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

September 19, 1996

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
1997 Surety Estimate

Dear Mr. Holonich:

Enclosed is the annual update to the surety estimate for the Crow Butte Mine. The estimate is larger than last year mainly due to additional Mine Unit 5 construction. The total estimated restoration and reclamation amount for 1997 is $6,153,850.

Included in this year's estimate are costs associated with the restoration of the Brule shallow aquifer in the I-196 area of Mine Unit 2 and costs associated with reclamation of the deep disposal well completed into the Morrison Formation.

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. CBR's current letter of credit is for $5,352,552 and expires on March 28, 1997.

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

Sincerely,

Stephen P. Collings

Stephen P. Collings
President

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

NLOS

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CROW BUTTE RESOURCES, INC.
CROW BUTTE IN-SITU MINE
9-19-96
1997 RESTORATION/RECLAMATION SURETY COST ESTIMATE

SUMMARY

A.	Groundwater Restoration	$2,950,468
B.	Wellfield Reclamation	1,094,814
C.	Commercial Plant Reclamation/Decommissioning	326,911
D.	R.O. Building Reclamation/Decommissioning	48,075
E.	Evaporation Pond Reclamation	361,586
F.	Miscellaneous Site Reclamation	55,800
G.	Deep Disposal Well Reclamation	61,372
H.	I - 196 Brule Aquifer Restoration	24,054
	Subtotal	$4,923,080
I.	Contract Administration (10%)	492,308
J.	Contingency (15%)	738,462
	TOTAL	**$6,153,850**

BASIS OF COSTS:

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

1. Labor Rates: Labor rates are based on 1996 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/cf	$2.35/cf	$12.35/cf
Soil, etc.	$30/cy	$64/cy	$94/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 1996 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	19	17	8	4	2	50
Shredder	12	--	--	incl.	incl.	12
Bulldozer (D8N)	81	17	18	12	2	130
Smeal	40	incl.	incl.	incl.	incl.	40
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 $2.02/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 and 5. MU-1, 2, 3, and 4 are based on actual installed information. Construction of MU-5 is scheduled to be completed in 1997.

Mine Unit	Thickness (ft)	No. Patterns	Pattern 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	14.5	185	6,840	0.29	39,801,130	29.0

MU-1

1) Remove 3 pore volumes (PV) for halo recovery and transfer to ponds.
   - o Produce at 1,150 gpm with (36) 32 gpm downhole pumps (5 HP) and transfer to ponds with (2) 5 HP waste pumps.
   - o Total horsepower = 190 HP
   - o Time to do work:
     3 PV x 17,165,000 gal/PV x 1 min/1,150 gal x
     1 hour/60 min = 746 hours

   a. Power Cost:
      746 hours x 190 HP x .75 Kw/HP x $0.05/Kw-hr = $5,315

   b. Labor Cost:
      746 hours x 2 man-day/8 hours x $136/man-day = 25,364

      $30,679

      or $0.60/1000 gal

2) Treat 2 PV with R.O. and re-inject permeate using a 400 gpm R.O. unit.
   - o 2 PV x 17,165,000 gal/PV x 1 min/400 gal x 1 hr/60 min = 1,430 hours

   a. Power cost:

Downhole pump HP	
400 gpm/32 gpm/pump x 5 HP/pump	65 HP
Injection Pump	100 HP
R.O. System	
R.O. Unit pump	300 HP
Feed pump	25 HP
Decarbonator pump	15 HP
Permeate pump	50 HP
Waste pump	10 HP
	565 HP

      1,430 hrs x 565 HP x .75 Kw/HP x $0.05/Kw-hr = $30,300

   b. Chemical Cost:
      Acid: $0.76/gal x 3.5 gal/hr x 1,430 hrs = $3,804
      Antiscalant: $31/gal x 0.26 gal/hr x 1,430 hrs = 11,526
      Cleaning Chemicals: $2.72/hr x 1,430 hrs = 3,890

   c. Labor Cost:
      1,430 hrs x 2 man-day/8 hours x $136/man-day = $48,620
      Total $98,140

      or $2.86/1,000 gal

3) Recirculate 3 PV with reductant @ 1,150 gpm.

   a. Power Cost:

(36) 5 HP downhole pumps =	180 HP
(1) Injection pump =	150 HP
Total HP	330 HP

      330 HP x 746 hrs x .75 Kw/HP x $0.05/Kw-hr = $ 9,232

   b. Chemical Cost:
      3 PV x 17,165,000 gal/PV x 1 lb Na2S/1000 gal
      .: $0.35/lb = 18,023

c.	Labor Cost: (see above)	25,364	
	Total		$52,619
		or $1.02/1000 gal	
4)	Treat 2 PV with R.O. and re-inject (same as above). or $2.86/1000 gal		$98,140
5)	Spare parts, filters, consumables, etc. for items 1-4 above are estimated to be $15,988/yr.		
	o Time to do work is 4,352 hours/24 hours = 181 days (1/2 yr)		
	a. $15,988/yr x 1/2 yrs =		$7,994
6)	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 $164/well (32 parameter suite) =	$1,640	
	b. Phase I sampling (halo recovery): 10 wells x $38/well x (6 parameters) 1 month =	380	
	c. Phase 2 sampling (2PV to R.O., 3 PV recirculation, 2 PV to R.O.): 10 wells x $164/well x 5 months =	8,200	
	d. Phase 3 sampling (stabilization): 10 wells x $164/well x 6 months =	9,840	
	e. Monitor well sampling: 14 wells x 2 samples/month x $38/well x 6 months =	6,384	
	f. Other lab analysis (radon, urinalysis, etc): $783/month x 6 months =	4,698	
	Total sampling and monitoring		$ 31,142
7)	Supervisory labor for restoration work (including 33% overhead factor)		
	a. (1) Engineer $6,074/month x 6 months =	$36,444	
	b. (1) Radiation Technician $5,060/month x 6 months = (Operator wages included in above calculations)	30,360	
			$ 66,804
MU-1 TOTAL			**$385,518**

MU-2

1)	Remove 3 PV, halo recovery.		
	o 3 PV x 18,018,500 gal/PV x 1 min/1,150 gal x 1 hr/60 min = 784 hours		
	a. 3 PV x 18,018,500 gal/PV x $0.60/1000 gal =		$32,433
2)	Treat 2 PV with R.O. and inject permeate.		
	o 2 PV x 18,018,500 gal/PV x 1 min/400 gal x 1 hr/60 min = 1,502 hours		
	a. 2 PV x 18,018,500 gal/PV x $2.86/1000 gal =		$103,066
3)	Recirculate 3 PV with reductant.		
	o Time = 784 hours		
	a. 3PV x 18,018,500 gal/PV x $1.02/1000 gal =		$55,137
4)	Treat 2 PV with R.O. and inject permeate		
	o Time = 1,502 hours		
	a. 2 PV x 18,018,500 gal/PV x $2.86/1000 gal =		$103,066
5)	Spare parts, etc.		
	o Total time to do work = 1/2 yr		
	a. $15,988/yr x 1/2 yr =		$7,994
6)	Sampling and monitoring - 12 restoration wells plus 14 monitor wells.		
	a. Sample prior to restoration: 12 wells x $164/well (32 parameter suite) =	$1,968	
	b. Phase I sampling (halo recovery): 12 wells x $38/well x (6 parameters) 1 month =	456	
	c. Phase 2 sampling (2PV to R.O., 3 PV recirculation, 2 PV to R.O.): 12 wells x $164/well x 5 months =	9,840	
	d. Phase 3 sampling (stabilization): 12 wells x $164/well x 6 months =	11,808	
	e. Monitor well sampling: 14 wells x 2 samples/month x $38/well x 6 months =	6,384	
	f. Other lab analysis (radon, urinalysis, etc) $783/month x 6 months =	4,698	
			$35,154
7)	Supervisory Labor (same as MU-1).		$66,804
	MU-2 TOTAL		**$403,654**

MU-3

1)	Remove 3 PV, halo recovery			
	o Time to do work: 3 PV x 15,447,280 gal/PV x 1 min/1,150 gpm x 1 hr/60 min = 672 hours			
	a. Cost: 3 PV x 15,447,280 gal/PV x $0.60/1000 gal =		$27,805	
2)	Treat 2 PV with R.O. and inject permeate			
	o 2 PV x 15,447,280 gal/PV x 1 min/400 gal x 1 hr/60 min = 1,287 hours			
	a. Cost: 2 PV x 15,447,280 gal/PV x $2.86/1000 gal =		$88,358	
3)	Recirculate 3 PV with reductant			
	o Time = 672 hours			
	a. Cost: 3 PV x 15,447,280 gal/PV x $1.02/1000 gal =		$47,269	
4)	Treat 2 PV with R.O. and inject permeate			
	o Time = 1,202 hours			
	a. Cost: 2 PV x 15,447,280 gal/PV x $2.86/1000 gal =		$88,358	
5)	Spare parts, etc.			
	o Time = 6 months			
	a. Cost: $15,988 x 1/2 =		$7,994	
6)	Sampling and monitoring 18 restoration wells plus 14 monitor wells.			
	a. 18 wells x $164/well =	$2,952		
	b. 18 wells x $38/well x 2 months =	1,368		
	c. 18 wells x $164/well x 5 months =	14,760		
	d. 18 wells x $164/well x 6 months =	17,712		
	e. 14 wells x 2 samples/month x $38/well x 5 months =	5,320		
	f. Other lab: $783/month x 5 months =	3,915		
	Total		$46,027	
7)	Supervisory Labor (same as MU-1).		$66,804	
	MU-3 TOTAL			**$372,615**

MU-4

1) Remove 3 PV, halo recovery
   - o Time to work:
     3 PV x 29,142,600 gal/PV x 1 min/1,150 gpm x 1 hr/60 min = 1,267 hours
   - a. Cost:
     3 PV x 29,142,600 gal/PV x $0.60/1000 gal= $52,457

2) Treat 2 PV with R.O. and inject permeate
   - o 2 PV x 29,142,600 gal/PV x 1 min/400 gal x 1 hr/60 min = 2,429 hours
   - a. Cost:
     2 PV x 29,142,600 gal/PV x $2.86/1000 gal= $166,696

3) Recirculate 3 PV with reductant
   - o Time = 1,267 hours
   - a. Cost:
     3 PV x 29,142,600 gal/PV x $1.02/1000 gal= $89,176

4) Treat 2 PV with R.O. and inject permeate
   - o Time = 2,429
   - a. Cost:
     2 PV x 29,142,600 x $2.86/1000 gal= $166,696

5) Spare parts, etc.
   - o Time = 7,392
   - a. Cost:
     15,988 x 11/12= $14,656

6) Sampling and monitoring 25 restoration wells plus 18 monitor wells.

a.	25 wells x 164/well=	$4,100	
b.	25 wells x 38/well x 2 months=	1,900	
c.	25 wells x 164/well x 9 months=	36,900	
d.	25 wells x 164/well x 6 months=	24,600	
e.	18 wells x 2 samples/month x 38/well x 11 months =	15,048	
f.	Other lab: $783/month x 11 months=	8,613	
			$91,161

7) Labor:

a.	(1) Engineer: $6,074/month x 11 months=	$66,814	
b.	(1) Radiation Technician: $5,060/month x 11 months (Operator wages included in above calculations)	55,660	
			$122,474

MU-4 TOTAL **$703,316**

MU-5

1) Remove 3 PV, halo recovery
   - o Time to work:
     3 PV x 39,801,130 gal/PV x 1 min/1,150 gpm x 1 hr/60 min = 1,730 hours
   - a. Cost:
     3 PV x 39,801,130 gal/PV x $0.60/1000 gal= $71,642

2) Treat 2 PV with R.O. and inject permeate
   - o 2 PV x 39,801,130 gal/PV x 1 min/400 gal x 1 hr/60 min = 4,975 hours
   - a. Cost:
     2 PV x 39,801,130 gal/PV x $2.86/1000 gal= $227,662

3) Recirculate 3 PV with reductant
   - o Time = 1,730 hours
   - a. Cost:
     3 PV x 39,801,130 gal/PV x $1.02/1000 gal= $121,791

4) Treat 2 PV with R.O. and inject permeate
   - o Time = 4,975
   - a. Cost:
     2 PV x 39,801,130 x $2.86/1000 gal= $227,662

5) Spare parts, etc.
   - o Time = 13,410
   - a. Cost:
     15,988 x 1 1/2= $23,982

6) Sampling and monitoring 33 restoration wells plus 52 monitor wells.

a.	33 wells x 164/well=	$5,412	
b.	33 wells x 38/well x 2 months=	2,508	
c.	33 wells x 164/well x16 months=	86,592	
d.	33 wells x 164/well x 6 months=	32,472	
e.	52 wells x 2 samples/month x 38/well x 18 months =	71,136	
f.	Other lab: $783/month x 18 months=	14,094	
			$212,214

7) Labor:

a.	(1) Engineer: $6,074/month x 18 months=	$109,332	
b.	(1) Radiation Technician: $5,[illegible]/month x 11 months (Operator wages included in above calculations)	91,080	
			$200,412

MU-5 TOTAL $1,085,365

TOTAL MU-1, 2, 3, 4, 5 RESTORATION COST $2,950,468

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	185	214

Pipe Volumes:

Normal 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	4.2286	0.0103
6" Sch. 40 process pipe	0.280	6.5600	0.0384

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, $50/hr x 533 hours =	26,650	
	o Shredder, $12/hr x 533 hours =	6,396	
d.	Disposal:		
	30,000 ft x .0069 ft^2/ft x		
	$12.35/$ft^3$ x 1.25(1) =	3,196	
			72,508
	or	$2.42/ft	

(1) 1.25 factor for void spaces.

2) 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 $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:		
	Smeal: $40/hour x 78 hours =	3,120	
	Shredder: $12/hour x 78 hours =	936	
d.	Disposal:		
	43,200 ft x .0044 ft^3/ft x $12.35/$ft^3$ x 1.25 =	2,934	
	15,200 ft x .0074 ft^3/ft x $12.35/$ft^3$ x 1.25 =	1,736	
			$16,228

or $0.26/ft (stinger pipe)
or $0.31/ft (2" production pipe)

3) Well Plugging.

o Assume 700 ft total depth/well average.

a. Materials:

Cement - 564 lbs x $80/ton =	$23	
Bentonite - 45 lbs x $200/ton =	5	
Salt - 33 lbs x $55/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 $45/hour =	23	
Mixing Unit - 2 hours x $12/hour =	24	
	$154/well	
110 production and injection wells x $154/well =	$16,940	
11 monitor wells x $154/well =	1,694	
		$18,634

4) 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 $94/cy =	$3,830	
20 hours loader x $50/hour =	1,000	
20 man-hours x $136/8 hours =	340	

b. Recontour and seed

9.3 acres x $285/acre =	2,650	
		$7,820

5) 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 $50/hour =	100	

c. Disposal at landfill

$370/load x 6,000 lbs/wellhouse x 1 load/40,000 lbs =	56	
Total per wellhouse	$428	
2 Wellhouses x $428/wellhouse =		$856

MU-1 Total **$116,046**

MU-2

1)	Removal/disposal of 2" production and injection lines			
	a. 34,000 ft x $2.42/ft =		$82,280	
2)	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	
3)	Well plugging			
	o 131 production and injection wells, 14 monitoring wells			
	a. 145 wells x $154/well =		22,330	
4)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	131 wells x $47/well =	6,157		
	b. Recontour, seed			
	11.7 acres x $285/acre =	3,335		
			9,492	
5)	Wellfield house dismantle/disposal			
	a. 3 wellfield houses x $428/wellfield house =		1,284	
	MU-2 Total			**$134,158**

MU-3

1)	Removal/disposal of 2" production and injection lines			
	a. 39,520 ft x $2.42/ft =		$95,638	
2)	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	
3)	Well plugging			
	o (152 production and injection wells, 14 monitor wells)			
	a. 166 wells x $154/well =		25,564	
4)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	166 wells x $47/well =	7,802		
	b. Recontour, seed			
	13.4 acres x $285/acre =	3,847		
			11,649	
5)	Wellfield house dismantle/disposal			
	a. 4 wellfield houses x $428/wellfield house =		1,712	
	MU-3 Total			**$156,555**

MU-4

1)	Removal/disposal of 2" production and injection lines			
	a. 68,900 ft x $2.42/ft=		$166,738	
2)	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	
3)	Well plugging			
	o (265 production and injection wells, 18 monitor wells)			
	a. 283 wells x $154/well=		43,582	
4)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	283 wells x $47/well =	13,301		
	b. Recontour, seed			
	25 acres x $285/acre=	7,125		
			20,426	
5)	Wellfield house dismantle/disposal			
	a. 5 wellfield houses x $428/wellfield house =		2,140	
	MU-4 Total			**271,154**

MU-5

1)	Removal/disposal of 2" production and injection lines			
	a. 103,740 ft x $2.42/ft=		$251,051	
2)	Removal/disposal of downhole pipe			
	a. Dispose:			
	55,500 ft stinger x 0.313ft^3/ft x$12.35/cf x 1.25=	26,817		
	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		
			57,305	
3)	Well plugging			
	o (484 production and injection wells, 18 monitor wells)			
	a. 484 wells x $154/well=		74,536	
4)	Surface reclamation			
	a. Removal/disposal of contaminated soil			
	484 wells x $47/well =	22,748		
	b. Recontour, seed			
	29 acres x $285/acre=	8,265		
			31,013	
5)	Wellfield house dismantle/disposal			
	a. 7 wellfield houses x $428/wellfield house =		2,996	
	MU-5 Total			**416,901**

TOTAL WELLFIELD RECLAMATION MU-1, 2, 3, 4 and 5 **$1,094,814**

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 1996 $'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)

o $66,600 (1988$) x 156.7 (June 1996 CPI Index)/ 118.3 (1988 average CPI Index) = $88,218

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

o 146 tons of steel, siding, girts x $300 (1988 dismantle cost)/ton x 156.7/118.3 = $58,017

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 $97/cy x 1 cy/27 ft^3 = $9,790

b. Removal:
5,450 ft^2 x $2.64/sf = $14,388 $24,178

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 $12.35/ft= 7,723

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. = 5,542
$23,835

(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 $12.35/$ft^3$ = $1,853

b. 350 downhole pumps x 0.5 ft^3/pump
x $12.35/$ft^3$ = 2,161
$4,014

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

a. 4 filters x 100 ft^3/filter x \$12.35/ft^3= \$4,940

8) Dispose of yellowcake dryer

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

a. 400 ft^3 x \$12.35/ft^3 = \$4,940

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 \$12.35/ft^3
x 1.25(1) = \$2,547

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

\$2,917

(1) void space factor

10) Reclaim plant site

a. Dirtwork:
20,000 cy x 1 hour/700 cy x \$130/hour = \$3,714

b. Seed:
4 acres x \$285/acre = 1,140

\$4,854

11) Supervisory labor for plant reclamation

a. (1) Engineer
\$6,074/month x 6 months = \$36,444

b. (1) Radiation Technician
\$5,060/month x 6 months
(operator wages included in above
calculation) = 30,360

\$66,804

TOTAL COMMERCIAL PLANT RECLAMATION/DECOMMISSIONING **\$326,911**

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. $326,911 x 5,000 ft²/34,000 ft² = $48,075

TOTAL R.O. BUILDING RECLAMATION/DECOMMISSIONING **$48,075**

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 \$12.35/ft^3 = \$160,743

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 \$12.35/ft^3 = \$4,631

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 \$50/hour = \$8,800

\$192,534

(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 .010 ft^3/ft x 1.25 x \$12.35/ft^3 = \$1,621

b. R&D pond pipe removal:
2 ponds x 600 ft of 3" pipe/pond x .006 ft^3/ft x 1.25 x \$12.35/ft^3 = 111

c. Pipe disposal:
24.60 ft^3 x \$12.35/ft^3 x 1.25 = 380

\$2,112

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 1996 will be approximately 5,200,000,000 gallons
5,200,000,000 gallons x 1 cy/9,772,000 gallons x \$94/cy = \$50,020

b. Labor:
532 cy x 3 man-days/25 cy x $136/man-day = 8,682

c. Equipment (IT12):
$50/hour x 100 hours = 5,000

$63,702

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 $130 (including operator)/hour = $61,286

b. Topsoil placement and seed:
30 acres x $285/acre = 8,550

$69,836

(1) Caterpillar Handbook, Edition 19

5) Supervisory labor for pond reclamation.

a. (1) Engineer
$6,074/month x 3 months = $18,222

b. (1) Radiation Technician
$5,060/month x 3 months (operator wages included in above calculation) = 15,180

$33,402

TOTAL EVAPORATION POND RECLAMATION **$361,586**

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 $130/hour =	$2,408	
	b. Seed roadway:		
	2.3 acres x $285/acre =	655	
			$3,063
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 $12.35/$ft^3$ x 1.25 =	$1,686	
	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 $50/hour x 8 hours/day =	2,000	
	o Shredder:		
	5 days x $12/hour x 8 hours/day =	480	
			$14,774
3)	Remove electrical facilities.		
	a. Remove HV lines:		
	6,000 ft of HV line at $0.57/ft =	$3,420	
	b. Remove substations:	1,141	
			$4,561
4)	Supervisory Labor.		
	a. (1) Engineer		
	$6,074/month x 3 months =	$18,222	
	b. (1) Radiation Technician		
	$5,060/month x 3 months		
	(Operator wages included		
	in above calculations) =	15,180	
			$33,402

TOTAL MISCELLANEOUS SITE RECLAMATION **$55,800**

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.

1) Plugging and Abandonment	$59,026	
2) Site Reclamation	2,346	
TOTAL DEEP DISPOSAL WELL RECLAMATION		**$61,372**

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 /14 days 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 additional wells:		
(Same as 1-3 above)	9,527	
b. Drill four additional wells:		
4 wells x 50 ft x $25 =	5,000	
		14,527
TOTAL I-196 RESTORATION		**$24,054**

ATTACHMENT A

APPENDIX F OF THE
COMPLETION OF CONSTRUCTION REPORT-
CROW BUTTE RESOURCES, INC
CLASS 1 UIC WELL
June 6, 1996

PLUGGING, ABANDONMENT, AND SITE RESTORATION PROCEDURES

Note: These procedures have been revised based on the well completion in the Morrison Formation in June, 1996. The general procedures are consistent with those previously presented and approved by NDEQ. These procedures are subject to change based on well conditions encountered during the plugging operations.

The site restoration procedures are identical to those presented previously.

P&A Procedures

1. Obtain regulatory approvals, as required, to plug and abandon the well.

2. Flush well with three (3) wellbore volumes of buffer fluid.

3. Perform annulus pressure test for mechanical integrity.

4. Rig up pulling unit and associated equipment.

5. Nipple down wellhead.

6. Release injection packer. Remove packer and injection tubing.

7. Run in the hole with a cement packer to about 3450 feet. Pressure test annulus to assure proper set of packer. Establish injection rate down workstring. Squeeze cement into Morrison Formation with premium cement and additives. Reverse out 2 tubing volumes (if circulation is possible). Pull out of hole.

8. Run in the hole with 6¼-inch bit. Clean out Morrison perforations to top of fish (3634.72'). Pressure test squeeze job to 500 psi.

9. Mix polymer with water to obtain 40 to 60 second viscosity. Run in the hole with 5½-inch washpipe; swallow top of fish and wash sand to 3682. Pull out of hole.

10. Pick up overshot (with packoff and release), jars and bumper sub. Trip in the hole, latch fish and jar free. Pull out with the fish.

11. Run in the hole with workstring and wash sand to top of the bridge plug at 3690 feet. Pull out of hole. Repeat the same with the work string and bridge plug retrieving head (without guts).

12. Based on recommendation from fishing company, either:

    - o Pick up retrieving head with guts, safety joint, jars, and bumper sub. Latch bridge plug, and attempt to release and pull out of hole; or,

    - o Run in hole with mill and junk basket. Mill slips and rubbers on bridge plug and push to the bottom of the hole. Pull out of hole.

13. Set wireline (or tubing set) cement retainer between the Morrison and Sundance Formations (about 3700 feet).

14. Pick up workstring and run in hole. Sting into cement retainer. Pressure annulus to assure proper set of retainer.

15. Establish injection rate down workstring. Squeeze cement into Sundance Formation with premium cement and additives.

16. Close cement retainer. Pressurize wellbore to assure proper closure of cement retainer.

17. Release workstring from cement retainer leaving approximately 60 feet of cement on top of the retainer. Reverse circulate clean.

18. Perform the same for Morrison Formation, with cement retainer set at approximately 3450 feet. Leave 100 feet of cement on top of retainer.

19. Pull out of the hole to approximately 900 feet. Spot 200 foot balanced plug (premium cement) across the surface casing shoe from approximately 700 to 900 feet. Pull out of the hole and wait for cement to set.

20. Go in the hole and tag cement plug with workstring to assure cement has set.

21. Pull out of the hole to 200 feet.

22. Spot a balanced plug from 200 feet back to 10 feet with premium cement.

23. Cut surface and production casings off approximately 5 feet below grade and close all casings with steel plate.

24. Rig down pulling unit and release same.

25. Erect a permanent well location marker. Marker is to be inscribed with the operators name, well class and number, serial number, section-township-range, county, and date plugged and abandoned.

26. Prepare and file closure and post closure report with NDEQ.

Site Restoration Procedures

1. Perform radiation survey and collect soil samples, if needed. Soil samples will be collected if radiation is significantly above background levels.

2. Remove gravel (approximately 6" thick) from the location.

3. Rip the location to a depth of 1 foot.

4. Replace topsoil.

5. Revegetate the location, including soil preparation (grade and contour topsoil, disk and harrow), seeding and mulching.

CBR ESTIMATED PLUGGING, ABANDONMENT, and RECLAMATION COSTS

Class I Injection Well - Crow Butte Project

CEMENT	Total Units	Unit Cost	Total Cost ($)
Squeeze Job (Morrison)	1	$2,000	$2,000
300 Foot Bottom Plug (3750'-3450') 70 sx. Class H or G Cement	70	$7.80	$546
7" Bridge Plug	2	$1,500	$3,000
200 Foot Bottom Plug (900'-700') 50 sx. Class H or G Cement	50	$7.80	$390
200 Foot Bottom Plug (200'-surface) 50 sx. Class H or G Cement	50	$7.80	$390
Pumping Charges	1	$5,000	$5,000
OPERATIONS			
Rig Cost (days)	8	$1,900	$15,200
Circulating Pump & Tank (days)	4	$500	$2,000
Power Swivel (days)	2	$400	$800
Water Hauling (days)	4	$300	$1,200
Wireline Services (2 days)	2	$800	$1,600
Mud Materials	1	$2,000	$2,000
2 7/8" Tubing Rental (days)	8	$700	$5,600
Welder, Dirtwork (days)	4	$300	$1,200
Trucking	1	$2,000	$2,000
Removal, Disposal of Wellhead, Piping & Eq.	1	$2,000	$2,000
Supervision (days)	8	$600	$4,800
Fishing Supervisor (days)	3	$600	$1,800
Fishing tools & Rentals	1	$5,000	$5,000
Pump Rehabilitation	1	$500	$500
Miscellaneous Costs	1	$2,000	$2,000
TOTAL ESTIMATED P&A COST ($)			$59,026

ESTIMATED SITE RESORATION COSTS

Class I Injection Well - Crow Butte Project

	Total Units	Unit Cost	Total Cost ($)
Radiation Survey - 1 day			
Labor Crew (8 hours)	8	$30	$240
Soil Sampling (5 samples)	5	$50	$250
Gravel Removal (6" thickness)			
21780 cu. ft. = 806 cu. yd.	806	$1.00	$806
Ripping - Rip with Motor Grader to 1' depth			
1 acre @ 4 acres/hr ==> 1/2 day	4	$80	$320
Topsoil Replacement			
1 acre @ 8 acres/hr ==> 1/2 day	4	$80	$320
Revegetate 1 Acre			
Grade & Contour Topsoil; per acre	1	$80	$80
Preparation (Disk & Harrow)	1	$20	$20
Drill Seed	1	$160	$160
Mulch @ 2 tons/acre; $50/ton	2	$50	$100
Mulch & Crimp	1	$50	$50
TOTAL ESTIMATED SITE RESTORATION COST ($)			$2,346