

Alternative 2

Cost Summary

**Alternative 2A
Cost Summary**

Alternative 2A		
Treatment Only (with CIA Sludge Disposal Beds)		
Interest =	7%	
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	0	0
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	0	31,000
AMD Treatment	9,561,000	849,000
Sludge Management ¹	6,743,000	46,000
Performance Monitoring	0	78,000
Totals	16,644,000	2,205,000
30-Year NPV of O&M		27,362,000
Total 30-Year Net Present Value	44,006,000	
The capital cost is the present worth of capital expenditures which occur during the 30-year time period. See the sludge option NPV calculation summary sheet for details.		

AMD Mitigations	Capital	O&M
None	0	0
	0	0
Subtotal	0	0
AMD Collection	Capital	O&M
Existing In Mine System	0	1,071,000
Subtotal	0	1,071,000
AMD Conveyance	Capital	O&M
Existing Concrete Channel	0	25,000
Existing HDPE Pipeline	0	68,000
New HDPE Pipeline to CTP	340,000	37,000
Subtotal	340,000	130,000
AMD Storage	Capital	O&M
Existing Lined Pond	0	31,000
Subtotal	0	31,000
AMD Treatment	Capital	O&M
Upgraded 5000 gpm CTP with Media Filters	9,561,000	849,000
Subtotal	9,561,000	849,000
Sludge Management	NPV of Capital	O&M
CIA Sludge Disposal Beds	5,083,000	46,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	6,743,000	46,000
Performance Monitoring	Capital	O&M
KT Portal	0	18,000
CTP	0	60,000
Subtotal	0	78,000



**Alternative 2B
Cost Summary**

Alternative 2B		
Treatment Only (with Mechanical Dewatering and Offsite Sludge Disposal)		
Interest =	7%	
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	0	0
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	0	31,000
AMD Treatment	9,561,000	849,000
Sludge Management ¹	5,590,000	745,000
Performance Monitoring	0	78,000
Totals	15,491,000	2,904,000
30-Year NPV of O&M		36,036,000
Total 30-Year Net Present Value	51,527,000	
¹ The capital cost is the present worth of capital expenditures which occur during the 30-year time period.		

AMD Mitigations	Capital	O&M
None	0	0
	0	0
Subtotal	0	0

AMD Collection	Capital	O&M
Existing In Mine System	0	1,071,000
Subtotal	0	1,071,000

AMD Conveyance	Capital	O&M
Existing Concrete Channel	0	25,000
Existing HDPE Pipeline	0	68,000
New HDPE Pipeline to CTP	340,000	37,000
Subtotal	340,000	130,000

AMD Storage	Capital	O&M
Existing Lined Pond	0	31,000
Subtotal	0	31,000

AMD Treatment	Capital	O&M
Upgraded 5000 gpm CTP with Media Filters	9,561,000	849,000
Subtotal	9,561,000	849,000

Sludge Management	NPV of Capital	O&M
Mechanical Dewatering System	3,930,000	152,000
Offsite Haulage and Disposal		593,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	5,590,000	745,000

Performance Monitoring	Capital	O&M
KT Portal	0	18,000
CTP	0	60,000
Subtotal	0	78,000

**Alternative 2C
Cost Summary**

Alternative 2C		
Treatment Only (with Smelter Closure Area Sludge Disposal Beds)		
Interest =	7%	
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	0	0
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	0	31,000
AMD Treatment	9,561,000	849,000
Sludge Management ¹	11,260,000	72,000
Performance Monitoring	0	78,000
Totals	21,161,000	2,231,000
30-Year NPV of O&M		27,685,000
Total 30-Year Net Present Value	48,846,000	
¹ The capital cost is the present worth of capital expenditures which occur during the 30-year time period. See the sludge option NPV calculation summary sheet for details.		

AMD Mitigations	Capital	O&M
None	0	0
	0	0
Subtotal	0	0
AMD Collection	Capital	O&M
Existing In Mine System	0	1,071,000
Subtotal	0	1,071,000
AMD Conveyance	Capital	O&M
Existing Concrete Channel	0	25,000
Existing HDPE Pipeline	0	68,000
New HDPE Pipline to CTP	340,000	37,000
Subtotal	340,000	130,000
AMD Storage	Capital	O&M
Existing Lined Pond	0	31,000
Subtotal	0	31,000
AMD Treatment	Capital	O&M
Upgraded 5000 gpm CTP with Media Filters	9,561,000	849,000
Subtotal	9,561,000	849,000
Sludge Management	NPV of Capital	O&M
Smelter Closure Area Sludge Disposal Beds	9,600,000	72,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	11,260,000	72,000
Performance Monitoring	Capital	O&M
KT Portal	0	18,000
CTP	0	60,000
Subtotal	0	78,000



**Alternative 2D
Cost Summary**

Alternative 2D		
Treatment Only (with CIA Sludge Drying Beds and Smelter Closure Area Landfill)		
Interest =	7%	
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	0	0
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	0	31,000
AMD Treatment	9,561,000	849,000
Sludge Management ¹	10,239,000	154,000
Performance Monitoring	0	78,000
Totals	20,140,000	2,313,000
30-Year NPV of O&M		28,702,000
Total 30-Year Net Present Value	48,842,000	
¹ The capital cost is the present worth of capital expenditures which occur during the 30-year time period.		

AMD Mitigations	Capital	O&M
None	0	0
	0	0
Subtotal	0	0

AMD Collection	Capital	O&M
Existing In Mine System	0	1,071,000
Subtotal	0	1,071,000

AMD Conveyance	Capital	O&M
Existing Concrete Channel	0	25,000
Existing HDPE Pipeline	0	68,000
New HDPE Pipeline to CTP	340,000	37,000
Subtotal	340,000	130,000

AMD Storage	Capital	O&M
Existing Lined Pond	0	31,000
Subtotal	0	31,000

AMD Treatment	Capital	O&M
Upgraded 5000 gpm CTP with Media Filters	9,561,000	849,000
Subtotal	9,561,000	849,000

Sludge Management	NPV of Capital	O&M
Smelter Closure Area Landfill	6,770,000	103,000
Landfill Closure (Yr 31)	278,000	0
CIA Sludge Drying Beds	1,531,000	51,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	10,239,000	154,000

Performance Monitoring	Capital	O&M
KT Portal	0	18,000
CTP	0	60,000
Subtotal	0	78,000



Existing Collection Costs

Existing Mine Water Collection System O&M Costs

	Qty	Unit	Total Unit Cost	Total Cost	Comments
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Annual Costs

	Qty	Unit	Total Unit Cost	Total Cost	Comments
Mine Operation Labor	52	Week		\$320,840	Weekly cost based on estimate of existing mine owner incurred cost. Includes a crew of a foreman, hoistman, backup hoistman, and 3-man repair crew. Total labor at \$4,410/week and a benefits package at \$1,760/week = \$6,170/week total
Power	12	Month		\$102,000	Power cost estimated for existing mine operations
Level Repair and Maintenance	1	Year	81,000	\$81,000	9, 10, and 11 level areas necessary for mine water control
Compressor Maintenance	1	Year	20,000	\$20,000	Compressor maintenance costs
Hoist Maintenance	1	Year	160,000	\$160,000	Cherry Hoist, #2 Hoist, and #1 Temporary Hoist
Pumps and Pipe Columns	1	Year	100,000	\$100,000	Maintenance of mine dewatering pumps in #2 Shaft, #1 Shaft, 9 Level Pumps, and piping
Electrical System Maintenance	1	Year	40,000	\$40,000	
Subtotal				\$823,840	
Contingency Allowance	15%			\$123,576	15% contingency for repairs and maintenance
	15%			\$123,576	15% allowance for unaccounted for costs
Total Annual Cost				\$1,070,992	



KT Portal Channel and Flume Cleaning Costs

	Qty	Unit	Total Unit Cost	Total Cost	Comments
Annual Costs					
Inspection and Cleanout	12	Month	1,875	\$22,500	Based on USACE cost of \$1,875/month for existing cleanout work
Contingency	10%			\$2,250	
Total Annual Cost				<u>\$24,750</u>	



Existing Pipeline O&M

Existing 20-Inch HDPE Pipeline from Mine Yard to Lined Pond O&M Costs

	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	2	Each	0	674	288	\$1,924	2 times/year & 4hrs/time each with 2 laborers with pickup
Pigging	2	Each				\$56,000	2 times per year at \$28,000 each lump sum based on the USACE estimate of 8/1/00 for the pipeline from mine yard to lined pond
Camera	2	YR	2,000			\$4,000	2 times/year (subcontracted out)
						<u>\$61,924</u>	
Contingency	10%					<u>\$6,192</u>	
Total Annual Cost						\$68,116	

Notes

Camera costs = 1,000/day times 2 days each time (Big Sky Industrial 509/624-4949)



Bunker Hill
 Future Pipeline to CTP
 Order of Magnitude Cost Opinion

DATE: 03/03/2000
 PROJECT NO.: 152215.RS.06
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Pigging/Camera Station					
818 LA Utility Vault Company Vault (8 feet deep)	1	EA	4,584.51	\$4,585	
30 degree SDR 17 HDPE (wrapped in fiberglass)	1	EA	3,072.38	\$3,072	
20-inch ORBE knife-gate valve	1	EA	6,572.38	\$6,572	
Link-Seals	2	EA	1,072.38	\$2,145	
Electrofusio couplers	2	EA	1,472.38	\$2,945	
Stainless steel flanges	2	EA	3,572.38	\$7,145	
Pig Launching Station (see pipeline O&M plan)	1	EA	8,144.75	\$8,145	based on past estimate
Pipeline					
20-inch diameter SDR 17 HDPE	800	LF	52.90	\$42,316	R2-38
Excavation	1,312	CY	8.62	\$11,301	5' of cover, utility obstructions, concrete debris, etc
Bed & Zone	397	CY	31.62	\$12,541	
Native Backfill	847	CY	13.30	\$11,258	
Waste	465	CY	4.93	\$2,295	
Remove & Dispose of Box Culvert (Asbestos)	1	LS	6,892.03	\$6,892	allow 2 days & local disposal
Tee connection to 24-inch existing line	1	EA	6,579.02	\$6,579	cut, fab tee, install
McKinley Avenue paved road crossing (standard 2 lane road with shoulders)	1	LS	800.00	\$800	28'x 13' @ @20/sy
Bunker Creek Crossing (assume 20 feet wide)	1	LS	5,307.52	\$5,308	cofferdams, temp diversion, dewatering, open cut, etc
Electrofusio couplers	5	EA	1,472.38	\$7,362	
Stainless steel flanges	5	EA	3,572.38	\$17,862	
SUBTOTAL				\$159,121	
MISC ALLOWANCE	10%			\$15,912	
SUBTOTAL				\$175,033	
CONTINGENCY	30%			\$52,510	
SUBTOTAL				\$227,543	
MOBILIZATION	15%			\$34,131	
CONSTRUCTION TOTAL				\$261,675	
SALES TAX ON MATERIALS	5.0%			\$3,977	
ENGINEERING AND SUPPORT	20%			\$52,335	
CONST MANAGEMENT	8%			\$20,934	
CAPITAL TOTAL (ROUNDED)				\$340,000	
ANNUAL O&M COST			\$37,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$459,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$799,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
 Contingency is for scope changes that are presently unforeseen.
 Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

Assumptions

Pipe is buried 5-feet deep
 Incidentals to consider include:
 Excavation through several abandoned utilities and live utilities
 Excavating through sections of concrete demolition waste (quantity unknown)
 Remove and dispose of an old box culvert (asbestos removal)



Future Pipeline O&M

	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	2	Each	0	674	288	\$1,924	2 times/year & 4hrs/time each with 2 laborers with pickup
							2 times per year at \$14,000 each lump sum based on 1/2 the USACE estimate of 8/1/00 for the pipeline from mine yard to lined pond of \$28,000
Pigging	2	Each				\$28,000	each
Camera	2	YR	2,000			\$4,000	2 times/year (subcontracted out)
						\$33,924	
						\$3,392	
Contingency	10%						
Total Annual Cost						\$37,316	

Notes

Camera costs = 1,000/day times 2 days each time (Big Sky Industrial 509/624-4949)



Pond O&M

O&M Costs
Existing Lined Pond
Bunker Hill
Acid Mine Drainage: Storage

DATE: 01/11/2001
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspect Pond and Remove Debris	2	YR		4,000		\$8,000	assume 2 times/year - 8 hours @ \$250 to remove & dispose
Pond Repair & Maintenance	1	YR		18,000		\$18,000	fence, gate, road, liner, and misc. maintenance
Pumping System Inspection	8	HR	0	50		\$400	minimal pump operation-assume 2-4hr inspections/ year @ \$50
Pumping System Operation	1	HR	0	50		\$50	allow for power for minimal use
Pump maintenance	1	YR	500.00	800	0	\$1,300	minimal pump operation-assume 2-8hr repairs/ year @ \$50
						\$27,750	
						\$2,775	
Contingency	10%						
Total Annual Cost						\$30,525	

NOTE:

**Bunker Hill
 Mine Water
 Upgrade HDS Plant & Add Media Filters (2,500gpm) Phase 1
 Order of Magnitude Cost Opinion**

Phase 1
 DATE: 11/01/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
HDS (Hydroxide)					
Sitework/Yard Piping					
Fencing	500	LF	10.00	\$5,000	allowance
Gravel Surfacing & Misc	1	LS	25,000.00	\$25,000	allowance
Connections & Relocations of Existing Piping	1	LS	30,000.00	\$30,000	allowance
AMD Coarse Filter					
Earthwork & Concrete for Slab & Sump	1	LS	6,000.00	\$6,000	10cy @ \$600
2500gpm Self-Cleaning Filter	2	EA	16,563.04	\$33,126	quote + frt + markup
Appurtenances for Filter	2	EA	21,738.95	\$43,478	4-valves, fittings, misc
Electrical for Filter	2	EA	5,000.00	\$10,000	allowance
Cleaning Debris Bin	2	LS	1,000.00	\$2,000	Fiberglass tank due to pH 2
Structural Steel Tank Support System	1	LS	5,000.00	\$5,000	allowance
Supernatant Pump	1	EA	10,000.00	\$10,000	Low pH
Mechanical for Pump	1	LS	5,000.00	\$5,000	slab, FG tank, concrete sump, pH 2 reqs FG & acid rest conc
				\$114,604	
Lime Feed System					
Earthwork & Concrete for Slab, Curbs, Sumps, etc	1	LS	79,488.00	\$79,488	apx 200cy @ \$400/cy
Retaining Wall to Accommodate New Tank	550	SF	25.00	\$13,750	55'x 8'H + 2' below grade, CIP cantilever
Earthwork for Retaining Wall	1	LS	6,814.27	\$6,814	
Paint	1	LS	50,000.00	\$50,000	allowance for subcontract
Lime Silo, 21'x 48' h, Conical, Coated Steel	1	EA	179,040.98	\$179,041	quote + 5%frt, rep, sp pts + 10%mu, esca;ated
Screw Feeder, 9" dia x 20' long	2	EA	14,774.78	\$29,550	quote + 5%frt, rep, sp pts + 10%mu, esca;ated
Lime Slaker, Grit Screen & Screw, Controls	2	EA	74,816.42	\$149,633	quote + 5%frt, rep, sp pts + 10%mu, esca;ated
Lime Slurry Storage Tank, 43000gal	1	EA	34,015.95	\$34,016	
Lime Slurry Storage Tank Mixer, 15hp	2	EA	17,190.11	\$34,380	
Slurry Circulation Pumps, 100gpm, 50' tdh	4	EA	16,901.45	\$67,606	
Slurry Transfer Pumps, 100gpm, 50' tdh	4	EA	16,901.45	\$67,606	same as above
Grit Bin	2	EA	2,183.17	\$4,366	allowance
Clean, Refurbish, Upgrade Existing System	1	LS	24,653.63	\$24,654	allow hours & misc parts i.e. bin vents,etc
Truck Unloading Improvements	1	LS	10,000.00	\$10,000	ACP, curbing, etc - allowance
Lime Slurry Piping, 2" GE Steel	1,000	LF	20.20	\$20,205	incl cplgs, ftgs, etc, on pipe rack
Piping Rack	250	LF	25.00	\$6,250	allowance
Reactor A (Sludge Conditioning Tank)					
Earthwork & Concrete for Slab	1	LS	19,872.00	\$19,872	apx 50cy @ \$400/cy
Elevated Platform for Reactor A&B	1	LS	60,000.00	\$60,000	asm 40x20 @ \$75/sf high level and to support reactor A
Paint	1	LS	10,000.00	\$10,000	allowance for subcontract
Sludge Conditioning Tank, 2500gal FRP	1	EA	42,694.85	\$42,695	quote + 5% infla. + 5%frt + 10%mu



**Bunker Hill
 Mine Water
 Upgrade HDS Plant & Add Media Filters (2,500gpm) Phase 1
 Order of Magnitude Cost Opinion**

Phase 1
 DATE: 11/01/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Mixer, 3hp	1	EA	13,802.75	\$13,803	quote + 5% infla. + 5%frt + 10%mu
Inlet Piping, 24" SDR 15.5	120	LF	193.68	\$23,242	constrained schedule & access w/obstacles, ftgs, valves, connections, etc
Inlet Piping, 18" SDR 15.5	120	LF	146.95	\$17,634	constrained schedule & access w/obstacles, ftgs, valves, connections, etc
Valves, vaults, etc	1	LS	50,000.00	\$50,000	allowance
Neutralization/Oxidation System					
Distribution Piping, 24" HDPE	170	LF	193.68	\$32,926	constrained schedule & access w/obstacles, ftgs, valves, connections, etc
Retaining Wall to Accommodate New Tank	450	SF	25.00	\$11,250	45'x 8'H + 2' below grade, CIP cantilever
Earthwork for Retaining Wall	1	LS	6,814.27	\$6,814	
Earthwork & Concrete for Slab	1	LS	65,577.60	\$65,578	apx 165cy @ \$400/cy
Paint	1	LS	50,000.00	\$50,000	allowance for subcontract
Aeration Tank (Reactor B), 75,000gal Steel Tank	1	EA	37,500.00	\$37,500	revised to \$.50/gal
Submerged Turbine Aerator/Mixer	1	EA	73,520.37	\$73,520	use same a 5000gpm estimate
Positive Displacement Blower	1	EA	13,205.04	\$13,205	
Pipe Supports, Hangers, etc	1	LS	2,500.00	\$2,500	allowance
Automated Polymer Make-up & Feed System					
Earthwork & Concrete for Slab	1	LS	0.00	\$0	in bldg
Paint	1	LS	5,000.00	\$5,000	allowance for subcontract
Polymer Make-up System	2	EA	10,216.52	\$20,433	
Polymer Make-up Tank, 2000gal	1	EA	3,973.95	\$3,974	
Mixer	2	EA	2,337.07	\$4,674	corrected hours
Transfer Pump, 20gpm	2	EA	3,273.75	\$6,548	corrected hours
Polymer Feed Tank, 2000gal	1	EA	3,973.95	\$3,974	
Variable Speed Gear Pump, 1gpm	2	EA	4,210.43	\$8,421	
Piping to Feed Point	100	LF	19.90	\$1,990	
Thickener					
Clean & Decommission Existing Floc System	1	LS	1,774.62	\$1,775	
Replace Weir	1	LS	28,860.00	\$28,860	quote + frt & markup=\$19/lf & allow for removal & replacement
Groundwater Test & Empty Tank	1	LS	10,000.00	\$10,000	allowance
Replace Thickener Rake System Complete	1	LS	146,934.08	\$146,934	quote + frt & markup
E-DUC Feed & Floc System & Center Well Mods	1	LS	45,933.63	\$45,934	quote + frt & markup + add'l parts for mods
Surface Prep & Coat	1	LS	100,000.00	\$100,000	allowance for interior walls & mechanism
Sludge Wasting & Recycle Pumps					
Earthwork & Concrete for Slab	1	LS	79,488.00	\$79,488	apx 200cy @ \$400/cy
Remove Existing Pumps	1	LS	2,474.40	\$2,474	
Paint	1	LS	20,000.00	\$20,000	allowance for subcontract



**Bunker Hill
 Mine Water
 Upgrade HDS Plant & Add Media Filters (2,500gpm) Phase 1
 Order of Magnitude Cost Opinion**

Phase 1
 DATE: 11/01/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Sludge Recycle Pump, 400gpm	2	EA	14,616.89	\$29,234	new cost for smaller pump
Sludge Recycle Pump, 800gpm	2	EA	22,047.87	\$44,096	new cost for smaller pump
Sludge Waste Pump, 400gpm, 200' tdh	2	EA	26,380.15	\$52,760	new cost for larger pump
Sludge Recycle Piping, 8" DI	600	LF	68.47	\$41,084	including ftgs, valves, etc, revised cost
Sludge Wasting Piping, 6" DI	400	LF	54.78	\$21,912	including ftgs, valves, etc, revised cost
I&C and Electrical					
Total I&C	1	LS	108,103.26	\$108,103	use 5% of above, enough?????
Generator & Fuel Tank	1	EA	352,246.48	\$352,246	same as 5000gpm + escalation
New Magnetic Flowmeter in Existing Vault	1	EA	10,268.68	\$10,269	24"
Parshall Flume @ Effluent	1	EA	3,037.37	\$3,037	12"
Electrical	1	LS	210,857.68	\$210,858	use 8% of above
Building Extension					
Addition to Existing Building	900	SF	150.00	\$135,000	added size for additional pumps
Existing Plant Demolition					
Earthwork	1	LS	7,314.27	\$7,314	
Concrete Slab & Footings	100	CY	255.36	\$25,536	assume 18" avg thickness to account for ftgs, etc
Relocate Existing Filtration Bldg, etc	1	LS	34,071.36	\$34,071	60' x 30' x 10' eave ht metal bldg-remove contents, dismantle & re-erect
Repairs, Touchup, etc	1	LS	5,000.00	\$5,000	allowance for some painting, sealants, doors, etc
Water	1	LS	4,234.70	\$4,235	sink, emer. Shower, hose bibbs, piping & service
Sanitary	1	LS	1,917.35	\$1,917	toilet, piping & service
Drains	1	LS	2,117.35	\$2,117	
HVAC	1	LS	1,617.35	\$1,617	reinstall unit heaters
Electrical	1	LS	4,933.48	\$4,933	reinstall, fixtures, panels, wiring, etc
Tertiary Media Filters					
HDS Pump Station Complete	1	LS	70,000.00	\$70,000	cost by DAH
Water Reuse Pump Station Complete	1	LS	30,000.00	\$30,000	cost by DAH
Distribution Piping	500	LF	35.00	\$17,500	4" plastic, below grade
Media Filter System	1	LS	566,834.08	\$566,834	quote=430000 + 10% frt + 10% mu & 100hrs to install
Liquid Polymer System	0	LS	47,634.41	\$0	Not required as per JS 11/28/2000
Backwash Pumping Complete	1	LS	133,461.22	\$133,461	Bob York spreadsheet + 10% OH&P, scaled to 2500gpm + escalation to 2000gpm
Dirty Backwash Storage Tank, 30,000gal	1	EA	22,500.00	\$22,500	\$.75/gal
Dirty Backwash Storage Tank Mixer	1	EA	3,737.46	\$3,737	allowance
Dirty Backwash Return Pump	1	EA	13,885.36	\$13,885	allowance
Clean Backwash Supply Tank, 30,000gal	1	EA	22,500.00	\$22,500	\$.75/gal
Clean Backwash Supply Pump	1	EA	13,885.36	\$13,885	



**Bunker Hill
 Mine Water
 Upgrade HDS Plant & Add Media Filters (2,500gpm) Phase 1
 Order of Magnitude Cost Opinion**

Phase 1
 DATE: 11/01/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Building Complete	1	LS	318,750.00	\$318,750	85'x 50 @ \$75/sf
Electrical/I&C	1	LS	0.00	\$0	included
Mechanical	1	LS	0.00	\$0	included
Backflow Preventer	1	EA	10,000.00	\$10,000	allowance
Distribution Piping	1,000	LF	23.00	\$23,000	2" plastic
Paint	1	LS	5,000.00	\$5,000	misc painting allowance
SUBTOTAL				\$4,319,374	
MISC ALLOWANCE	5%			\$215,969	
SUBTOTAL				\$4,535,343	
CONTINGENCY	20%			\$907,069	
SUBTOTAL				\$5,442,411	
MOBILIZATION	15%			\$816,362	
CONSTRUCTION TOTAL				\$6,258,773	
SALES TAX ON MATERIALS	5.0%			\$186,656	
ENGINEERING AND SUPPORT	20%			\$1,251,755	
CONSTRUCTION MANAGEMENT	8%			\$500,702	
CAPITAL TOTAL (ROUNDED)				\$8,198,000	
ANNUAL O&M COST			\$849,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$10,535,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$18,733,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
 Contingency is for scope changes that are presently unforeseen.
 Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in October 2000 dollars and does not include escalation.
 The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Bunker Hill
 Mine Water
 Upgrade HDS Plant & Add Media Filters (5,000gpm) (Equivalent to Phase 2 of
 CTP Masterplan)**

**DATE: 11/29/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin**

Order of Magnitude Cost Opinion

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
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Improvements

Remove Reactor A	1	LS	2,810.04	\$2,810	
Remove Aeration Basin, Ret Wall, Stairs, etc	1	LS	127,767.60	\$127,768	6000cy @ 200cy/hr
Remove Flocculation Basin	1	LS	18,733.63	\$18,734	allow 40hrs
Remove Associated Piping	1	LS	1,873.36	\$1,873	
Remove Associated Electrical	1	LS	1,873.36	\$1,873	
Regrade Area	1	LS	1,703.57	\$1,704	
Connections & Relocations of Existing Piping	1	LS	5,000.00	\$5,000	allowance

New Reactor B

Earthwork & Concrete for Slab	1	LS	19,872.00	\$19,872	apx 50cy @ \$400/cy
Elevated Platform	1	LS	35,000.00	\$35,000	asm 35x20 addition @ \$50/sf
Paint	1	LS	10,000.00	\$10,000	allowance for subcontract
Aeration Tank (Reactor B), 75,000gal Steel Tank	1	EA	37,500.00	\$37,500	
Submerged Turbine Aerator/Mixer	1	EA	73,527.30	\$73,527	use same a 5000gpm estimate
Positive Displacement Blower	1	EA	13,205.04	\$13,205	
Outlet Piping, 24" DI	200	LF	104.78	\$20,956	
Pipe Rack & Walkway	200	LF	243.47	\$48,695	

same as ph 1

Reactor A

Modify Reactor A to Feed Both B Reactors	1	LS	10,000.00	\$10,000	allowance
Piping to All B Reactors to Operate in Series or Parallel	1	LS	5,000.00	\$5,000	allowance
Sludge Recycle Pump, 400gpm	2	EA	14,618.10	\$29,236	

Filtration

Media Filter System	1	LS	132,000.00	\$132,000	Bob York spreadsheet + 10% OH&P
Expand Filtration Building	1	LS	165,000.00	\$165,000	Bob York spreadsheet + 10% OH&P

**Bunker Hill
 Mine Water
 Upgrade HDS Plant & Add Media Filters (5,000gpm) (Equivalent to Phase 2 of
 CTP Masterplan)
 Order of Magnitude Cost Opinion**

**DATE: 11/29/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Electrical/I&C	1	LS	0.00	\$0	included
Mechanical	1	LS	0.00	\$0	included
Paint	1	LS	0.00	\$0	included
SUBTOTAL				\$759,753	
MISC ALLOWANCE	10%			\$75,975	greater uncertainty of quantities & detail
SUBTOTAL				\$835,728	
CONTINGENCY	25%			\$208,932	greater uncertainty of scope & remodeling
SUBTOTAL				\$1,044,660	
MOBILIZATION	0%			\$0	included in phase 1 cost
CONSTRUCTION TOTAL				\$1,044,660	
SALES TAX	5.0%			\$26,116	50% materials
ENGINEERING	20%			\$208,932	
CONSTRUCTION MANAGEMENT	8%			\$83,573	
CAPITAL TOTAL (ROUNDED)				\$1,363,000	
ANNUAL O&M COST			\$849,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7%)				\$10,535,000	
TOTAL PROJECT COST FOR PHASE 2				\$11,898,000	
TOTAL CAPITAL COST FOR 5000 GPM OPTION (PHASE 1 + PHASE 2)				\$9,561,000	
ANNUAL O&M COST			\$849,000		
TOTAL NPV OF ANNUAL O&M COST (30 YEARS @ 7%)				\$10,535,000	
TOTAL PROJECT COST FOR 5000 GPM OPTION				\$20,096,000	



Bunker Hill
 Mine Water
 Upgrade HDS Plant & Add Media Filters (5,000gpm) (Equivalent to Phase 2 of
 CTP Masterplan)
 Order of Magnitude Cost Opinion

DATE: 11/29/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
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NOTES:

- Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
- Contingency is for scope changes that are presently unforeseen.
- Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc. and is included in phase 1 costs

NOTE: The above cost opinion is in October 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs (5,000 gpm)							
Operation Costs	1	YR	0	509,000	0	\$509,000	Based on existing plant O&M costs calculated over 12/98 to 9/00; excludes outside analytical services & non routine maintenance
Maintenance Costs @ 2%	1	YR	0	107,421	0	\$107,421	asm 2% of subtotal after allowance of HDS upgrade, phase 1 & 2
HDS Effluent Pump Station	1	YR	46,800	0	0	\$46,800	
Media Filters	1	YR	97,500	0	0	\$97,500	
Polymer System	0	YR	6,825	0	0	\$0	not required
Polymer	0	YR	52,634	0	0	\$0	not required
Backwash Pumping	1	YR	8,775	0	0	\$8,775	
Building (not incl HDS)	1	YR	0	2,400	0	\$2,400	asm \$.50/SF
						\$771,896	
Contingency	10%					\$77,190	
Total Annual Cost						\$849,000	
NPV of Annual O&M Costs (30 years @ 7%)						\$10,535,000	



Existing CTP O&M

Historical CTP O&M Costs

	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Unit Cost	Total Cost	Comments
June 1998 thru May 1999								
Jun-98	1	Month					\$44,335	From EPA Cost Record
Jul-98	1	Month					\$73,829	From EPA Cost Record
Aug-98	1	Month					\$40,436	From EPA Cost Record
Sep-98	1	Month					\$33,517	From EPA Cost Record
Oct-98	1	Month					\$72,233	From EPA Cost Record
Nov-98	1	Month					\$39,582	From EPA Cost Record
Dec-98	1	Month					\$37,083	From EPA Cost Record
Jan-99	1	Month					\$46,206	From EPA Cost Record
Feb-99	1	Month					\$62,474	From EPA Cost Record
Mar-99	1	Month					\$81,237	From EPA Cost Record
Apr-99	1	Month					\$32,128	From EPA Cost Record
May-99	1	Month					\$58,806	From EPA Cost Record
							\$621,866	
Jun-99	1	Month					\$77,378	From EPA Cost Record
Jul-99	1	Month					\$30,478	From EPA Cost Record
Aug-99	1	Month					\$116,559	From EPA Cost Record
Sep-99	1	Month					\$100,556	From EPA Cost Record
Oct-99	1	Month					\$44,459	From EPA Cost Record
Nov-99	1	Month					\$50,342	From EPA Cost Record
Dec-99	1	Month					\$56,221	From EPA Cost Record
Jan-00	1	Month					\$57,592	From EPA Cost Record
Feb-00	1	Month					\$34,511	From EPA Cost Record
Mar-00	1	Month					\$41,880	From EPA Cost Record
Apr-00	1	Month					\$50,910	From EPA Cost Record
May-00	1	Month					\$80,357	From EPA Cost Record
							\$741,243	
2-Year Average =							\$681,555	

Note: Treatment costs vary year-to-year depending on mine water flow rates and unplanned maintenance requirements. More unplanned maintenance was conducted during the June 1999 to May 2000 period than the previous 12 months.



**Alternative 2
Option A**

**Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in CIA Disposal Beds
Order of Magnitude Cost Opinion**

DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Sitework/Yard Piping				
6" HDPE Sludge Pipeline in Trench	800	LF	21.54	\$17,233
6" HDPE Leachate Pipeline in Trench	800	LF	21.54	\$17,233
Sludge Pumping				
Prefab Metal Bldg w/Concrete Floor	216	SF	150.00	\$32,400
Paint	1	LS	5,000.00	\$5,000
Pump, 30hp	2	EA	14,810.06	\$29,620
Standby Pump, 30hp	1	EA	14,810.06	\$14,810
Gland Seal Water Pump	1	EA	7,948.38	\$7,948
Electrical/I&C	1	LS	17,955.71	\$17,956
Sludge Disposal Bed (per each)				
Excavation	25,000	C. Y.	3.00	\$75,000
Subgrade Preparation	5	Acres	3,000.00	\$15,000
Subgrade Stabilization	10,500	C. Y.	4.00	\$42,000
Liner Protection Sand	8250	C. Y.	10.00	\$82,500
Drain Rock	1,950	C. Y.	18.00	\$35,100
Ditch Lining Geotextile	21,200	S. Y.	1.65	\$34,980
G C L	18,100	S. Y.	4.05	\$73,305
H D P E Geomembrane	18,100	S. Y.	5.40	\$97,740
H D P E Pipe, 10"	550	L. F.	23.00	\$12,650
Erosion Control Matting	11800	S.Y.	1.50	\$17,700
Perf Pipe, 4"	2000	L. F.	2.00	\$4,000
Perf Pipe, 6"	580	L. F.	3.00	\$1,740
HDPE Pipe, 6"	130	L. F.	2.50	\$325
Strip Drains	700	L. F.	1.75	\$1,225
Valves, 6" Knife Gate	2	Each	700	\$1,400
Valves, 10" Knife Gate	6	Each	1,000	\$6,000
Air/Vacuum Release Valve	1	Each	2,000	\$2,000
Valve Vault	6	Each	1,950	\$11,700
Water Tight Manhole	1	Each	3,500	\$3,500
Vertical Filtrate Drains	6	Each	4,000	\$24,000
Cleanouts	2	Each	750	\$1,500
Perimeter Road Embankment (not reduced)	43500	C. Y.	10	\$435,000
Chain Link Fence and Gates (not reduced)	2000	L.F.	12	\$24,000
Crushed Rock Surfacing (not reduced)	1500	C. Y.	15	\$22,500
SUBTOTAL				\$1,167,065
MISC ALLOWANCE	10%			\$116,706
SUBTOTAL				\$1,283,771
CONTINGENCY	30%			\$385,131
SUBTOTAL				\$1,668,903
MOBILIZATION	15%			\$250,335
CONSTRUCTION TOTAL				\$1,919,238
SALES TAX ON MATERIALS	5.0%			\$28,216
ENGINEERING AND SUPPORT	20%			\$383,848
CONSTRUCTION MANAGEMENT	8%			\$153,539
CAPITAL COST FIRST BED (ROUNDED)				\$2,480,000
CAPITAL COST FOR NEW CELLS IN FUTURE YEARS (DOES NOT INCLUDE PUMPING AND PIPING COST)				
Sludge Disposal Bed (per each)				
Excavation	25,000	C. Y.	3.00	\$75,000
Subgrade Preparation	5	Acres	3,000.00	\$15,000



**Alternative 2
Option A**

**Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in CIA Disposal Beds
Order of Magnitude Cost Opinion**

DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Subgrade Stabilization	10,500	C. Y.	4.00	\$42,000
Liner Protection Sand	8250	C. Y.	10.00	\$82,500
Drain Rock	1,950	C. Y.	18.00	\$35,100
Ditch Lining Geotextile	21,200	S. Y.	1.65	\$34,980
G C L	18,100	S. Y.	4.05	\$73,305
H D P E Geomembrane	18,100	S. Y.	5.40	\$97,740
H D P E Pipe, 10"	550	L. F.	23.00	\$12,650
Erosion Control Matting	11800	S.Y.	1.50	\$17,700
Perf Pipe, 4"	2000	L. F.	2.00	\$4,000
Perf Pipe, 6"	580	L. F.	3.00	\$1,740
HDPE Pipe, 6"	130	L. F.	2.50	\$325
Strip Drains	700	L. F.	1.75	\$1,225
Valves, 6" Knife Gate	2	Each	700.00	\$1,400
Valves, 10" Knife Gate	6	Each	1,000.00	\$6,000
Air/Vacuum Release Valve	1	Each	2,000.00	\$2,000
Valve Vault	6	Each	1,950.00	\$11,700
Water Tight Manhole	1	Each	3,500.00	\$3,500
Vertical Filtrate Drains	6	Each	4,000.00	\$24,000
Cleanouts	2	Each	750.00	\$1,500
Perimeter Road Embankment (not reduced)	28275	C. Y.	10	\$282,750
Chain Link Fence and Gates (not reduced)	1000	L.F.	12	\$12,000
Crushed Rock Surfacing (not reduced)	1500	C. Y.	15	\$22,500

SUBTOTAL				\$1,024,865
MISC ALLOWANCE	10%			\$102,487
SUBTOTAL				\$1,127,352
CONTINGENCY	30%			\$338,205
SUBTOTAL				\$1,465,557
MOBILIZATION	15%			\$219,834
CONSTRUCTION TOTAL				\$1,685,390
SALES TAX ON MATERIALS	5.0%			\$25,622
ENGINEERING AND SUPPORT	20%			\$337,078
CONSTRUCTION MANAGEMENT	8%			\$134,831

CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED) \$2,180,000

ANNUAL O&M COST FOR OPERATING BED \$46,000

NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST) \$566,000

NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST \$6,859,000

TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST \$7,425,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



Alternative 2
Option A

Bunker Hill
Acid Mine Drainage
Sludge CIA Disposal Beds - Future Closure Cost
Order of Magnitude Cost Opinion

DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Sludge Disposal Bed Closure (per each)

Cell Closure Allowance	3.80	AC	137,500.00	\$522,500
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SUBTOTAL				\$522,500
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MISC ALLOWANCE	10%			\$52,250
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SUBTOTAL				\$574,750
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CONTINGENCY	30%			\$172,425
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SUBTOTAL				\$747,175
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MOBILIZATION	15%			\$112,076
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CONSTRUCTION TOTAL				\$859,251
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SALES TAX ON MATERIALS	5.0%			\$11,875
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ENGINEERING AND SUPPORT	20%			\$171,850
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CONSTRUCTION MANAGEMENT	8%			\$68,740
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CAPITAL TOTAL (ROUNDED)				\$1,110,000
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ANNUAL O&M COST (considered incidental to rest of CIA)				\$0
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NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



Alternative 2
Option A

Bunker Hill
Acid Mine Drainage
Closure of Existing CIA Sludge Pond
Order of Magnitude Cost Opinion

DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Closure of Existing Sludge Pond on CIA

Cell Closure Allowance	6.50	AC	137,500.00	\$893,750
SUBTOTAL				\$893,750
MISC ALLOWANCE	10%			\$89,375
SUBTOTAL				\$983,125
CONTINGENCY	30%			\$294,938
SUBTOTAL				\$1,278,063
MOBILIZATION	15%			\$191,709
CONSTRUCTION TOTAL				\$1,469,772
SALES TAX ON MATERIALS	5.0%			\$20,313
ENGINEERING AND SUPPORT	20%			\$293,954
CONSTRUCTION MANAGEMENT	8%			\$117,582
 CAPITAL TOTAL (ROUNDED)				 \$1,900,000

ANNUAL O&M COST (considered incidental to rest of CIA) \$0

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 2
Option A
O & M COST ESTIMATE DETAILS**

Description	Qty	Unit	Unit Cost	Total Cost
Annual Costs				
Pump Station & Pipeline				
Operation Labor	1	YR	25,000	\$25,000
Pump & Pipeline Maintenance & Repairs	1	YR	9,482	\$9,482
Power Cost for Pumping & Misc	10,000	kWHR	0.05	\$500
Filtrate Discharge System Inspect/Clean	4	EA	1,000	\$4,000
Roads Maintenance	1	EA	2,500	\$2,500
			Subtotal	\$41,482
Contingency	10%			\$4,148
Total Annual Cost				\$45,630



**Alternative 2
Sludge Management Option A**

**ANNUAL O&M COSTS CALCULATIONS
Series of Expenditures**

Interest Rate	7.00%
Net Present Value	\$566,227

Year	Annual Cost	Factor	NPV
0	NA	1.0000	NA
1	\$45,630	0.9346	\$42,645
2	\$45,630	0.8734	\$39,855
3	\$45,630	0.8163	\$37,248
4	\$45,630	0.7629	\$34,811
5	\$45,630	0.7130	\$32,534
6	\$45,630	0.6663	\$30,405
7	\$45,630	0.6227	\$28,416
8	\$45,630	0.5820	\$26,557
9	\$45,630	0.5439	\$24,820
10	\$45,630	0.5083	\$23,196
11	\$45,630	0.4751	\$21,679
12	\$45,630	0.4440	\$20,260
13	\$45,630	0.4150	\$18,935
14	\$45,630	0.3878	\$17,696
15	\$45,630	0.3624	\$16,538
16	\$45,630	0.3387	\$15,457
17	\$45,630	0.3166	\$14,445
18	\$45,630	0.2959	\$13,500
19	\$45,630	0.2765	\$12,617
20	\$45,630	0.2584	\$11,792
21	\$45,630	0.2415	\$11,020
22	\$45,630	0.2257	\$10,299
23	\$45,630	0.2109	\$9,626
24	\$45,630	0.1971	\$8,996
25	\$45,630	0.1842	\$8,407
26	\$45,630	0.1722	\$7,857
27	\$45,630	0.1609	\$7,343
28	\$45,630	0.1504	\$6,863
29	\$45,630	0.1406	\$6,414
30	\$45,630	0.1314	\$5,994

**PERIODIC COSTS CALCULATIONS
Single Expenditure at Year XX**

Interest Rate	7.00%
Net Present Value	\$6,742,799

Year	Investment	Factor	NPV	
0	\$2,480,000	1.0000	\$2,480,000	initial bed construction
1	\$0	0.9346	\$0	
2	\$1,900,000	0.8734	\$1,659,534	closure of existing bed
3	\$0	0.8163	\$0	
4	\$0	0.7629	\$0	
5	\$0	0.7130	\$0	
6	\$0	0.6663	\$0	
7	\$0	0.6227	\$0	
8	\$0	0.5820	\$0	
9	\$0	0.5439	\$0	
10	\$2,180,000	0.5083	\$1,108,201	new bed
11	\$1,110,000	0.4751	\$527,353	closure
12	\$0	0.4440	\$0	
13	\$0	0.4150	\$0	
14	\$0	0.3878	\$0	
15	\$0	0.3624	\$0	
16	\$0	0.3387	\$0	
17	\$0	0.3166	\$0	
18	\$0	0.2959	\$0	
19	\$0	0.2765	\$0	
20	\$2,180,000	0.2584	\$563,353	new bed
21	\$1,110,000	0.2415	\$268,080	closure
22	\$0	0.2257	\$0	
23	\$0	0.2109	\$0	
24	\$0	0.1971	\$0	
25	\$0	0.1842	\$0	
26	\$0	0.1722	\$0	
27	\$0	0.1609	\$0	
28	\$0	0.1504	\$0	
29	\$0	0.1406	\$0	
30	\$0	0.1314	\$0	
31	\$1,110,000	0.1228	\$136,278	closure



**Alternative 2
Option B**

**Bunker Hill
Acid Mine Drainage
Dewatering with Belt Filter Press
Order of Magnitude Cost Opinion**

**DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Belt Filter Press				
Earthwork & Concrete for Slab	0	LS	\$0	\$0
Misc Metals	1	LS	\$0	\$0
Building	4,000	SF	\$130	\$520,000
Paint	1	LS	\$20,000	\$20,000
Belt Press	4	EA	\$260,540	\$1,042,161
Booster Pump	1	EA	\$6,793	\$6,793
Air Compressor	1	EA	\$5,638	\$5,638
Conveyor	4	EA	\$37,910	\$151,640
Storage Hopper	2	EA	\$38,997	\$77,994
Electrical/I&C	1	LS	\$0	\$0
Haul to Off-Site Landfill				
Load	0	CY	\$0	\$0
Misc	0	LS	\$0	\$0

SUBTOTAL		\$1,824,227
MISC ALLOWANCE	10%	\$182,423
SUBTOTAL		\$2,006,649
CONTINGENCY	30%	\$601,995
SUBTOTAL		\$2,608,644
MOBILIZATION	15%	\$391,297
CONSTRUCTION TOTAL		\$2,999,941
SALES TAX ON MATERIALS	5.0%	\$87,299
ENGINEERING AND SUPPORT	20%	\$599,988
CONSTRUCTION MANAGEMENT	8%	\$239,995

FILTER PRESS CAPITAL TOTAL (ROUNDED)	\$3,930,000
FILTER PRESS ANNUAL O&M COST	\$152,000
30-YEAR NPV OF FILTER PRESS ANNUAL O&M COST	\$1,886,000
HAUL AND DISPOSE OFFSITE ANNUAL O&M COST	\$593,000
30-YEAR NPV OF HAUL AND DISPOSE OFFSITE	\$7,359,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST	\$13,175,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in August 2000 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 2
Option B**

O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Unit Cost	Total Cost
<u>Annual Costs</u>				
Belt Press Operator/Mechanic	1	YR	100,000	\$100,000
Belt Press Repair Parts	1	YR	17,200	\$17,200
Chemical Conditioning Polymer	1	YR	20,000	\$20,000
Operation Costs	16,000	kWHR	0	\$800
			Subtotal	\$138,000
		Contingency	10%	\$13,800
		Total Annual Cost		\$151,800



**Alternative 2
Option B**

O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Unit Cost	Total Cost	Comments
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Annual Costs

Haul & Dispose	12,400	TN	43.5	\$539,400	Average cost for three regional landfills. Cost range from \$35 to \$52/ton
			Subtotal	\$539,400	
Contingency	10%			\$53,940	
Total Annual Cost				\$593,000	



**Alternative 2
Option C**

**Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in Smelter Closure Area Disposal Beds
Order of Magnitude Cost Opinion**

DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Sitework/Yard Piping				
Clear & Grub	20	AC	3,000.00	\$60,000
Site Prep Cut	300,000	CY	3.30	\$990,000
Site Prep Fill	300,000	CY	1.10	\$330,000
6" HDPE Sludge Pipeline in Trench	6,400	LF	31.78	\$203,421
6" HDPE Leachate Pipeline in Trench	2,500	LF	24.70	\$61,749
Leachate pipe tie in to pump	1	LS	2,000.00	\$2,000
Manholes	7	EA	3,850.00	\$26,950
Sludge Pumping				
Prefab Metal Bldg w/Concrete Floor	500	SF	165.00	\$82,500
Paint	1	LS	5,500.00	\$5,500
Pump, 30hp	4	EA	15,380.27	\$61,521
Standby Pump, 30hp	1	EA	15,380.27	\$15,380
Gland Seal Water Pump	1	EA	8,136.01	\$8,136
Electrical/I&C	1	LS	32,400.00	\$32,400
6" Check Valve	4	EA	1,897.78	\$7,591
6" Gate Valve	4	EA	1,897.78	\$7,591
6" HDPE Pipe in Trench	200	LF	22.50	\$4,500
Flushing Hookups	1	LS	5,500.00	\$5,500
Pipeline Cleanout Pig Station	1	LS	27,500.00	\$27,500
Sludge Disposal Bed (per each)				
Excavation	25,000	C. Y.	3.30	\$82,500
Subgrade Preparation	5	Acres	3,300.00	\$16,500
Subgrade Stabilization	10,500	C. Y.	4.40	\$46,200
Liner Protection Sand	8250	C. Y.	19.80	\$163,350
Drain Rock	1,950	C. Y.	19.80	\$38,610
Ditch Lining Geotextile	21,200	S. Y.	1.82	\$38,478
G C L	18,100	S. Y.	4.46	\$80,636
H D P E Geomembrane	18,100	S. Y.	5.94	\$107,514
H D P E Pipe, 10"	550	L. F.	25.30	\$13,915
Erosion Control Matting	11800	S.Y.	1.65	\$19,470
Perf Pipe, 4"	2000	L. F.	2.20	\$4,400
Perf Pipe, 6"	580	L. F.	3.30	\$1,914
HDPE Pipe, 6"	130	L. F.	2.75	\$358
Strip Drains	700	L. F.	1.93	\$1,348
Valves, 6" Knife Gate	2	Each	770.00	\$1,540
Valves, 10" Knife Gate	6	Each	1,100.00	\$6,600
Air/Vacuum Release Valve	1	Each	2,200.00	\$2,200
Valve Vault	6	Each	2,145.00	\$12,870
Water Tight Manhole	1	Each	3,850.00	\$3,850
Vertical Filtrate Drains	6	Each	4,400.00	\$26,400
Cleanouts	2	Each	825.00	\$1,650
Perimeter Road Embankment (not reduced)	43500	C. Y.	11.00	\$478,500
Chain Link Fence and Gates (not reduced)	2000	L.F.	13.20	\$26,400
Groundwater Monitoring Wells	2	Each	6,600.00	\$13,200
Crushed Rock Surfacing (not reduced)	1500	C. Y.	16.50	\$24,750
SUBTOTAL				\$3,145,391
MISC ALLOWANCE	10%			\$314,539
SUBTOTAL				\$3,459,931
CONTINGENCY	30%			\$1,037,979
SUBTOTAL				\$4,497,910
MOBILIZATION	15%			\$674,686
CONSTRUCTION TOTAL				\$5,172,596
SALES TAX ON MATERIALS	5.0%			\$66,650
ENGINEERING AND SUPPORT	20%			\$1,034,519
CONSTRUCTION MANAGEMENT	8%			\$413,808
CAPITAL COST FIRST BED (ROUNDED)				\$6,690,000



**Alternative 2
Option C**

**Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in Smelter Closure Area Disposal Beds
Order of Magnitude Cost Opinion**

DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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**CAPITAL COST FOR NEW CELLS IN FUTURE YEARS
(DOES NOT INCLUDE PUMPING AND PIPING COST)**

Sludge Disposal Bed (per each)

Excavation	25,000	C. Y.	3.30	\$82,500
Subgrade Preparation	5	Acres	3,300.00	\$16,500
Subgrade Stabilization	10,500	C. Y.	4.40	\$46,200
Liner Protection Sand	8250	C. Y.	19.80	\$163,350
Drain Rock	1,950	C. Y.	19.80	\$38,610
Ditch Lining Geotextile	21,200	S. Y.	1.82	\$38,478
G C L	18,100	S. Y.	4.46	\$80,636
H D P E Geomembrane	18,100	S. Y.	5.94	\$107,514
H D P E Pipe, 10"	550	L. F.	25.30	\$13,915
Erosion Control Matting	11800	S.Y.	1.65	\$19,470
Perf Pipe, 4"	2000	L. F.	2.20	\$4,400
Perf Pipe, 6"	580	L. F.	3.30	\$1,914
HDPE Pipe, 6"	130	L. F.	2.75	\$358
Strip Drains	700	L. F.	1.93	\$1,348
Valves, 6" Knife Gate	2	Each	770.00	\$0
Valves, 10" Knife Gate	6	Each	1,100.00	\$0
Air/Vacuum Release Valve	1	Each	2,200.00	\$0
Valve Vault	6	Each	2,145.00	\$0
Water Tight Manhole	1	Each	3,850.00	\$0
Vertical Filtrate Drains	6	Each	4,400.00	\$0
Cleanouts	2	Each	825.00	\$0
Perimeter Road Embankment (not reduced)	28275	C. Y.	11.00	\$311,025
Chain Link Fence and Gates (not reduced)	1000	L.F.	13.20	\$13,200
Groundwater Monitoring Wells	2	Each	6,600.00	\$0
Crushed Rock Surfacing (not reduced)	1500	C. Y.	16.50	\$24,750

SUBTOTAL		\$1,213,152
MISC ALLOWANCE	10%	\$121,315
SUBTOTAL		\$1,334,467
CONTINGENCY	30%	\$400,340
SUBTOTAL		\$1,734,807
MOBILIZATION	15%	\$260,221
CONSTRUCTION TOTAL		\$1,995,028
SALES TAX ON MATERIALS	5.0%	\$27,572
ENGINEERING AND SUPPORT	20%	\$399,006
CONSTRUCTION MANAGEMENT	8%	\$159,602

CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED) **\$2,580,000**

ANNUAL O&M COST FOR OPERATING BED **\$72,000**

NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST) **\$889,000**

NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST **\$11,376,000**

TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST **\$12,265,000**

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



Alternative 2
Option C

Bunker Hill
Acid Mine Drainage
Smelter Closure Area Disposal Beds - Future Closure Cost
Order of Magnitude Cost Opinion

DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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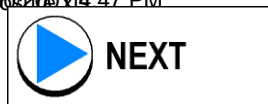
Sludge Disposal Bed Closure (per each)

Cell Closure Allowance	3.80	AC	137,500.00	\$522,500
SUBTOTAL				\$522,500
MISC ALLOWANCE	10%			\$52,250
SUBTOTAL				\$574,750
CONTINGENCY	30%			\$172,425
SUBTOTAL				\$747,175
MOBILIZATION	15%			\$112,076
CONSTRUCTION TOTAL				\$859,251
SALES TAX ON MATERIALS	5.0%			\$11,875
ENGINEERING AND SUPPORT	20%			\$171,850
CONSTRUCTION MANAGEMENT	8%			\$68,740
 CAPITAL TOTAL (ROUNDED)				 \$1,110,000
 ANNUAL O&M COST (considered incidental to operating sludge bed)				 \$0

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



Alternative 2
Option C

Bunker Hill
Acid Mine Drainage
Closure of Existing CIA Sludge Pond
Order of Magnitude Cost Opinion

DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Closure of Existing CIA Sludge Pond

Cell Closure Allowance	6.50	AC	137,500.00	\$893,750
SUBTOTAL				\$893,750
MISC ALLOWANCE	10%			\$89,375
SUBTOTAL				\$983,125
CONTINGENCY	30%			\$294,938
SUBTOTAL				\$1,278,063
MOBILIZATION	15%			\$191,709
CONSTRUCTION TOTAL				\$1,469,772
SALES TAX ON MATERIALS	5.0%			\$20,313
ENGINEERING AND SUPPORT	20%			\$293,954
CONSTRUCTION MANAGEMENT	8%			\$117,582
 CAPITAL TOTAL (ROUNDED)				 \$1,900,000
 ANNUAL O&M COST (considered incidental to rest of CIA)				 \$0

NOTES:

- Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
- Contingency is for scope changes that are presently unforeseen.
- Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 2
Option C**

O & M COST ESTIMATE DETAILS

Description	Qty	Unit	UNIT COST	Total Cost
Annual Costs				
Pump Station & Pipeline				
Operation Labor	1	YR	\$33,000	\$33,000
Pump & Pipeline Maintenance & Repairs	1	YR	\$10,430	\$10,430
Power Cost for Pumping & Misc	65,000	kWHR	\$0.05	\$3,250
Groundwater/Surface Water Monitoring				
System Inspection & Sampling	48	HR	\$88	\$4,224
Sample Shipping	4	EA	\$66	\$264
Supplies	4	EA	\$220	\$880
Indicator Analyses (quarterly)	8	EA	\$297	\$2,376
Metals Analyses (semiannually)	6	EA	\$220	\$1,320
Reporting	20	HR	\$110	\$2,200
Filtrate Discharge System Inspect/Clean	4	EA	\$1,100	\$4,400
Roads Maintenance	1	EA	\$2,750	\$2,750
			Subtotal	\$65,094
	10%			\$6,509
				\$71,604



**Alternative 2
Sludge Management Option C**

**ANNUAL O&M COSTS CALCULATIONS
Series of Expenditures**

Interest Rate	7.00%
Net Present Value	\$889,000

Year	Annual Cost	Factor	NPV
0	NA	1.0000	NA
1	\$71,604	0.9346	\$66,919
2	\$71,604	0.8734	\$62,541
3	\$71,604	0.8163	\$58,450
4	\$71,604	0.7629	\$54,626
5	\$71,604	0.7130	\$51,052
6	\$71,604	0.6663	\$47,713
7	\$71,604	0.6227	\$44,591
8	\$71,604	0.5820	\$41,674
9	\$71,604	0.5439	\$38,948
10	\$71,604	0.5083	\$36,400
11	\$71,604	0.4751	\$34,018
12	\$71,604	0.4440	\$31,793
13	\$71,604	0.4150	\$29,713
14	\$71,604	0.3878	\$27,769
15	\$71,604	0.3624	\$25,952
16	\$71,604	0.3387	\$24,255
17	\$71,604	0.3166	\$22,668
18	\$71,604	0.2959	\$21,185
19	\$71,604	0.2765	\$19,799
20	\$71,604	0.2584	\$18,504
21	\$71,604	0.2415	\$17,293
22	\$71,604	0.2257	\$16,162
23	\$71,604	0.2109	\$15,105
24	\$71,604	0.1971	\$14,116
25	\$71,604	0.1842	\$13,193
26	\$71,604	0.1722	\$12,330
27	\$71,604	0.1609	\$11,523
28	\$71,604	0.1504	\$10,769
29	\$71,604	0.1406	\$10,065
30	\$71,604	0.1314	\$9,406

**PERIODIC COSTS CALCULATIONS
Single Expenditure at Year XX**

Interest Rate	7.00%
Net Present Value	\$11,260,000

Year	Investment	Factor	NPV	
0	\$6,690,000	1.0000	\$6,690,000	initial bed construction
1	\$0	0.9346	\$0	
2	\$1,900,000	0.8734	\$1,659,534	closure of existing bed
3	\$0	0.8163	\$0	
4	\$0	0.7629	\$0	
5	\$0	0.7130	\$0	
6	\$0	0.6663	\$0	
7	\$0	0.6227	\$0	
8	\$0	0.5820	\$0	
9	\$0	0.5439	\$0	
10	\$2,580,000	0.5083	\$1,311,541	new bed
11	\$1,110,000	0.4751	\$527,353	closure
12	\$0	0.4440	\$0	
13	\$0	0.4150	\$0	
14	\$0	0.3878	\$0	
15	\$0	0.3624	\$0	
16	\$0	0.3387	\$0	
17	\$0	0.3166	\$0	
18	\$0	0.2959	\$0	
19	\$0	0.2765	\$0	
20	\$2,580,000	0.2584	\$666,721	new bed
21	\$1,110,000	0.2415	\$268,080	closure
22	\$0	0.2257	\$0	
23	\$0	0.2109	\$0	
24	\$0	0.1971	\$0	
25	\$0	0.1842	\$0	
26	\$0	0.1722	\$0	
27	\$0	0.1609	\$0	
28	\$0	0.1504	\$0	
29	\$0	0.1406	\$0	
30	\$0	0.1314	\$0	
31	\$1,110,000	0.1228	\$136,278	closure



**Alternative 2
Option D**

**Bunker Hill
Acid Mine Drainage
Onsite Landfill - Smelter Closure Area
Order of Magnitude Cost Opinion**

**DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Sitework

Clear and Grub	20	AC	3,000.00	\$60,000
Site Prep Excavation	300,000	CY	3.30	\$990,000
Site Prep Fill	300,000	CY	1.10	\$330,000

Pipeline

6" HDPE Gravity Pipeline in Trench	2,500	LF	22.50	\$56,249
Manhole	8	EA	3,850.00	\$32,083

Landfill Construction

Excavation	58,000	CY	3.30	\$191,400
Subgrade Preparation	13	AC	3,300.00	\$41,910
Subgrade Stabilization	20,537	CY	4.40	\$90,363
Embankment Fill	63,265	CY	11.00	\$695,915
Liner Protection Sand	18,000	CY	19.80	\$356,400
Drain Rock	5,100	CY	19.80	\$100,980
Ditch Lining Geotextile	35,400	SY	1.82	\$64,251
G C L	35,400	SY	4.46	\$157,707
H D P E Geomembrane	35,400	SY	5.94	\$210,276
H D P E Pipe, 12"	2,000	LF	28.60	\$57,200
Erosion Control Matting	19,500	SY	1.65	\$32,175
Perf Pipe, 6"	650	LF	3.30	\$2,145
Strip Drains	1,180	LF	1.93	\$2,272
Filtrate Penetration Sump (Allowance)	1	EA	27,500.00	\$27,500
HDPE Pipe, 6"	150	LF	2.75	\$413
Water Tight Manhole	1	EA	3,850.00	\$3,850
Cleanouts	2	EA	825.00	\$1,650
Chain Link Fence and Gates	3,060	LF	13.20	\$40,392
Groundwater Monitoring Wells	4	EA	6,600.00	\$26,400
Crushed Rock Surfacing	2,270	CY	16.50	\$37,455

SUBTOTAL				\$3,608,985
MISC ALLOWANCE	10%			\$360,899
SUBTOTAL				\$3,969,884
CONTINGENCY	15%			\$595,483
SUBTOTAL				\$4,565,366
MOBILIZATION	15%			\$684,805
CONSTRUCTION TOTAL				\$5,250,171
SALES TAX ON MATERIALS	5%			\$49,693
ENGINEERING AND SUPPORT	20%			\$1,050,034
CONSTRUCTION MANAGEMENT	8%			\$420,014

CAPITAL TOTAL (ROUNDED) \$6,770,000



Alternative 2
Option D

Bunker Hill
Acid Mine Drainage
Onsite Landfill - Smelter Closure Area
Order of Magnitude Cost Opinion

DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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ANNUAL O&M COST			\$103,000		
CAPITAL COST OF CLOSURE @ YEAR 31			\$2,263,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)					\$1,272,000
NPV OF CLOSURE COST (YEAR 31 @ 7% INTEREST)					\$278,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST					\$8,320,000

NOTES:

- Landfill post-closure costs are not included here since they extend beyond the 30 year period.
- Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
- Contingency is for scope changes that are presently unforeseen.
- Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alterative 2
Option D**

SLUDGE LANDFILL O & M COST ESTIMATE DETAILS

Description	Qty	Unit	UNIT COST	Total Cost
Annual Costs				
Remove, Load, Decon Truck, Haul & Unload	6,800	CY	\$11	\$74,800
Groundwater/Surface Water Monitoring				
System Inspection & Sampling	48	HR	\$88	\$4,224
Sample Shipping	4	EA	\$66	\$264
Supplies	4	EA	\$220	\$880
Indicator Analyses (quarterly)	8	EA	\$297	\$2,376
Metals Analyses (semiannually)	6	EA	\$220	\$1,320
Reporting	20	HR	\$110	\$2,200
Filtrate Discharge System Inspect/Clean	4	EA	\$1,100	\$4,400
Roads Maintenance	1	EA	\$2,750	\$2,750
			Subtotal	\$93,214
	Contingency	10%		\$9,321
	Total Annual Cost			\$102,535



**Alternative 2
Option D**

**Bunker Hill
Acid Mine Drainage
Dewatering in CIA Sludge Drying Beds
Order of Magnitude Cost Opinion**

**DATE: 12/16/1998
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Sitework/Yard Piping				
6" HDPE Sludge Pipeline in Trench	800	LF	21.54	\$17,233
6" HDPE Leachate Pipeline in Trench	800	LF	21.54	\$17,233
Sludge Pumping				
Prefab Metal Bldg w/Concrete Floor	216	SF	150.00	\$32,400
Paint	1	LS	5,000.00	\$5,000
Pump, 30hp	2	EA	14,810.06	\$29,620
Standby Pump, 30hp	1	EA	14,810.06	\$14,810
Gland Seal Water Pump	1	EA	7,948.38	\$7,948
Electrical/I&C	1	LS	17,955.71	\$17,956
Sludge Drying Bed				
Excavation	7000	C. Y.	3.00	\$21,000
Subgrade Preparation	2.6	Acres	3,000.00	\$7,800
Subgrade Stabilization	4200	C. Y.	4.00	\$16,800
Liner Protection Sand	5,000	C. Y.	10.00	\$50,000
Drain Rock	1250	C. Y.	18.00	\$22,500
Ditch Lining Geotextile	2,000	S. Y.	1.65	\$3,300
G C L	10,000	S. Y.	4.05	\$40,500
H D P E Geomembrane	10,500	S. Y.	5.40	\$56,700
H D P E Pipe, 10"	450	L. F.	23.00	\$10,350
Erosion Control Matting	8,000	S.Y.	1.50	\$12,000
Perf Pipe, 4"	1600	L. F.	2.00	\$3,200
Perf Pipe, 6"	400	L. F.	3.00	\$1,200
HDPE Pipe, 6"	250	L. F.	2.50	\$625
Strip Drains	850	L. F.	1.75	\$1,488
Valves, 6" Knife Gate	2	Each	700	\$1,400
Valves, 10" Knife Gate	4	Each	1,000.00	\$4,000
Air/Vacuum Release Valve	1	Each	2,000.00	\$2,000
Valve Vault	6	Each	1,950.00	\$11,700
Water Tight Manhole	2	Each	3,500.00	\$7,000
Vertical Filtrate Drains	8	Each	4,000.00	\$32,000
Cleanouts	4	Each	750.00	\$3,000
Perimeter Road Embankment	8000	C. Y.	10.00	\$80,000
Chain Link Fence and Gates	2000	L.F.	12.00	\$24,000
Groundwater Monitoring Wells	2	Each	6,000.00	\$12,000
Access Road (CCP)	500	L.F.	50.00	\$25,000
Crushed Rock Surfacing	1500	C. Y.	15.00	\$22,500
Decontamination Station	1	LS	200,000.00	\$200,000
SUBTOTAL				\$814,262



Alternative 2
Option D

Bunker Hill
Acid Mine Drainage
Dewatering in CIA Sludge Drying Beds
Order of Magnitude Cost Opinion

DATE: 12/16/1998
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
MISC ALLOWANCE	10%			\$81,426
SUBTOTAL				\$895,689
CONTINGENCY	15%			\$134,353
SUBTOTAL				\$1,030,042
MOBILIZATION	15%			\$154,506
CONSTRUCTION TOTAL				\$1,184,548
SALES TAX ON MATERIALS	5.0%			\$14,396
ENGINEERING AND SUPPORT	20%			\$236,910
CONSTRUCTION MANAGEMENT	8%			\$94,764
CAPITAL TOTAL (ROUNDED)				\$1,531,000
ANNUAL O&M COST			\$51,000	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$635,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$2,166,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in December 1998 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 2
Option D**

SLUDGE DRYING BEDS O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Unit Cost	Total Cost
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Annual Costs

Pump Station & Pipeline

Operation Labor	1	YR	\$27,500	\$27,500
Pump & Pipeline Maintenance & Repairs	1	YR	\$10,773	\$10,773
Power Cost for Pumping & Misc	20,000	kWHR	\$0.06	\$1,100
Filtrate Discharge System Inspect/Clean	4	EA	\$1,100	\$4,400
Roads Maintenance	1	EA	\$2,750	\$2,750
			Subtotal	\$46,523
Contingency	10%			\$4,652
Total Annual Cost				\$51,176



**ALTERNATIVE 2
Bunker Hill Mine Water RI/FS
Performance Monitoring Costs**

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Annual Cost	Comments
Annual Costs							
KT Portal (flow and chemistry)							
KT Flow Data Management & Reporting	1	MO	0	800	0	\$9,600	Monthly data management; asm 10 hrs/month (1 person) @ \$80/hr labor
KT Sampling and Analysis	1	WK	300	0	0	\$15,600	Weekly sample collection; asm analysis cost of \$300/sample for Cd, Pb, Zn, SO4, LD/SF
Sample Collection Supplies	1	YR	500	0	0	\$500	Allowance
Sample Shipment	1	YR	500	0	0	\$500	Allowance
Subtotal						\$16,600	
Allowance	10%					\$1,660	
Total Annual Cost						\$18,260	
CTP (flow and chemistry)							
	1	Day	150	0	0	\$54,750	Total, Cd, Pb, and Zn low level analysis
Subtotal						\$54,750	
Allowance	10%					\$5,475	
Total Annual Cost						\$60,225	
TOTAL ANNUAL COST (YEARS 1 THROUGH 30)						\$78,485	

