= 13,437

   c. Labor Cost:
      3,814 hrs x 2 man-day/8 hours x $136/man-day = $129,676
      Total $201,535

      or $2.94/1,000 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 $0.35/lb = 3,364

   c. Labor Cost: (see above) 8,466
      Total $13,791

      or $0.80/1000 gal

4) Spare parts, filters, consumables, etc.
for items 1-4 above are estimated to be $16,468/yr.
- o Time to do work is 3,358 hours/24 hours = 140 days
- a. $16,468/yr x 140/365= $6,316

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 $150/well (32 parameter suite) = $1,500
- b. Phase 1 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 $150/well x 6 months = 9,000
- d. Phase 3 sampling (stabilization):
  10 wells x $150/well x 6 months = 9,000
- e. Monitor well sampling:
  14 wells x 2 samples/month x $47/well x 5 months = 6,580
- f. Other lab analysis (radon, urinalysis, etc):
  $806/month x 5 months = 4,030

  Total sampling and monitoring $ 30,580

6) Supervisory labor for restoration work (including 33% overhead factor)
- a. (1) Engineer $6,256/month x 7 months = $43,792
- b. (1) Radiation Technician $5,212/month x 7 months = 36,484
  (Operator wages included in above calculations)

$ 80,276

MU-1 TOTAL **$342,645**

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 $0.59/1000 gal =		$10,631
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 18,018,500 gal/PV x 1 min/300 gal x 1 hr/60 min = 4,004 hours		
	a. 4 PV x 18,018,500 gal/PV x $2.94/1000 gal =		$211,898
3)	Recirculate 1 PV with reductant.		
	o Time = 261 hours		
	a. 1PV x 18,018,500 gal/PV x $0.80/1000 gal =		$14,415
4)	Spare parts, etc.		
	o Total time to do work = 147 days		
	a. $16,468/yr x 147/365 =		$6,632
5)	Sampling and monitoring - 12 restoration wells plus 14 monitor wells.		
	a. Sample prior to restoration: 12 wells x $150/well (32 parameter suite) =	$1,800	
	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 $150/well x 6 months =	10,800	
	d. Phase 3 sampling (stabilization): 12 wells x $150/well x 6 months =	10,800	
	e. Monitor well sampling: 14 wells x 2 samples/month x $47/well x 5 months =	6,580	
	f. Other lab analysis (radon, urinalysis, etc) $806/month x 5 months =	4,030	
			$34,574
7)	Supervisory Labor (same as MU-1).		$80,276
	MU-2 TOTAL		**$358,426**

MU-3

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 15,447,280 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 224 hours		
	a. 1 PV x 15,447,280 gal/PV x $0.59/1000 gal =		$9,114
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 15,447,280 gal/PV x 1 min/300 gal x 1 hr/60 min = 3,433 hours		
	a. 4 PV x 15,447,280 gal/PV x $2.94/1000 gal =		$181,660
3)	Recirculate 1 PV with reductant.		
	o Time = 224 hours		
	a. 1PV x 15,447,280 gal/PV x $0.80/1000 gal =		$12,358
4)	Spare parts, etc.		
	o Total time to do work = 126 days		
	a. $16,468/yr x 126/365 =		$5,685
5)	Sampling and monitoring 18 restoration wells plus 14 monitor wells.		
	a. 18 wells x $150/well =	$2,700	
	b. 18 wells x $47/well x 1 months =	846	
	c. 18 wells x $150/well x 5 months =	13,500	
	d. 18 wells x $150/well x 6 months =	16,200	
	e. 14 wells x 2 samples/month x $47/well x 5 months =	6,580	
	f. Other lab: $806/month x 5 months =	4,030	
	Total		$43,856
6)	Supervisory Labor.		
	a. (1) Engineer $6,256/month x 6 months =	$37,536	
	b. (1) Radiation Technician $5,212/month x 6 months =	31,272	
	(Operator wages included in above calculations)		
			$ 68,808
	MU-3 TOTAL		**$321,481**

MU-4

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 29,142,600 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 422 hours		
	a. 1 PV x 29,142,600 gal/PV x $0.59/1000 gal =		$17,194
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 29,142,600 gal/PV x 1 min/300 gal x 1 hr/60 min = 6,476 hours		
	a. 4 PV x 29,142,600 gal/PV x $2.94/1000 gal =		$342,717
3)	Recirculate 1 PV with reductant.		
	o Time = 422 hours		
	a. 1PV x 29,142,600 gal/PV x $0.80/1000 gal =		$23,314
4)	Spare parts, etc.		
	o Total time to do work = 237 days		
	a. $16,468/yr x 237/365 =		$10,693
5)	Sampling and monitoring 25 restoration wells plus 18 monitor wells.		
	a. 25 wells x 150/well=	$3,750	
	b. 25 wells x 47/well x 1 months=	1,175	
	c. 25 wells x 150/well x 9 months=	33,750	
	d. 25 wells x 150/well x 6 months=	22,500	
	e. 18 wells x 2 samples/month x 47/well x 8 months =	13,536	
	f. Other lab: $806/month x 8 months=	6,448	
			$81,159
6)	Supervisory Labor:		
	a. (1) Engineer: $6,256/month x 10 months=	$62,560	
	b. (1) Radiation Technician: $5,212/month x 10 months (Operator wages included in above calculations)	52,120	
			$114,680
	MU-4 TOTAL		**$589,757**

MU-5

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 44,997,809 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 652 hours		
	a. 1 PV x 44,997,809 gal/PV x $0.59/1000 gal =		$26,549
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 44,997,809 gal/PV x 1 min/300 gal x 1 hr/60 min = 10,000 hours		
	a. 4 PV x 44,997,809 gal/PV x $2.94/1000 gal =		$529,174
3)	Recirculate 1 PV with reductant.		
	o Time = 652 hours		
	a. 1PV x 44,997,809 gal/PV x $0.80/1000 gal =		$35,998
4)	Spare parts, etc.		
	o Total time to do work = 367 days		
	a. $16,468/yr x 367/365 =		$16,558
6)	Sampling and monitoring 33 restoration wells plus 52 monitor wells.		
	a. 33 wells x $150/well=	$4,950	
	b. 33 wells x $47/well x 1 months=	1,551	
	c. 33 wells x 150/well x14 months=	69,300	
	d. 33 wells x 150/well x 6 months=	29,700	
	e. 52 wells x 2 samples/month x 47/well x 12 months =	58,656	
	f. Other lab: $806/month x 12 months=	9,672	
			$173,829
7)	Supervisory Labor:		
	a. (1) Engineer: $6,256/month x 15 months=	$93,840	
	b. (1) Radiation Technician: $5,212/month x 15 months (Operator wages included in above calculations)	78,180	
			$172,020
	MU-5 TOTAL		**$954,128**

MU-6

1)	Remove 1 PV, gw transfer/sweep.		
	o 1 PV x 75,922,000 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 1,100 hours		
	a. 1 PV x 75,922,000 gal/PV x $0.59/1000 gal =		$44,794
2)	Treat 4 PV with R.O. and inject permeate.		
	o 4PV x 75,922,000 gal/PV x 1 min/300 gal x 1 hr/60 min = 16,872 hours		
	a. 4 PV x 75,922,000 gal/PV x $2.94/1000 gal =		$892,843
3)	Recirculate 1 PV with reductant.		
	o Time = 1,100 hours		
	a. 1PV x 75,922,000 gal/PV x $0.80/1000 gal =		$60,738
4)	Spare parts, etc.		
	c Total time to do work = 619 days		
	a. $16,468/yr x 619/365 =		$27,928
6)	Sampling and monitoring 33 restoration wells plus 52 monitor wells.		
	a. 33 wells x $150/well=	$4,950	
	b. 33 wells x $47/well x 2 months=	3,102	
	c. 33 wells x 150/well x24 months=	118,800	
	d. 33 wells x 150/well x 6 months=	29,700	
	e. 52 wells x 2 samples/month x 47/well x 20 months =	97,760	
	f. Other lab: $806/month x 18 months=	14,508	
			$268,820
7)	Supervisory Labor:		
	a. (1) Engineer: $6,256/month x 26 months=	$162,656	
	b. (1) Radiation Technician: $5,212/month x 26 months (Operator wages included in above calculations)	135,512	
			$298,168
	MU-6 TOTAL		**$1,593,291**

TOTAL MU-1, 2, 3, 4, 5 and 6 RESTORATION COST **$4,159,728**

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	1-1/4" Stinger (ft)	2" Prod. Downhole Pipe	Producers	Injectors
MU-1	30,000		43,200	15,200	38	72
MU-2	34,000		47,400	20,800	52	79
MU-3	39,520		57,400	22,800	57	95
MU-4	68,900		101,400	38,400	96	169
MU-5	103,740	55,500	0	74,000	183	214
MU-6	99,200	52,500	0	70,000	175	205

Pipe Volumes:

Nominal Pipe Size	Wall Thickness (inches)	Pipe O.D (Inches)	Volume[1] per Foot (ft^3/ft)
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	4.2236	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	8.543	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 $136/man-day = $18,133

b. Shred pipe:
30,000 ft x 2 man-days/450 ft
x $136/man-day = 18,133

c. Equipment:
o IT12 loader, $52/hr x 533 hours = 27,716
o Shredder, $12/hr x 533 hours = 6,396

d. Disposal:
30,000 ft x .0069 ft³/ft x
$12.42/ft³ x 1.25(1) = 3,214

73,592

or $2.45/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 $136/man-day = $7,344

b. Shred pipe:
5,400 ft x 2 man-days/200 ft
x $136/man-day = 7,344

c. Equipment:
o IT12 loader, $52/hr x 216 hours = 11,232
o Shredder, $12/hr x 216 hours = 2,592

d. Disposal:
6" - 1000 ft x 0.0651 ft³/ft x
$12.42/ft³ x 1.25 = 1,011
8" - 4,400 ft x 0.1103 ft³/ft x
$12.42/ft³ x 1.25 = 7,535

37,058

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 smea[1].

a. Removal of downhole pipe
43,200 ft stinger x 3 man-days/6,000 ft
x $136/man-day = 2,938
15,200 ft prod. x 3 man-days/6,000 ft

	x $136/man-day =	1,034	
b.	Shred pipe:		
	43,200 ft x 2 man-days/4,500 ft		
	x $136/man-day =	2,611	
	15,200 ft x 2 man-days/4,500 ft		
	x $136/man-day =	919	
c.	Equipment:		
	Skeal: $41/hour x 78 hours =	3,198	
	Shredder: $12/hour x 78 hours =	936	
d.	Disposal:		
	43,200 ft x .0044 ft^3/ft x $12.42/$ft^3$ x 1.25 =	2,951	
	15,200 ft x .0074 ft^3/ft x $12.42/$ft^3$ x 1.25 =	1,746	
			$16,333
	or $0.26/ft (stinger pipe)		
	or $0.31/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	
	Well Cap	10	
b.	Labor:		
	2 hours/well x 1 day/8 hours x 2 man-days		
	x $136/man-day =	68	
c.	Equipment:		
	Backhoe - 1/2 hour/well x $46/hour =	23	
	Mixing Unit - 2 hours x $12/hour =	24	
		$158/well	
	110 production and injection wells		
	x $158/well =	$17,380	
	11 monitor wells x $158/well =	1,738	
			$19,118

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^3/well x 110 wells x		
	1 cy/27 ft^3 x $147/cy =	$5,989	
	20 hours loader x $52/hour =	1,040	
	20 man-hours x $136/8 hours =	340	
b.	Recontour and seed		
	9.3 acres x $294/acre =	2,734	
			$10,103

6) Wellfield house dismantle and disposal.

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

a. Labor:		
2 man-days x $136/man-day	$272	
b. Equipment (IT12):		
2 hours x $52/hour =	104	
c. Disposal at landfill		
$370/load x 6,000 lbs/wellhouse		
x 1 load/40,000 lbs =	56	
Total per wellhouse	$432	
2 Wellhouses x $432/wellhouse =		$864
MU-1 Total		**$157,068**

MU-2

1)	Removal/disposal of 2" production and injection lines			
	a. 34,000 ft x $2.45/ft =		$83,300	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.			
	a. Remove pipe:			
	2,900 ft x 2 man-days/200 ft			
	x $136/man-day =	$3,944		
	b. Shred pipe:			
	2,900 ft x 2 man-days/200 ft			
	x $136/man-day =	3,944		
	c. Equipment:			
	o IT12 loader, $52/hr x 116 hours =	6,032		
	o Shredder, $12/hr x 116 hours =	1,392		
	d. Disposal:			
	6" - 1,600 ft x 0.065 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	1,617		
	8" - 1,300 ft x 0.1103 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	2,226		
			19,155	
3)	Removal/disposal of downhole pipe			
	a. 47,400 ft stinger x $0.26/ft =	12,324		
	b. 20,800 ft production x $0.31/ft =	6,448		
			18,772	
4)	Well plugging			
	o 131 production and injection wells, 14 monitoring wells			
	a. 145 wells x $158/well =		22,910	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	131 wells x $54/well =	7,074		
	b. Recontour, seed			
	11.7 acres x $294/acre =	3,440		
			10,514	
6)	Wellfield house dismantle/disposal			
	a. 3 wellfield houses x $432/wellfield house =		1,296	
	MU-2 Total			**$155,947**

MU-3

1)	Removal/disposal of 2" production and injection lines			
	a. 39,520 ft x $2.45/ft =		$96,824	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.			
	a. Remove pipe:			
	2,950 ft x 2 man-days/200 ft			
	x $136/man-day =	$4,012		
	b. Shred pipe:			
	2,950 ft x 2 man-days/200 ft			
	x $136/man-day =	4,012		
	c. Equipment:			
	o IT12 loader, $52/hr x 118 hours =	6,136		
	o Shredder, $12/hr x 118 hours =	1,416		
	d. Disposal:			
	8" - 1,450 ft x 0.1103 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	2,483		
	12" - 1,500 ft x 0..2408 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	5,608		
			23,667	
3)	Removal/disposal of downhole pipe			
	a. 57,400 ft stinger x $0.26/ft =	$14,924		
	b. 22,800 ft production x $0.31/ft =	7,068		
			21,992	
4)	Well plugging			
	o (152 production and injection wells, 14 monitor wells)			
	a. 166 wells x $158/well =		26,228	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	166 wells x $54/well =	8,964		
	b. Recontour, seed			
	13.4 acres x $294/acre =	3,940		
			12,904	
6)	Wellfield house dismantle/disposal			
	a. 4 wellfield houses x $432/wellfield house =		1,728	
	MU-3 Total			**$183,343**

MU-4

1)	Removal/disposal of 2" production and injection lines			
	a. 68,900 ft x $2.45/ft=		$168,805	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.			
	a. Remove pipe:			
	7,400 ft x 2 man-days/200 ft			
	x $136/man-day =	$10,064		
	b. Shred pipe:			
	7,400 ft x 2 man-days/200 ft			
	x $136/man-day =	10,064		
	c. Equipment:			
	o IT12 loader, $52/hr x 296 hours =	15,392		
	o Shredder, $12/hr x 296 hours =	3,552		
	d. Disposal:			
	8" - 5,400 ft x 0.1103 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	9,247		
	12" - 2,000 ft x 0.2408 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	7,477		
			55,796	
3)	Removal/disposal of downhole pipe			
	a. 101,400 ft stinger x $0.26/ft=	26,364		
	b. 38,400 ft production x $0.31/ft=	11,904		
			38,268	
4)	Well plugging			
	o (265 production and injection wells, 18 monitor wells)			
	a. 283 wells x $158/well=		44,714	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	283 wells x $54/well =	15,282		
	b. Recontour, seed			
	25 acres x $294/acre=	7,350		
			22,632	
6)	Wellfield house dismantle/disposal			
	a. 5 wellfield houses x $432/wellfield house =		2,160	
	MU-4 Total			**$332,275**

MU-5

1)	Removal/disposal of 2" production and injection lines			
	a. 103,740 ft x $2.45/ft=		$254,163	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.			
	a. Remove pipe:			
	17,800 ft x 2 man-days/200 ft			
	x $136/man-day =	$24,208		
	b. Shred pipe:			
	17,800 ft x 2 man-days/200 ft			
	x $136/man-day =	24,208		
	c. Equipment:			
	o IT12 loader, $52/hr x 712 hours =	37,024		
	o Shredder, $12/hr x 712 hours =	8,544		
	d. Disposal:			
	8" - 3,700 ft x 0.1103 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	6,336		
	12" - 14,100 ft x 0.2408 ft^3/ft x			
	$12.42/$ft^3$ x 1.25 =	52,712		
			153,032	
3)	Removal/disposal of downhole pipe			
	a. Dispose:			
	55,500 ft hose x 0.0313ft^3/ft x$12.42/cf x 1.25=	26,969		
	Remove:			
	55,500 ft x 1 man-day/1,000ft x $136/man-day=	7,548		
	b. 74,000 ft production x $0.31/ft=	22,940		
			57,457	
4)	Well plugging			
	o (397 production and injection wells, 52 monitor wells)			
	a. 449 wells x $158/well=		70,942	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	449 wells x $54/well =	24,246		
	b. Recontour, seed			
	32 acres x $294/acre=	9,408		
			33,654	
6)	Wellfield house dismantle/disposal			
	a. 7 wellfield houses x $432/wellfield house =		3,024	
	MU-5 Total			**$572,272**

MU-6

1)	Removal/disposal of 2" production and injection lines			
	a. 99,200 ft x $2.45/ft=		$243,040	
2)	Removal/disposal of trunklines. Piping is rated SDR 13.5.			
	a. Remove pipe:			
	12,000 ft x 2 man-days/200 ft			
	x $136/man-day =	$16,320		
	b. Shred pipe:			
	12,000 ft x 2 man-days/200 ft			
	x $136/man-day =	16,320		
	c. Equipment:			
	o IT12 loader, $52/hr x 480 hours =	24,960		
	o Shredder, $12/hr x 480 hours =	5,760		
	d Disposal:			
	8" - 2,000 ft x 0.1103 ft³/ft x			
	$12.42/ft³ x 1.25 =	3,425		
	12" - 10,000 ft x 0.2408 ft³/ft x			
	$12.42/ft³ x 1.25 =	37,384		
			104,169	
3)	Removal/disposal of downhole pipe			
	a. Dispose:			
	52,500 ft hose x 0.0313ft³/ft x$12.42/cf x 1.25=	25,511		
	Remove:			
	52,500 ft x 1 man-day/1,000ft x $136/man-day=	7,140		
	b. 70,000 ft production x $0.31/ft=	21,700		
			54,351	
4)	Well plugging			
	o (380 production and injection wells, 52 monitor wells)			
	a. 432 wells x $158/well=		68,256	
5)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	432 wells x $54/well =	23,328		
	b. Recontour, seed			
	40.2 acres x $294/acre=	11,819		
			35,147	
6)	Wellfield house dismantle/disposal			
	a. 7 wellfield houses x $432/wellfield house =		3,024	
	MU-6 Total			**$507,987**
TOTAL WELLFIELD RECLAMATION MU-1, 2, 3, 4, 5 and 6				**$1,908,992**

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 1997 $'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 volume 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)

- $66,600 (1988$) x 160.3 (June 1997 CPI Index)/ 118.3 (1988 average CPI Index) = $90,245

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

- 146 tons of steel, siding, girts x $300 (1988 dismantle cost)/ton x 160.3/118.3 = $59,350

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 x 2 gal HCl/sf x $0.57/gal HCl = $19,984
   Walls: 24,000 sf x 1 gal HCl/sf x $0.57/gal HCl = 13,680
b. Labor:
   2 men x 30 days x $136/man-day = $8,160
c. HCl Disposal (to ponds):
   59,060 gal HCl x 5 HP/30 gpm x .75 Kw/HP x $0.05/Kw-hr= $370

d. Decontamination equipment:

Sprayer pump	$500		
Tank (on hand)			
Recycle pump	500		
Sprayer with hose	1,000		
		$2,000	$44,194

4) Dispose of concrete

o Area which would be potentially contaminated and not decontaminated by HCl is 5,450 ft^2. 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^2 x .5 ft x $147/cy x 1 cy/27 ft^3 = $14,836

b. Removal:
5,450 ft^2 x $2.72/sf = $14,824 $29,660

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
$136/man-day = 9,248

b. Disposal:
27 tanks @ (14' dia x 14' high x 1/4" wall thickness)
27 tanks x 19.3 ft^3/tank
x 1.20(1) x $12.42/ft= 7,766

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 $136/man-day = 952

d. Equipment:
Saws, scaffolding, tools, etc. = 5,708

$24,044

(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^3 each, downhole pumps are 0.5 ft^3 each

a. 30 pumps x 5 ft^3/pump x $12.42/$ft^3$ = $1,863

b. 350 downhole pumps x 0.5 ft^3/pump
x $12.42/$ft^3$ = 2,174

$4,037

7) Dispose of filters; (2) injection filters, (1) backwash filter and (1) yellowcake filter

a. 4 filters x 100 ft^3/filter x \$12.42/ft^3= \$4,968

8) Dispose of yellowcake dryer

o yellowcake dryer system is approximately 400 ft^3 in volume

a. 400 ft^3 x \$12.42/ft^3 = \$4,968

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^3/ft x \$12.42/ft^3 x 1.25(1) = \$2,562

b. Landfill disposal:
1 load @ \$10 fee + \$360 = 370

\$2,932

(1) void space factor

10) Reclaim plant site

a. Dirtwork:
20,000 cy x 1 hour/700 cy x \$133/hour = \$3,800

b. Seed:
4 acres x \$294/acre = 1,176

\$4,976

11) Supervisory labor for plant reclamation

a. (1) Engineer
\$6,256/month x 6 months = \$37,536

b. (1) Radiation Technician
\$5,212/month x 6 months
(operator wages included in above calculation) = 31,272

\$68,808

TOTAL COMMERCIAL PLANT RECLAMATION/DECOMMISSIONING \$338,182

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. $338,182 x 5,000 ft²/34,000 ft² =	$49,733
TOTAL R.O. BUILDING RECLAMATION/DECOMMISSIONING	**$49,733**

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. Five solar evaporation ponds at 250,000 ft^2/each at commercial plant
Total thickness of liners is 100 mils.
5 ponds x 250,000 ft^2/pond x 0.00833 ft thick x 1.25(1) x \$12.42/ft^3 = \$161,654

b. Two solar evaporation ponds at R&D plant
Total liner thickness is 36 mils.
2 ponds x 50,000 ft^2 x 0.0030 ft thick x 1.25 x \$12.42/ft^3 = \$4,657

c. Labor for liner and pipe removal
Cut and stack 40,000 ft^2/day with a four man crew.(5 ponds x 250,000 ft^2/pond + 2 ponds x 50,000 ft^2/pond) x 4 man-days/40,000 ft^2 x \$136/man-day = \$18,360

d. Equipment for liner and pipe removal
Loader:
176 hours x \$52/hour = \$9,152

\$193,823

(1) void space factor

2) Removal/Disposal of leak detection pipe, SDR 35 pipe.

a. Commercial pond pipe removal:
5 ponds x 2,100 ft of 4" pipe/pond x .0103 ft^3/ft x 1.25 x \$12.42/ft^3 = \$1,679

b. R&D pond pipe removal:
2 ponds x 600 ft of 3" pipe/pond x .0069 ft^3/ft x 1.25 x \$12.42/ft^3 = 129

c. Pipe disposal:
24.60 ft^3 x \$12.42/ft^3 x 1.25 = 382

\$2,190

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 1997 will be approximately 6,066,700,000 gallons
6,066,700,000 gallons x 1 cy/9,772,000 gallons x \$147/cy = \$91,261

b.	Labor:		
	532 cy x 3 man-days/25 cy x $136/man-day =	8,682	
c.	Equipment (IT12):		
	$52/hour x 100 hours =	5,200	
			$105,143
4)	Reclaim ponds.		
	o Dirtwork 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 $133 (including operator)/hour =	$62,700	
b.	Topsoil placement and seed:		
	30 acres x $294/acre =	8,820	
			$71,520
	(1) Caterpillar Handbook, Edition 19		
5)	Supervisory labor for pond reclamation.		
a.	(1) Engineer		
	$6,256/month x 3 months =	$18,768	
b.	(1) Radiation Technician $5,212/month x 3 months (operator wages included in above calculation) =	15,636	
			$34,404
TOTAL EVAPORATION POND RECLAMATION			**$407,080**

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^3 = 3,704 cy		
	3,704 cy x 1 hour/200 cy x $133/hour =	$2,463	
	b. Wellfield road dirtwork:		
	25,000' long x 12' wide x 1/2' deep x		
	1cy/27 ft^3 = 5,556 cy		
	5,556 cy x 1hour/200cy x $133/hour=	3,695	
	c. Seed roadway:		
	2.3 acres x $294/acre =	676	
			$6,834
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^2 x $12.42/$ft^3$ x 1.25 =	$1,695	
	b. Removal labor:		
	5,200 ft x 3 man-days/200 ft x $136/man-day =	10,608	
	c. Equipment:		
	o Loader:		
	5 days x $52/hour x 8 hours/day =	2,080	
	o Shredder:		
	5 days x $12/hour x 8 hours/day =	480	
			$14,863
3)	Remove electrical facilities.		
	a. Remove HV lines:		
	6,000 ft of HV line at $0.59/ft =	$3,540	
	b. Remove substations:	1,175	
			$4,715
4)	Supervisory Labor.		
	a. (1) Engineer		
	$6,256/month x 3 months =	$18,768	
	b. (1) Radiation Technician		
	$5,212/month x 3 months		
	(Operator wages included		
	in above calculations) =	15,636	
			$34,404
TOTAL MISCELLANEOUS SITE RECLAMATION			**$60,816**

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 NDEQ. A summary of the cost is given below, escalated to 1997 $.

1) Plugging and Abandonment $59,026 x 1.03=	$60,797	
2) Site Reclamation $2,346 x 1.03=	2,416	
TOTAL DEEP DISPOSAL WELL RECLAMATION		**$63,213**

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 I96a, j & n (Ground Water Sweep)			
a.Power:			
337,758 gals/pv x 3 pv x 1min/3gal x 1 hour/60min x 3kw x $0.05/kwhr=	$844		
b.Manpower:			
234 days x 0.13 man-day /day x $136/man-day =	4,137		
		4,981	
2) Bi-weekly sampling (in-house analyses):			
234 days x 1 man-day /14days x $136/man-day=		2,273	
3) Bi-weekly I - 196i, m, l sampling: (Same as # 2)		2,273	
4) Pump additional wells:			
a. Pump from additionaal wells: (Same as 1-3 above)	9,527		
b. Drill four additional wells:			
4 wells x 50 ft x $26 =	5,200		
		14,727	
5) Well Abandonment:			
a. 14 wells x $158/well=		2,212	
TOTAL I-196 RESTORATION			**$26,466**