O&M Costs
Storage from 30 feet below 11 Level and up
Bunker Hill
Acid Mine Drainage: Storage

DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: J. Winters
N.Gulensoy

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Mucking out diversion and main channels	1	YR		10,000		$10,000	Allowance.
Maintenance of electrical system for pumps	1	YR		50,000		$10,000	Allowance.
Diversion system maintenance	1	YR	2,000	4,800		$6,800	allowance $2k materials and 16hrs/mo for 6 months
Pumping System Inspection	365	HR	0	50		$18,250	asm 1 hr/day, 365 days/yr @ $50/hr labor
Pump removal and replacement	1	YR	5,000	22,385	672	$28,057	asm 1 time/year & 120hrs/time + material allowance
Pump maintenance	1	YR	20,000	18,620	3,168	$41,788	asm 1 time/year & 80hrs/time + material allowance
						$114,896	
Contingency	10%					$11,490	
Total Annual Cost						**$126,385**	

NOTE:
Pumping cost of extra minewater above11 Level is not included in this cost estimate due to infrequent pumping and unknown quantities of water.

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 operatiion-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 operatiion-assume 2-8hr repairs/ year @ $50
						$27,750	
Contingency	10%					$2,775	
Total Annual Cost						**$30,525**	

NOTE:

NEXT

Bunker Hill
Mine Water
Upgrade HDS Plant & Add Media Filters (2,500gpm) (Equivalent to Phase I 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
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 cantelever
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) (Equivalent to Phase I 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
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 cantelever
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) (Equivalent to Phase I 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
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
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 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 2(
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) (Equivalent to Phase I 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
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			**$797,000**		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				**$9,890,000**	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				**$18,088,000**	

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.

O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
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	90,707	0	$90,707	asm 2% of subtotal after allowance of HDS upgrade
HDS Effluent Pump Station	1	YR	46,800	0	0	$46,800	
Media Filters	1	YR	97,500	0	0	$97,500	
Backwash Pumping	1	YR	8,775	0	0	$8,775	
Building (not incl HDS)	1	YR	0	2,400	0	$2,400	
						$755,182	
Contingency	10%					$75,518	
Subtotal						**$831,000**	
Lime Savings Estimated at 10% Reduction in Lime Use						($34,000)	Annual lime cost without mitigations estimated at $335,000/year
Total Annual Cost With Savings						**$797,000**	
NPV of Annual O&M Costs (30 years @ 7%)						**$9,890,000**	

NEXT

Alternatives 3 and 4
Option A

Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in CIA Disposal Beds
Order of Magnitude Cost Opinion (Quantity reduced by 10%)

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

DESCRIPTION	QTY	QTY Reduced by 10%	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	22,500	C. Y.	3.00	$67,500
Subgrade Preparation	5	5	Acres	3,000.00	$13,500
Subgrade Stabilization	10,500	9,450	C. Y.	4.00	$37,800
Liner Protection Sand	8250	7,425	C. Y.	10.00	$74,250
Drain Rock	1,950	1,755	C. Y.	18.00	$31,590
Ditch Lining Geotextile	21,200	19,080	S. Y.	1.65	$31,482
G C L	18,100	16,290	S. Y.	4.05	$65,975
H D P E Geomembrane	18,100	16,290	S. Y.	5.40	$87,966
H D P E Pipe, 10"	550	495	L. F.	23.00	$11,385
Erosion Control Matting	11800	10,620	S.Y.	1.50	$15,930
Perf Pipe, 4"	2000	1,800	L. F.	2.00	$3,600
Perf Pipe, 6"	580	522	L. F.	3.00	$1,566
HDPE Pipe, 6"	130	117	L. F.	2.50	$293
Strip Drains	700	630	L. F.	1.75	$1,103
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	43,500	C. Y.	10	$435,000
Chain Link Fence and Gates (not reduced)	2000	2,000	L.F.	12	$24,000
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	15	$22,500
SUBTOTAL					**$1,117,738**
MISC ALLOWANCE	**10%**				**$111,774**
SUBTOTAL					**$1,229,512**
CONTINGENCY	**30%**				**$368,854**
SUBTOTAL					**$1,598,366**
MOBILIZATION	**15%**				**$239,755**
CONSTRUCTION TOTAL					**$1,838,121**
SALES TAX ON MATERIALS	**5.0%**				**$28,216**
ENGINEERING AND SUPPORT	**20%**				**$367,624**
CONSTRUCTION MANAGEMENT	**8%**				**$147,050**
CAPITAL COST FIRST BED (ROUNDED)					**$2,380,000**
CAPITAL COST FOR NEW CELLS IN FUTURE YEARS (DOES NOT INCLUDE PUMPING AND PIPING COST)					
Sludge Disposal Bed (per each)					
Excavation	25,000	22,500	C. Y.	3.00	$67,500
Subgrade Preparation	5	5	Acres	3,000.00	$13,500

NEXT

Alternatives 3 and 4
Option A

Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in CIA Disposal Beds
Order of Magnitude Cost Opinion (Quantity reduced by 10%)

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

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
Subgrade Stabilization	10,500	9,450	C. Y.	4.00	$37,800
Liner Protection Sand	8250	7,425	C. Y.	10.00	$74,250
Drain Rock	1,950	1,755	C. Y.	18.00	$31,590
Ditch Lining Geotextile	21,200	19,080	S. Y.	1.65	$31,482
G C L	18,100	16,290	S. Y.	4.05	$65,975
H D P E Geomembrane	18,100	16,290	S. Y.	5.40	$87,966
H D P E Pipe, 10"	550	495	L. F.	23.00	$11,385
Erosion Control Matting	11800	10,620	S.Y.	1.50	$15,930
Perf Pipe, 4"	2000	1,800	L. F.	2.00	$3,600
Perf Pipe, 6"	580	522	L. F.	3.00	$1,566
HDPE Pipe, 6"	130	117	L. F.	2.50	$293
Strip Drains	700	630	L. F.	1.75	$1,103
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	28,275	C. Y.	10	$282,750
Chain Link Fence and Gates (not reduced)	1000	1,000	L.F.	12	$12,000
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	15	$22,500
SUBTOTAL					**$975,539**
MISC ALLOWANCE	**10%**				**$97,554**
SUBTOTAL					**$1,073,092**
CONTINGENCY	**30%**				**$321,928**
SUBTOTAL					**$1,395,020**
MOBILIZATION	**15%**				**$209,253**
CONSTRUCTION TOTAL					**$1,604,273**
SALES TAX ON MATERIALS	**5.0%**				**$25,622**
ENGINEERING AND SUPPORT	**20%**				**$320,855**
CONSTRUCTION MANAGEMENT	**8%**				**$128,342**
CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED)					**$2,080,000**
ANNUAL O&M COST FOR OPERATING BED				**$42,000**	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)					**$518,000**
NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST					**$6,590,000**
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST					**$7,108,000**

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.

Alternatives 3 and 4
Option A

Bunker Hill — **DATE: 11/22/2000**
Acid Mine Drainage — **PROJECT NO.: 152215.FS.02**
Sludge CIA Disposal Beds - Future Closure Cost — **ESTIMATE BY: D. Bunte**
Order of Magnitude Cost Opinion (Quantity reduced by 10%) — **N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Sludge Disposal Bed Closure (per each)				
Cell Closure Allowance	3.42	AC	137,500.00	$470,250
SUBTOTAL				**$470,250**
MISC ALLOWANCE	**10%**			**$47,025**
SUBTOTAL				**$517,275**
CONTINGENCY	**30%**			**$155,183**
SUBTOTAL				**$672,458**
MOBILIZATION	**15%**			**$100,869**
CONSTRUCTION TOTAL				**$773,326**
SALES TAX ON MATERIALS	**5.0%**			**$10,688**
ENGINEERING AND SUPPORT	**20%**			**$154,665**
CONSTRUCTION MANAGEMENT	**8%**			**$61,866**
CAPITAL TOTAL (ROUNDED)				**$1,000,000**
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.

NEXT

Alternatives 3 and 4
Option A

Bunker Hill — **DATE: 11/22/2000**
Acid Mine Drainage — **PROJECT NO.: 152215.FS.02**
Closure of Existing Sludge Pond on CIA — **ESTIMATE BY: D. Bunte**
Order of Magnitude Cost Opinion — **N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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.

NEXT

Alternatives 3 and 4
Option A
O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Unit Cost	Total Cost
Annual Costs				
Pump Station & Pipeline				
Operation Labor	1	YR	22,500	$22,500
Pump & Pipeline Maintenance & Repairs	1	YR	8,534	$8,534
Power Cost for Pumping & Misc (Quantity reduced by 10%)	9,000	kWHR	0	$450
Filtrate Discharge System Inspect/Clean	4	EA	1,000	$4,000
Roads Maintenance	1	EA	2,500	$2,500
			Subtotal	**$37,984**
Contingency	10%			$3,798
Total Annual Cost				**$41,782**

Alternatives 3 and 4
Sludge Management Option A

ANNUAL O&M COSTS CALCULATIONS
Series of Expenditures

Interest Rate	**7.00%**
Net Present Value	**$518,477**

Year	Annual Cost	Factor	NPV
0	NA	1.0000	NA
1	$41,782	0.9346	$39,049
2	$41,782	0.8734	$36,494
3	$41,782	0.8163	$34,107
4	$41,782	0.7629	$31,875
5	$41,782	0.7130	$29,790
6	$41,782	0.6663	$27,841
7	$41,782	0.6227	$26,020
8	$41,782	0.5820	$24,318
9	$41,782	0.5439	$22,727
10	$41,782	0.5083	$21,240
11	$41,782	0.4751	$19,850
12	$41,782	0.4440	$18,552
13	$41,782	0.4150	$17,338
14	$41,782	0.3878	$16,204
15	$41,782	0.3624	$15,144
16	$41,782	0.3387	$14,153
17	$41,782	0.3166	$13,227
18	$41,782	0.2959	$12,362
19	$41,782	0.2765	$11,553
20	$41,782	0.2584	$10,797
21	$41,782	0.2415	$10,091
22	$41,782	0.2257	$9,431
23	$41,782	0.2109	$8,814
24	$41,782	0.1971	$8,237
25	$41,782	0.1842	$7,698
26	$41,782	0.1722	$7,195
27	$41,782	0.1609	$6,724
28	$41,782	0.1504	$6,284
29	$41,782	0.1406	$5,873
30	$41,782	0.1314	$5,489

PERIODIC COSTS CALCULATIONS
Single Expenditure at Year XX

Interest Rate	**7.00%**
Net Present Value	**$6,473,791**

Year	Investment	Factor	NPV	
0	$2,380,000	1.0000	$2,380,000	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	$2,080,000	0.5083	$1,057,367	new bed
11	$1,000,000	0.4751	$475,093	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	$2,080,000	0.2584	$537,512	new bed
21	$1,000,000	0.2415	$241,513	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	$1,000,000	0.1228	$122,773	closure

Alternatives 3 and 4
Option B

Bunker Hill — **DATE: 08/24/2000**
Acid Mine Drainage — **PROJECT NO.: 152215.FS.02**
Dewatering with Belt Filter Press — **ESTIMATE BY: D. Bunte**
Order of Magnitude Cost Opinion (Quantity reduced by 10%) — **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	3,755	SF	$130	$488,145
Paint	1	LS	$18,775	$18,775
Belt Press	4	EA	$244,580	$978,319
Booster Pump	1	EA	$6,377	$6,377
Air Compressor	1	EA	$5,293	$5,293
Conveyor	4	EA	$35,588	$142,351
Storage Hopper	2	EA	$36,608	$73,216
Electrical/I&C	1	LS	$0	$0
Haul to Off-Site Landfill				
Load	0	CY	$0	$0
Misc	0	LS	$0	$0
SUBTOTAL				**$1,712,475**
MISC ALLOWANCE	**10%**			**$171,248**
SUBTOTAL				**$1,883,723**
CONTINGENCY	**30%**			**$565,117**
SUBTOTAL				**$2,448,839**
MOBILIZATION	**15%**			**$367,326**
CONSTRUCTION TOTAL				**$2,816,165**
SALES TAX ON MATERIALS	**5.0%**			**$85,707**
ENGINEERING AND SUPPORT	**20%**			**$563,233**
CONSTRUCTION MANAGEMENT	**8%**			**$225,293**
FILTER PRESS CAPITAL TOTAL (ROUNDED)				**$3,690,000**
FILTER PRESS ANNUAL O&M COST			**$148,000**	
30-YEAR NPV OF FILTER PRESS ANNUAL O&M COST				**$1,837,000**
HAUL AND DISPOSE OFFSITE ANNUAL O&M COST			**$534,000**	
30-YEAR NPV OF HAUL AND DISPOSE OFFSITE				**$6,626,000**
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				**$12,153,000**

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.

NEXT

Alternatives 3 and 4
Option B

O & M COST ESTIMATE DETAILS (Quantity reduced by 10%)

Description	Qty	Unit	Unit Cost	Total Cost
Annual Costs				
Belt Press Operator/Mechanic (fixed)	1	YR	100,000	$100,000
Belt Press Repair Parts (reduced by 10%)	1	YR	15,480	$15,480
Chemical Conditioning Polymer (reduced by 10%)	1	YR	18,000	$18,000
Operation Costs (reduced by 10%)	14,400	kWHR	0	$720
			Subtotal	**$134,200**
Contingency	10%			$13,420
Total Annual Cost				**$147,620**

NEXT

Alternatives 3 and 4
Option B

O & M COST ESTIMATE DETAILS (Quantity reduced by 10%)

Description	Qty	Unit	Unit Cost	Total Cost	Comments
Annual Costs					
Haul & Dispose	11,160	TN	43.5	$485,460	Based on Alt 2 unit cost
				$485,460	
Contingency	10%			$48,546	
Total Annual Cost				**$534,000**	

NEXT

Alternative 3 and 4
Option C

Bunker Hill — **DATE: 11/29/2000**
Acid Mine Drainage — **PROJECT NO.: 152215.FS.02**
Disposal of Raw Sludge in Smelter Closure Area Disposal Beds — **ESTIMATE BY: D. Bunte**
Order of Magnitude Cost Opinion (Quantity reduced by 10%) — **N. Gulensoy**

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
Sitework/Yard Piping					
Clear & Grub	20		AC	3,000.00	$60,000
Site Prep Cut	300,000	270,000	CY	3.30	$990,000
Site Prep Fill	300,000	270,000	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	22,500	C. Y.	3.30	$74,250
Subgrade Preparation	5	5	Acres	3,300.00	$14,850
Subgrade Stabilization	10,500	9,450	C. Y.	4.40	$41,580
Liner Protection Sand	8250	7,425	C. Y.	19.80	$147,015
Drain Rock	1,950	1,755	C. Y.	19.80	$34,749
Ditch Lining Geotextile	21,200	19,080	S. Y.	1.82	$34,630
G C L	18,100	16,290	S. Y.	4.46	$72,572
H D P E Geomembrane	18,100	16,290	S. Y.	5.94	$96,763
H D P E Pipe, 10"	550	495	L. F.	25.30	$12,524
Erosion Control Matting	11800	10,620	S.Y.	1.65	$17,523
Perf Pipe, 4"	2000	1,800	L. F.	2.20	$3,960
Perf Pipe, 6"	580	522	L. F.	3.30	$1,723
HDPE Pipe, 6"	130	117	L. F.	2.75	$322
Strip Drains	700	630	L. F.	1.93	$1,213
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	43,500	C. Y.	11.00	$478,500
Chain Link Fence and Gates (not reduced)	2000	2,000	L.F.	13.20	$26,400
Groundwater Monitoring Wells	2		Each	6,600.00	$13,200
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	16.50	$24,750
SUBTOTAL					**$3,083,872**
MISC ALLOWANCE	**10%**				**$308,387**
SUBTOTAL					**$3,392,259**
CONTINGENCY	**30%**				**$1,017,678**
SUBTOTAL					**$4,409,937**
MOBILIZATION	**15%**				**$661,491**
CONSTRUCTION TOTAL					**$5,071,428**
SALES TAX ON MATERIALS	**5.0%**				**$63,650**
ENGINEERING AND SUPPORT	**20%**				**$1,014,286**
CONSTRUCTION MANAGEMENT	**8%**				**$405,714**
CAPITAL COST FIRST BED (ROUNDED)					**$6,560,000**

Alternative 3 and 4
Option C

Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in Smelter Closure Area Disposal Beds
Order of Magnitude Cost Opinion (Quantity reduced by 10%)

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

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
CAPITAL COST FOR NEW CELLS IN FUTURE YEARS (DOES NOT INCLUDE PUMPING AND PIPING COST)					
Sludge Disposal Bed (per each)					
Excavation	25,000	22,500	C. Y.	3.30	$74,250
Subgrade Preparation	5	5	Acres	3,300.00	$14,850
Subgrade Stabilization	10,500	9,450	C. Y.	4.40	$41,580
Liner Protection Sand	8250	7,425	C. Y.	19.80	$147,015
Drain Rock	1,950	1,755	C. Y.	19.80	$34,749
Ditch Lining Geotextile	21,200	19,080	S. Y.	1.82	$34,630
G C L	18,100	16,290	S. Y.	4.46	$72,572
H D P E Geomembrane	18,100	16,290	S. Y.	5.94	$96,763
H D P E Pipe, 10"	550	495	L. F.	25.30	$12,524
Erosion Control Matting	11800	10,620	S.Y.	1.65	$17,523
Perf Pipe, 4"	2000	1,800	L. F.	2.20	$3,960
Perf Pipe, 6"	580	522	L. F.	3.30	$1,723
HDPE Pipe, 6"	130	117	L. F.	2.75	$322
Strip Drains	700	630	L. F.	1.93	$1,213
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	28,275	C. Y.	11.00	$311,025
Chain Link Fence and Gates (not reduced)	1000	1,000	L.F.	13.20	$13,200
Groundwater Monitoring Wells (not reduced)	2		Each	6,600.00	$13,200
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	16.50	$24,750

SUBTOTAL			**$1,151,632**
MISC ALLOWANCE	**10%**		**$115,163**
SUBTOTAL			**$1,266,796**
CONTINGENCY	**30%**		**$380,039**
SUBTOTAL			**$1,646,834**
MOBILIZATION	**15%**		**$247,025**
CONSTRUCTION TOTAL			**$1,893,859**
SALES TAX ON MATERIALS	**5.0%**		**$27,572**
ENGINEERING AND SUPPORT	**20%**		**$378,772**
CONSTRUCTION MANAGEMENT	**8%**		**$151,509**
CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED)			**$2,450,000**
ANNUAL O&M COST FOR OPERATING BED		**$67,000**	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)			**$829,000**
NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST			**$11,054,000**
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST			**$11,883,000**

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 3 and 4
Option C

Bunker Hill
Acid Mine Drainage
Disposal of Raw Sludge in Smelter Closure Area Disposal Beds
Order of Magnitude Cost Opinion (Quantity reduced by 10%)

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

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
CAPITAL COST FOR NEW CELLS IN FUTURE YEARS (DOES NOT INCLUDE PUMPING AND PIPING COST)					
Sludge Disposal Bed (per each)					
Excavation	25,000	22,500	C. Y.	3.30	$74,250
Subgrade Preparation	5	5	Acres	3,300.00	$14,850
Subgrade Stabilization	10,500	9,450	C. Y.	4.40	$41,580
Liner Protection Sand	8250	7,425	C. Y.	19.80	$147,015
Drain Rock	1,950	1,755	C. Y.	19.80	$34,749
Ditch Lining Geotextile	21,200	19,080	S. Y.	1.82	$34,630
G C L	18,100	16,290	S. Y.	4.46	$72,572
H D P E Geomembrane	18,100	16,290	S. Y.	5.94	$96,763
H D P E Pipe, 10"	550	495	L. F.	25.30	$12,524
Erosion Control Matting	11800	10,620	S.Y.	1.65	$17,523
Perf Pipe, 4"	2000	1,800	L. F.	2.20	$3,960
Perf Pipe, 6"	580	522	L. F.	3.30	$1,723
HDPE Pipe, 6"	130	117	L. F.	2.75	$322
Strip Drains	700	630	L. F.	1.93	$1,213
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	28,275	C. Y.	11.00	$311,025
Chain Link Fence and Gates (not reduced)	1000	1,000	L.F.	13.20	$13,200
Groundwater Monitoring Wells (not reduced)	2		Each	6,600.00	$13,200
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	16.50	$24,750

SUBTOTAL			**$1,151,632**
MISC ALLOWANCE	**10%**		**$115,163**
SUBTOTAL			**$1,266,796**
CONTINGENCY	**30%**		**$380,039**
SUBTOTAL			**$1,646,834**
MOBILIZATION	**15%**		**$247,025**
CONSTRUCTION TOTAL			**$1,893,859**
SALES TAX ON MATERIALS	**5.0%**		**$27,572**
ENGINEERING AND SUPPORT	**20%**		**$378,772**
CONSTRUCTION MANAGEMENT	**8%**		**$151,509**
CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED)			**$2,450,000**
ANNUAL O&M COST FOR OPERATING BED		**$67,000**	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)			**$829,000**
NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST			**$11,054,000**
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST			**$11,883,000**

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.

NEXT

Alternative 3 and 4
Option C

Bunker Hill — **DATE: 11/22/2000**
Acid Mine Drainage — **PROJECT NO.: 152215.FS.02**
Smelter Closure Area Disposal Beds - Future Closure Cost — **ESTIMATE BY: D. Bunte**
Order of Magnitude Cost Opinion (Quantity reduced by 10%) — **N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Sludge Disposal Bed Closure (per each)				
Cell Closure Allowance	3.42	AC	137,500.00	$470,250
SUBTOTAL				**$470,250**
MISC ALLOWANCE	**10%**			**$47,025**
SUBTOTAL				**$517,275**
CONTINGENCY	**30%**			**$155,183**
SUBTOTAL				**$672,458**
MOBILIZATION	**15%**			**$100,869**
CONSTRUCTION TOTAL				**$773,326**
SALES TAX ON MATERIALS	**5.0%**			**$10,688**
ENGINEERING AND SUPPORT	**20%**			**$154,665**
CONSTRUCTION MANAGEMENT	**8%**			**$61,866**
CAPITAL TOTAL (ROUNDED)				**$1,000,000**
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.

NEXT

Alternatives 3 and 4
Option C

Bunker Hill — **DATE: 11/22/2000**
Acid Mine Drainage — **PROJECT NO.: 152215.FS.02**
Close Existing CIA Disposal Bed — **ESTIMATE BY: D. Bunte**
Order of Magnitude Cost Opinion — **N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Closure of Existing Sludge Bed 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.

Alternatives 3 and 4
Option C

O & M COST ESTIMATE DETAILS

Description	Qty	Unit	UNIT COST	Total Cost
Annual Costs				
Pump Station & Pipeline				
Operation Labor	1	YR	$29,700	$29,700
Pump & Pipeline Maintenance & Repairs	1	YR	$9,387	$9,387
Power Cost for Pumping & Misc (Quantity reduced by 10%)	58,500	kWHR	$0.06	$3,218
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	**$60,719**
Contingency	10%			$6,072
Total Annual Cost				**$66,791**

NEXT

Alternatives 3 and 4
Sludge Management Option C

ANNUAL O&M COSTS CALCULATIONS
Series of Expenditures

Interest Rate	**7.00%**
Net Present Value	**$828,807**

Year	Annual Cost	Factor	NPV
0	NA	1.0000	NA
1	$66,791	0.9346	$62,421
2	$66,791	0.8734	$58,337
3	$66,791	0.8163	$54,521
4	$66,791	0.7629	$50,954
5	$66,791	0.7130	$47,621
6	$66,791	0.6663	$44,505
7	$66,791	0.6227	$41,594
8	$66,791	0.5820	$38,873
9	$66,791	0.5439	$36,330
10	$66,791	0.5083	$33,953
11	$66,791	0.4751	$31,732
12	$66,791	0.4440	$29,656
13	$66,791	0.4150	$27,716
14	$66,791	0.3878	$25,903
15	$66,791	0.3624	$24,208
16	$66,791	0.3387	$22,624
17	$66,791	0.3166	$21,144
18	$66,791	0.2959	$19,761
19	$66,791	0.2765	$18,468
20	$66,791	0.2584	$17,260
21	$66,791	0.2415	$16,131
22	$66,791	0.2257	$15,076
23	$66,791	0.2109	$14,089
24	$66,791	0.1971	$13,168
25	$66,791	0.1842	$12,306
26	$66,791	0.1722	$11,501
27	$66,791	0.1609	$10,749
28	$66,791	0.1504	$10,045
29	$66,791	0.1406	$9,388
30	$66,791	0.1314	$8,774

PERIODIC COSTS CALCULATIONS
Single Expenditure at Year XX

Interest Rate	**7.00%**
Net Present Value	**$10,937,495**

Year	Investment	Factor	NPV	
0	$6,560,000	1.0000	$6,560,000	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	$2,450,000	0.5083	$1,245,456	new bed
11	$1,000,000	0.4751	$475,093	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	$2,450,000	0.2584	$633,127	new bed
21	$1,000,000	0.2415	$241,513	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	$1,000,000	0.1228	$122,773	closure

Alternative 3 and 4
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	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
		0.90			
Sitework					
Clear and Grub	20		AC	3,000.00	$60,000
Site Prep Excavation	300,000	270,000	CY	3.30	$891,000
Site Prep Fill	300,000	270,000	CY	1.10	$297,000
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	52,200	CY	3.30	$172,260
Subgrade Preparation	13	11	AC	3,300.00	$37,719
Subgrade Stabilization	20,537	18,483	CY	4.40	$81,327
Embankment Fill	63,265	56,939	CY	11.00	$626,324
Liner Protection Sand	18,000	16,200	CY	19.80	$320,760
Drain Rock	5,100	4,590	CY	19.80	$90,882
Ditch Lining Geotextile	35,400	31,860	SY	1.82	$57,826
G C L	35,400	31,860	SY	4.46	$141,936
H D P E Geomembrane	35,400	31,860	SY	5.94	$189,248
H D P E Pipe, 12"	2,000	1,800	LF	28.60	$51,480
Erosion Control Matting	19,500	17,550	SY	1.65	$28,958
Perf Pipe, 6"	650	585	LF	3.30	$1,931
Strip Drains	1,180	1,062	LF	1.93	$2,044
Filtrate Penetration Sump (Allowance)	1		EA	27,500.00	$27,500
HDPE Pipe, 6"	150	135	LF	2.75	$371
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					**$3,276,645**
MISC ALLOWANCE	**10%**				**$327,664**
SUBTOTAL					**$3,604,309**
CONTINGENCY	**15%**				**$540,646**
SUBTOTAL					**$4,144,955**
MOBILIZATION	**15%**				**$621,743**
CONSTRUCTION TOTAL					**$4,766,699**
SALES TAX ON MATERIALS	**5%**				**$45,140**
ENGINEERING AND SUPPORT	**20%**				**$953,340**
CONSTRUCTION MANAGEMENT	**8%**				**$381,336**
CAPITAL TOTAL (ROUNDED)					**$6,147,000**

NEXT

Alternative 3 and 4
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	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
		0.90			
ANNUAL O&M COST				$94,000	
CAPITAL COST OF CLOSURE @ YEAR 31				$1,960,000	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)					$1,170,000
NPV OF CLOSURE COST (YEAR 31 @ 7% INTEREST)					$241,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST					$7,558,000

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.

NEXT

Alteratives 3 and 4
Option D

SLUDGE LANDFILL O & M COST ESTIMATE DETAILS

Description	Qty	Unit	UNIT COST	Total Cost
Annual Costs				
Remove, Load, Decon Truck, Haul & Unload	6,120	CY	$11	$67,320
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	**$85,734**
Contingency	10%			$8,573
Total Annual Cost				**$94,307**

Alternative 3 and 4
Option D

Bunker Hill — **DATE: 12/16/1998**
Acid Mine Drainage — **PROJECT NO.: 148562.02.01**
Dewatering in CIA Sludge Drying Beds — **ESTIMATE BY: D. Hedglin**
Order of Magnitude Cost Opinion (Reduced by 10%)

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
		0.9			
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	6300	C. Y.	3.00	$18,900
Subgrade Preparation	2.6	2.34	Acres	3,000.00	$7,020
Subgrade Stabilization	4200	3780	C. Y.	4.00	$15,120
Liner Protection Sand	5,000	4500	C. Y.	10.00	$45,000
Drain Rock	1250	1125	C. Y.	18.00	$20,250
Ditch Lining Geotextile	2,000	1800	S. Y.	1.65	$2,970
G C L	10,000	9000	S. Y.	4.05	$36,450
H D P E Geomembrane	10,500	9450	S. Y.	5.40	$51,030
H D P E Pipe, 10"	450	405	L. F.	23.00	$9,315
Erosion Control Matting	8,000	7200	S.Y.	1.50	$10,800
Perf Pipe, 4"	1600	1440	L. F.	2.00	$2,880
Perf Pipe, 6"	400	360	L. F.	3.00	$1,080
HDPE Pipe, 6"	250	225	L. F.	2.50	$563
Strip Drains	850	765	L. F.	1.75	$1,339
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					**$789,516**
MISC ALLOWANCE	**10%**				**$78,952**
SUBTOTAL					**$868,468**
CONTINGENCY	**15%**				**$130,270**
SUBTOTAL					**$998,738**
MOBILIZATION	**15%**				**$149,811**
CONSTRUCTION TOTAL					**$1,148,548**
SALES TAX ON MATERIALS	**5.0%**				**$13,777**
ENGINEERING AND SUPPORT	**20%**				**$229,710**
CONSTRUCTION MANAGEMENT	**8%**				**$91,884**

NEXT

Alternative 3 and 4
Option D

Bunker Hill — **DATE: 12/16/1998**
Acid Mine Drainage — **PROJECT NO.: 148562.02.01**
Dewatering in CIA Sludge Drying Beds — **ESTIMATE BY: D. Hedglin**
Order of Magnitude Cost Opinion (Reduced by 10%)

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
		0.9			
CAPITAL TOTAL (ROUNDED)					**$1,484,000**

NEXT

Alternative 3 and 4
Option D

Bunker Hill — **DATE: 12/16/1998**
Acid Mine Drainage — **PROJECT NO.: 148562.02.01**
Dewatering in CIA Sludge Drying Beds — **ESTIMATE BY: D. Hedglin**
Order of Magnitude Cost Opinion (Reduced by 10%)

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
		0.9			
ANNUAL O&M COST				$47,000	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)					$581,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST					$2,065,000

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.

NEXT

Alternatives 3 and 4
Option D

SLUDGE DRYING BEDS O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Unit Cost	Total Cost
Annual Costs				
Pump Station & Pipeline				
Operation Labor	1	YR	$24,750	$24,750
Pump & Pipeline Maintenance & Repairs	1	YR	$9,696	$9,696
Power Cost for Pumping & Misc	18,000	kWHR	$0.06	$990
Filtrate Discharge System Inspect/Clean	4	EA	$1,100	$4,400
Roads Maintenance	1	EA	$2,750	$2,750
				$42,586
Contingency	10%			$4,259
Total Annual Cost				**$46,844**

ALTERNATIVES 3 AND 4
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) (Years 1 through 30)							
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) (Years 1 through 30)							
	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**	
Surface Streams (flow only) (Years 1 through 10)							
Automatic Flow Recorder Data Download	1	MO	0	1,280	0	$15,360	Monthly data download from 3 flow recorders and 8 piezometers; asm 16 hrs/month (2 persons, 1 field day) @ $80/hr labor
Flow Data Recording & Management for surface water diversions	1	MO	0	320	0	$3,840	Monthly data management; asm 4 hrs/month (1 person) @ $80/hr labor
Data management & reporting for existing piezometers	1	MO	0	640	0	$7,680	Monthly data management and reporting; asm 8 hrs/month (1 person) @ $80/hr labor
Subtotal						**$26,880**	
Allowance	10%					**$2,688**	
Total Annual Cost						**$29,568**	
In-Mine (flow and chemistry) (Years 1 through 10)							
Sample Collection	15	Event	0	3,840	0	$57,600	15 events, 48 hrs/event (3 persons, 2 field days) @ $80/hr labor
Sample Collection Materials	15	Event	0	0	0	$2,000	Allowance
Sample Preparation and Packaging	15	Event	0	2,560	0	$38,400	15 events, 32 hrs/event (2 persons, 2 days) @ $80/hr labor
Sample Shipment	15	Event	100	0		$1,500	
Sample Analysis	15	Event	5,600	0	0	$84,000	15 events, 14 samples/event, $400/sample for analytical (total and dissolved metals, sulfate, lime demand, solids formed, TSS)
Data management, interpretation, QA/QC and reporting	15	Event	0	640	0	$9,600	15 events, 8 hrs/event, @ $80/hr labor
Subtotal						**$193,100**	
Allowance	10%					**$19,310**	
Total Annual Cost						**$212,410**	

Alternative 4
Cost Summary

NEXT

Alternative 4A
Cost Summary

Alternative 4A
Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with CIA Sludge Disposal Beds)
Interest = 7%

Remedy Component	Capital Cost ($)	Annual O&M Cost ($/yr)
AMD Mitigations	6,000,000	56,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	797,000
Sludge Management[1]	6,474,000	42,000
Performance Monitoring[2]	0	215,000
Totals	**22,962,000**	**2,468,000**
30-Year NPV of O&M		**30,626,000**
Total 30-Year Present Worth	**53,588,000**	

[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.

[2]The monitoring annual O&M cost is the annualized amount of the 30-year net present value , since annual costs vary over the 30-year period. See the monitoring summary sheet for details.

AMD Mitigations	Capital	O&M
West Fork Milo Creek Diversion	3,590,000	28,000
Rehabilitate Phil Sheridan Diversion	1,250,000	18,000
Plug Drill Holes	150,000	9,000
Plug Small Hopes	360,000	500
Plug/Bypass Inez Shaft	650,000	500
Subtotal	6,000,000	56,000

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
In-Mine Gravity Diversion System	710,000	Included in Extraction System
New Mine Pool Extraction System	1,240,000	126,000
Existing Lined Pond	0	31,000
Subtotal	1,950,000	157,000

AMD Treatment	Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters	8,198,000	797,000
Subtotal	8,198,000	797,000

Sludge Management	NPV of Capital	O&M
CIA Sludge Disposal Beds	4,814,000	42,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	6,474,000	42,000

Performance Monitoring	Capital	O&M
KT Portal (Years 1 -30)	0	18,000
CTP (Years 1-30)	0	60,000
Surface (Years 1 - 10)	0	30,000
In-Mine (Years 1-10)	0	212,000
Subtotal	0	320,000
	Annualized O&M (Yrs 1-30)	214,983

Alternative 4B
Cost Summary

Alternative 4B
Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with Mechanical Dewatering and Offsite Sludge Disposal)
Interest = 7%

Remedy Component	Capital Cost ($)	Annual O&M Cost ($/yr)
AMD Mitigations	6,000,000	56,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	797,000
Sludge Management[1]	5,350,000	682,000
Performance Monitoring[2]	0	215,000
Totals	**21,838,000**	**3,108,000**
30-Year NPV of O&M		**38,567,000**
Total 30-Year Present Worth	**60,405,000**	

[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.

[2]The monitoring annual O&M cost is the annualized amount of the 30-year net present value , since annual costs vary over the 30-year period. See the monitoring summary sheet for details.

AMD Mitigations	Capital	O&M
West Fork Milo Creek Diversion	3,590,000	28,000
Rehabilitate Phil Sheridan Diversion	1,250,000	18,000
Plug Drill Holes	150,000	9,000
Plug Small Hopes	360,000	500
Plug/Bypass Inez Shaft	650,000	500
Subtotal	6,000,000	56,000

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
In-Mine Gravity Diversion System	710,000	Included in Extraction System
New Mine Pool Extraction System	1,240,000	126,000
Existing Lined Pond	0	31,000
Subtotal	1,950,000	157,000

AMD Treatment	Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters	8,198,000	797,000
Subtotal	8,198,000	797,000

Sludge Management	NPV of Capital	O&M
Mechanical Dewatering System	3,690,000	148,000
Offsite Haulage and Disposal		534,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	5,350,000	682,000

Performance Monitoring	Capital	O&M
KT Portal (Years 1 -30)	0	18,000
CTP (Years 1-30)	0	60,000
Surface (Years 1 - 10)	0	30,000
In-Mine (Years 1-10)	0	212,000
Subtotal	0	320,000
	Annualized O&M (Yrs 1-30)	214,983

Alternative 4C
Cost Summary

Alternative 4C

Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with Smelter Closure Area Sludge Disposal Beds)

Interest = 7%

Remedy Component	Capital Cost ($)	Annual O&M Cost ($/yr)
AMD Mitigations	6,000,000	56,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	797,000
Sludge Management[1]	10,937,000	67,000
Performance Monitoring[2]	0	215,000
Totals	**27,425,000**	**2,493,000**
30-Year NPV of O&M		**30,936,000**
Total 30-Year Present Worth	**58,361,000**	

[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.

[2]The monitoring annual O&M cost is the annualized amount of the 30-year net present value , since annual costs vary over the 30-year period. See the monitoring summary sheet for details.

AMD Mitigations	Capital	O&M
West Fork Milo Creek Diversion	3,590,000	28,000
Rehabilitate Phil Sheridan Diversion	1,250,000	18,000
Plug Drill Holes	150,000	9,000
Plug Small Hopes	360,000	500
Plug/Bypass Inez Shaft	650,000	500
Subtotal	6,000,000	56,000

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
In-Mine Gravity Diversion System	710,000	Included in Extraction System
New Mine Pool Extraction System	1,240,000	126,000
Existing Lined Pond	0	31,000
Subtotal	1,950,000	157,000

AMD Treatment	Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters	8,198,000	797,000
Subtotal	8,198,000	797,000

Sludge Management	NPV of Capital	O&M
Smelter Closure Area Sludge Disposal Beds	9,277,000	67,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	10,937,000	67,000

Performance Monitoring	Capital	O&M
KT Portal (Years 1 -30)	0	18,000
CTP (Years 1-30)	0	60,000
Surface (Years 1 - 10)	0	30,000
In-Mine (Years 1-10)	0	212,000
Subtotal	0	320,000
	Annualized O&M (Yrs 1-30)	214,983

Alternative 4D
Cost Summary

Alternative 4D
Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with CIA Sludge Drying Beds and Smelter Closure Area Landfill)
Interest = 7%

Remedy Component	Capital Cost ($)	Annual O&M Cost ($/yr)
AMD Mitigations	6,000,000	56,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	797,000
Sludge Management[1]	9,532,000	141,000
Performance Monitoring[2]	0	215,000
Totals	**26,020,000**	**2,567,000**
30-Year NPV of O&M		**31,854,000**
Total 30-Year Present Worth	**57,874,000**	

[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.

[2]The monitoring annual O&M cost is the annualized amount of the 30-year net present value , since annual costs vary over the 30-year period. See the monitoring summary sheet for details.

AMD Mitigations	Capital	O&M
West Fork Milo Creek Diversion	3,590,000	28,000
Rehabilitate Phil Sheridan Diversion	1,250,000	18,000
Plug Drill Holes	150,000	9,000
Plug Small Hopes	360,000	500
Plug/Bypass Inez Shaft	650,000	500
Subtotal	6,000,000	56,000

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
In-Mine Gravity Diversion System	710,000	Included in Extraction System
New Mine Pool Extraction System	1,240,000	126,000
Existing Lined Pond	0	31,000
Subtotal	1,950,000	157,000

AMD Treatment	Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters	8,198,000	797,000
Subtotal	8,198,000	797,000

Sludge Management	NPV of Capital	O&M
Smelter Closure Area Landfill	6,147,000	94,000
Landfill Closure (Yr 31)	241,000	0
CIA Sludge Drying Beds	1,484,000	47,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	9,532,000	141,000

Performance Monitoring	Capital	O&M
KT Portal (Years 1 -30)	0	18,000
CTP (Years 1-30)	0	60,000
Surface (Years 1 - 10)	0	30,000
In-Mine (Years 1-10)	0	212,000
Subtotal	0	320,000
	Annualized O&M (Yrs 1-30)	214,983

Bunker Hill
AMD Mitigation Concepts
2.1: West Fork Diversion
Order of Magnitude Cost Opinion

DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin
T. Pyle

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Site Access Road					
Clear & Grub New Road	3,500	LF	8.62	$30,153	asm 30'w & 50'/hour
Grade, Fill & Compact New Road	3,500	LF	76.32	$267,137	encounter rock
Base Course on New Road	1,296	CY	24.92	$32,307	
Grade & Improve Existing Road	400	LF	28.90	$11,559	
Erosion & Sedimentation Control	1	LS	47,054.48	$47,054	$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
Diversion Structure					
Diversion/Care of Water	1	LS	10,000.00	$10,000	
Excavate for Sheetpile Dam	1,800	CY	17.23	$31,014	
Native Backfill Around Sheetpiles	1,800	CY	13.30	$23,940	
Sheetpile Wall for Cutoff	2,250	SF	30.00	$67,500	
Excavate for Screen Structure	70	CY	17.23	$1,206	
Native Backfill Around Screen Structure	20	CY	13.30	$266	
Backfill Riprap Overflow Spillway	325	CY	39.95	$12,984	
Construct Screen Intake Structure	15	CY	552.24	$8,284	
Construct Transition Structure	15	CY	552.24	$8,284	
Foundation Grout Curtain	1,500	LF	40.00	$60,000	Includes diamond drilling, grout pipe, pressure testing, etc.
Bar Screen	1	LS	10,329.99	$10,330	
Collector Pipe & Gabions					
Excavation	300	CY	17.23	$5,169	
Imported Bed, Zone & Backfill	250	CY	31.62	$7,906	
Waste	300	CY	3.29	$986	
36" Perf. Collector Pipe	200	LF	68.62	$13,724	
Regrade Stream	1	LS	20,676.10	$20,676	
Gabion Sediment Traps	50	CY	183.25	$9,162	
Pipeline & Access Road					
36" Pipeline in Imp Road	750	LF	127.24	$95,430	including earthwork & fittings
30" Pipeline in New Road	750	LF	117.24	$87,928	including earthwork & fittings
36" Pipeline in Unimp Road	1,700	LF	241.71	$410,912	including earthwork & fittings
36" Overland Pipe	150	LF	214.48	$32,171	including earthwork, supports & fittings
42" Slip Pipe for Overland Pipe	40	LF	127.24	$5,090	including earthwork, supports & fittings
Anchor Block	2	EA	4,061.89	$8,124	asm 6cy & 5hrs to form, rebar, place
Anchor Fitting	2	EA	1,172.38	$2,345	allowance
Slip Joint Gasket	1	EA	1,186.19	$1,186	based on quote for Lake Tapps outfall
Thrust Block	7	EA	822.38	$5,757	
Air Vent	2	EA	586.19	$1,172	
Cut-Off Trench Seepage Walls	30	EA	2,100.00	$63,000	asm 7cy @ $300/cy
22 1/2 Degree Elbow	10	EA	2,572.38	$25,724	
Bureau of Reclamation Stilling Basin					
Structure Complete	4	LS	67,230.08	$268,920	based on Lake Tapps design & estimate
SUBTOTAL				**$1,687,400**	
MISC ALLOWANCE	**10%**			**$168,740**	
SUBTOTAL				**$1,856,140**	
CONTINGENCY	**30%**			**$556,842**	
SUBTOTAL				**$2,412,983**	
MOBILIZATION	**15%**			**$361,947**	
CONSTRUCTION TOTAL				**$2,774,930**	
SALES TAX ON MATERIALS	**5.0%**			**$33,487**	
ENGINEERING AND SUPPORT	**20%**			**$554,986**	
CONST MANAGEMENT	**8%**			**$221,994**	
CAPITAL TOTAL (ROUNDED)				**$3,590,000**	
ANNUAL O&M COST			**$27,700**		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				**$344,000**	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				**$3,934,000**	

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.

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	1	YR	0	1,600	320	$1,920	asm 4 times/year & 8hrs/time @ $50/hr labor & $10 for pickup
Road Maintenance & Repairs	1	YR	1,000	4,477	2,016	$7,493	asm 3 time/year & 8hrs/time + material allowance
Pipeline & Structure Maint. & Repairs	1	YR	2,000	7,448	6,336	$15,784	asm 4 times/year & 8hrs/time + material allowance
						$25,197	
Contingency	10%					$2,520	
Total Annual Cost						**$27,717**	

Bunker Hill — **DATE: 08/24/2000**
AMD Mitigation Concepts — **PROJECT NO.: 152215.FS.02**
2.2.1: Rehabilitate Phil Sheridan Diversion — **ESTIMATE BY: D. Hedglin**
Order of Magnitude Cost Opinion — **T. Pyle**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Open Phil Sheridan Raises					
Site Access Road					
Grade & Improve Existing Road	200	LF	28.90	$5,779	
Erosion & Sedimentation Control	1	LS	5,328.72	$5,329	$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
Raise #1					
Open Up Raise #1	100	CY	107.69	$10,769	
Sink 6' Casing from Surface to Rock Line	25	LF	228.92	$5,723	
Prefabricated Steel Inlet Structure	1	LS	10,000.00	$10,000	
Native Backfill Around Screen Structure	100	CY	17.23	$1,723	
Place Riprap	100	CY	26.65	$2,665	
Raise #2					
Open Up Raise #2	100	CY	107.69	$10,769	
Sink 10' Casing from Surface to Rock Line	25	CY	2,500.00	$62,500	
Native Backfill Around Screen Structure	100	CY	17.23	$1,723	
Construct Screen Intake Structure	20	CY	500.90	$10,018	
Screens for Inlet Structure	2	LS	10,659.98	$21,320	
Regrade Stream	1	LS	10,338.05	$10,338	
Place Riprap	100	CY	26.65	$2,665	
Drift Construction					
Site Access Road					
Clear & Grub New Road for Access	150	LF	8.62	$1,292	
Grade, Fill & Compact New Road	150	LF	76.32	$11,449	$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
Base Course on New Road	56	CY	24.92	$1,385	
Erosion & Sedimentation Control	1	LS	7,410.90	$7,411	
Proposed Drift Construction					
Drift Advancement	300	LF	500.00	$150,000	Based on costs provided by Bill Hudson
Access Road and Staging Area	1	LS	15,000.00	$15,000	Based on costs provided by Bill Hudson
Diversion/Care of Water	1	LS	20,000.00	$20,000	
Bulkhead/Bracing for new portal area	1	LS	25,000.00	$25,000	
Concrete Collar with Steel Bulkhead Dam	8	CY	566.25	$4,530	
HDPE Diversion Pipeline					
42" HDPE Pipeline in adit	300	LF	264.48	$79,343	including supports & fittings
36" HDPE buried in Unimp Road	100	LF	241.71	$24,171	including earthwork & fittings
Anchor Block	2	EA	4,061.89	$8,124	asm 6cy & 5hrs to form, rebar, place
Cut-Off Trench Seepage Walls	1	EA	2,100.00	$2,100	asm 7cy @ $500/cy
Concentric Reducer 42" by 36"	1	EA	2,572.38	$2,572	

SUBTOTAL			**$513,697**
MISC ALLOWANCE	**10%**		**$51,370**
SUBTOTAL			**$565,067**
CONTINGENCY	**50%**		**$282,534**
SUBTOTAL			**$847,601**
MOBILIZATION	**15%**		**$127,140**
CONSTRUCTION TOTAL			**$974,741**
SALES TAX ON MATERIALS	**5.0%**		**$1,710**
ENGINEERING AND SUPPORT	**20%**		**$194,948**
CONST MANAGEMENT	**8%**		**$77,979**
CAPITAL TOTAL (ROUNDED)			**$1,250,000**
ANNUAL O&M COST		**$18,200**	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)			**$226,000**
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST			**$1,476,000**

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.

NEXT

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	1	YR	0	1,800	240	$2,040	asm 3 times/year & 8hrs/time @ $50/hr labor & $10 for pickup
Road Maintenance & Repairs	1	YR	1,000	1,492	672	$3,164	asm 1 time/year & 8hrs/time + material allowance
Pipeline & Structure Maint. & Repairs	1	YR	1,000	5,586	4,752	$11,338	asm 3 times/year & 8hrs/time + material allowance
						$16,542	
Contingency	10%					$1,654	
Total Annual Cost						**$18,197**	

Bunker Hill **DATE: 08/24/2000**
AMD Mitigation Concepts **PROJECT NO.: 152215.FS.02**
6.1: Plug Drill Holes **ESTIMATE BY: D. Hedglin**
Order of Magnitude Cost Opinion

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Plug Holes					
Tunnel Clearing	1	LS	10,822.00	$10,822	2 week w/4 man crew & equipment
Add anchor flange for high pressure hole	1	LS	10,000.00	$10,000	
Plug Low Pressure Hole	20	EA	1,392.64	$27,853	1 day w/ 3 man crew
Plug High Pressure Hole	1	EA	22,926.40	$22,926	
SUBTOTAL				**$71,601**	
MISC ALLOWANCE	**10%**			**$7,160**	
SUBTOTAL				**$78,761**	
CONTINGENCY	**30%**			**$23,628**	
SUBTOTAL				**$102,390**	
MOBILIZATION	**15%**			**$15,358**	
CONSTRUCTION TOTAL				**$117,748**	
SALES TAX ON MATERIALS	**5.0%**			**$600**	
ENGINEERING AND SUPPORT	**20%**			**$23,550**	
CONST MANAGEMENT	**8%**			**$9,420**	
CAPITAL TOTAL (ROUNDED)				**$150,000**	
ANNUAL O&M COST			**$9,200**		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				**$114,000**	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				**$264,000**	

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.

NEXT

O & M COST ESTIMATE DETAILS

Tasks	Qty		Unit Cost	Total Cost	Comments
Annual Costs					
Packer Inspection and Maintenance	21	Each	400	$8,400	$400/hole @ 21 holes
				$8,400	
Contingency	10%			$840	
Total Annual Cost				**$9,240**	

Bunker Hill **DATE: 08/24/2000**
AMD Mitigation Concepts **PROJECT NO.: 152215.FS.02**
4.1: Plug Small Hopes (SH) Drift **ESTIMATE BY: D. Hedglin**
Order of Magnitude Cost Opinion

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Plug Shaft					
Survey to Determine Location of SH Drift	1	LS	1,600.00	$1,600	
Install New Access Shaft to SH Drift	1	LS	10,000.00	$10,000	
Clean Out SH Drift & Find 2-Raises to Level 5	1	LS	51,690.24	$51,690	
Clean Out Min. of 16 Feet of Shafts to 5 Level	1	LS	10,338.05	$10,338	
Prepare for Plug	2	EA	5,319.96	$10,640	
Concrete Plug	60	CY	272.30	$16,338	
Construct Bulkhead Each End of SH Drift	2	EA	3,398.96	$6,798	400bf each @ 1.50/bf * 8hrs to install
Transport Mix to Pump Site	400	CY	3.29	$1,315	
Fill all Bulkheaded Areas w/Sand/Cement	400	CY	83.05	$33,222	add for mixing as in Cherry, etc
Remove/Backfill Access Shaft	1	LS	2,659.98	$2,660	
Replace Culvert Under Road	1	LS	3,546.02	$3,546	
SUBTOTAL				**$148,147**	
MISC ALLOWANCE	**10%**			**$14,815**	
SUBTOTAL				**$162,962**	
CONTINGENCY	**50%**			**$81,481**	
SUBTOTAL				**$244,443**	
MOBILIZATION	**15%**			**$36,666**	
CONSTRUCTION TOTAL				**$281,109**	
SALES TAX ON MATERIALS	**5.0%**			**$1,365**	
ENGINEERING AND SUPPORT	**20%**			**$56,222**	
CONST MANAGEMENT	**8%**			**$22,489**	
CAPITAL TOTAL (ROUNDED)				**$360,000**	
ANNUAL O&M COST			**$500**		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				**$6,000**	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				**$366,000**	

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.

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	1	YR	0	400	80	$480	asm 1 times/year & 8hrs/time @ $50/hr labor & $10 for pickup
Road Maintenance & Repairs	1	YR	0	0	0	$0	
Pipeline & Structure Maint. & Repairs	1	YR	0	0	0	$0	
						$480	
Contingency	10%					$48	
Total Annual Cost						**$528**	

Bunker Hill **DATE: 08/24/2000**
AMD Mitigation Concepts **PROJECT NO.: 152215.FS.02**
5.1: Plug/Bypass Inez Shaft **ESTIMATE BY: D. Hedglin**
Order of Magnitude Cost Opinion

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Plug Shaft					
Survey to Determine Location of Shaft	1	LS	3,200.00	$3,200	
Provide 2000' of 15' wide access road	2,000	LF	25.00	$50,000	
Excavate to Find Location	1	LS	51,690.24	$51,690	15 days
Sheetpiles	2,700	SF	21.65	$58,455	
Excavate to Top of Rock	555	CY	34.46	$19,125	
Backfill Excavation	555	CY	13.30	$7,381	
Prepare for Plug	1	LS	5,319.96	$5,320	
Excavate & Waste 16' of Shaft	30	CY	258.45	$7,754	largely handwork
Concrete Plug	30	CY	143.08	$4,292	
Hydroseed all disturbed areas	60,000	SF	0.10	$6,000	
Regrade Stream	1	LS	51,690.24	$51,690	
SUBTOTAL				**$264,908**	
MISC ALLOWANCE	**10%**			**$26,491**	
SUBTOTAL				**$291,399**	
CONTINGENCY	**50%**			**$145,699**	
SUBTOTAL				**$437,098**	
MOBILIZATION	**15%**			**$65,565**	
CONSTRUCTION TOTAL				**$502,663**	
SALES TAX ON MATERIALS	**5.0%**			**$2,175**	
ENGINEERING AND SUPPORT	**20%**			**$100,533**	
CONST MANAGEMENT	**8%**			**$40,213**	
CAPITAL TOTAL (ROUNDED)				**$650,000**	
ANNUAL O&M COST			**$500**		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				**$6,000**	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				**$656,000**	

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.

NEXT

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	1	YR	0	400	80	$480	asm 1 times/year & 8hrs/time @ $50/hr labor & $10 for pickup
Road Maintenance & Repairs	1	YR	0	0	0	$0	
Pipeline & Structure Maint. & Repairs	1	YR	0	0	0	$0	asm 2 times/year & 8hrs/time + material allowance
						$480	
Contingency	10%					$48	
Total Annual Cost						**$528**	

Existing Mine Water Collection System O&M Costs

	Qty	Unit	Total Unit Cost	Total Cost	Comments
Annual Costs					
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	15%			**$123,576**	15% contingency for repairs and maintenance
Allowance	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				**$24,750**	

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)
						$61,924	
Contingency	10%					$6,192	
Total Annual Cost						**$68,116**	

Notes

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

NEXT

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	
Electrofusion 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
Electrofusion 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)

NEXT

	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				$28,000	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 each
Camera	2	YR	2,000			$4,000	2 times/year (subcontracted out)
						$33,924	
Contingency	10%					$3,392	
Total Annual Cost						**$37,316**	

Notes

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

Diversions Costs
Bunker Hill — **DATE: 08/24/2000**
Acid Mine Drainage: Storage — **PROJECT NO.: 152215.FS.02**
9 Level AMD Diversion Installation (Costs below are for two diversion locations) — **ESTIMATE BY: J. Winters**
Order of Magnitude Cost Opinion — **N.Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Rock work					
Construct new 3'x3'x30'lg channel	20	CY	504.49	$10,090	Assumes no cross cut tunneling to reach a raise for diversion. One diversion will be located at No. 2 Shaft. Second diversion location will be on the Barney Drift, exact location is not known.
Diversion Gates and Flumes					
Diversion gates w/electric operator	4	EA	6,407.50	$25,630	See quote from Plasti-Fab 1/3/00 + markup
Exstg and new channel prep for gates	4	EA	1,513.46	$6,054	
Gate installation	4	EA	1,112.88	$4,452	
Cut-throat (trapezoidal) flumes	4	EA	6,000.00	$24,000	Price is for trapezoidal flume. Decide during final design which flume type to use. See quote from Plasti-Fab of 1/7/00. PlastiFab says cutthroat flume accuracy not repeatble. They have discontinued active sales.
Isco flowmeter on each flume	4	EA	4,106.52	$16,426	See eqmt quote from Whitney Eqmt.
Flume installation	4	EA	1,669.32	$6,677	Some (<1CY) minor amt of rock work in existing channel.
Extend 480 v power to gates from 9 Level	600	LF	17.83	$10,700	Assume motor starter w/in 300 ft of gate location.
Extend 120 v power to flowmeters from 9 Level	600	LF	12.13	$7,277	
TWSP (#16) wire in conduit for flowmeter	10,000	LF	4.62	$46,169	Two wires: 8000 lf in mine tunnel & 2000 lf buried from gates to CTP
Control wire(#12) for gate operators	10,000	LF	7.56	$75,644	Eight wires: 8000 lf in mine tunnel & 2000 lf buried from gates to CTP
Diversion pipe in No. 2 Shaft and in the Barney Drift					
12 dia HDPE pipe (SDR 17)	840	LF	68.52	$57,553	Pipe mounted inside a 50 deg mine shaft. Access for installation off mine shaft lift system. Each diversion pipe 420 ft long
Pipe riser clamp brackets (SST)	40	EA	870.54	$34,822	SST Clamp with base plate and epoxy anchor bolts. Installed at 20 OC along pipe
SST sheet metal inlet box/funnel to riser pipe	2	EA	2,500.00	$5,000	3'x3' box with one side open and hopper bottom. Outlet pipe on bottom fits up to HPDE pipe.
Installation of inlet box and attachment to pipe	2	EA	1,912.90	$3,826	Box will require some structural support beams
SUBTOTAL				**$334,319**	
MISC ALLOWANCE	**10%**			**$33,432**	
SUBTOTAL				**$367,751**	
CONTINGENCY	**30%**			**$110,325**	
SUBTOTAL				**$478,077**	
MOBILIZATION	**15%**			**$71,712**	
CONSTRUCTION TOTAL				**$549,788**	
SALES TAX ON MATERIALS	**5.0%**			**$6,906**	
ENGINEERING AND SUPPORT	**20%**			**$109,958**	
CONST MANAGEMENT	**8%**			**$43,983**	
CAPITAL TOTAL (ROUNDED)				**$710,000**	

Diversions Costs
Bunker Hill — **DATE: 08/24/2000**
Acid Mine Drainage: Storage — **PROJECT NO.: 152215.FS.02**
9 Level AMD Diversion Installation (Costs below are for two diversion locations) — **ESTIMATE BY: J. Winters**
Order of Magnitude Cost Opinion — **N.Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
ANNUAL O&M COST			$0		**O & M cost for diversion equipment included with AMD pump O&M.
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				$0	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				$710,000	

NOTE: The above cost opinion is in February 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.

Two 700 gpm pumps (constant speed) & Storage from 30 feet below 11 Level and up

Bunker Hill — **DATE: 08/24/2000**
Acid Mine Drainage: Storage — **PROJECT NO.: 152215.FS.02**
9 Level AMD Pumping Installation — **ESTIMATE BY: J. Winters**
Order of Magnitude Cost Opinion — **N.Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Demolition					
Remove exstg pipe in No. 2 Shaft	1	LS	50,000.00	$50,000	Allowance.
Remove existing centrifugal pump (700 gpm)	1	LS	4,328.72	$4,329	Allowance. Assume 2 days. No materials.
Pump & Pipe Installation					
Upgrade electrical system into mine at 9 Level	1	ls	100,000.00	$100,000	Allowance.
New 12-inch dia throttling valve	1	LS	14,749.16	$14,749	Allowance $1000/ dia inch. Butterfly valve w/SSTdisk, seat and trim. Gear operator.
New 8' magnetic flowmeter	1	LS	7,632.78	$7,633	Assume $750/dia inch for meter. Need 8x12 reducer on each side of meter
Install 400 ft of 12" dia SST pipe (9 Level to 11 Level)	400	lf	156.87	$62,749	Pipe mtl quote from Alaska copper & Brass ($57.50/lf plus added $10/lf for flanged ends) = $67.50/lf + GC markup
New pipe riser clamps and base 20 ft OC	20	ea	452.24	$9,045	Pipe inside No. 2 Shaft from 9 to 11 Levels. Single pipe serves both 11 Level pumps.
Motor starters for 11 level Pump A	1	ls	24,576.43	$24,576	ANM quote from 1/10/00. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
New Pump A (700 & 700 gpm vertical turbine, submersible)	1	LS	38,670.46	$38,670	SST impeller and trim. Quote due from ANM on 1/10/00. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination. Each pump will be rated for 700 gpm at 460 ft.
Skid/rail car cost for submersible pump A.	1	ls	27,628.80	$27,629	ANM quote from 1/10/00. Cart will be designed to hold two pumps. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Power cable for two 150 HP Pumps (Pump A type)	500	lf	38.50	$19,248	Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Wire for pump control back to CTP	11,000	lf	13.42	$147,583	Wire and conduit. Assume ten # 12 wires plus two TWSP #16
Bubbler level control system mounted at 11 Level	1	ls	3,300.00	$3,300	Bubbler tube extends to 12 Level. Cost shown is an allowance $ amount.
New pump & diversion gate control panel at CTP	1	ls	33,000.00	$33,000	Allowance. $30k installed. Panel will include pump control, gate control, flowmeter readings from pumps and cutthroat flumes.
Valves					
Check valves	1	ls	8,952.61	$8,953	12" size. Style not selected yet. Assumed SST valve. Assume $500/inch dia for valve cost and $2000 to install it. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Air release valves	1	ls	1,738.83	$1,739	2" APCO 144 DAT w/SST float. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Isolation valves	1	ls	19,828.68	$19,829	Assumed $15000 for 300 psi rated SST BTV. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Check valve spare	1	ea	6,126.12	$6,126	

Two 700 gpm pumps (constant speed) & Storage from 30 feet below 11 Level and up

Bunker Hill — **DATE: 08/24/2000**
Acid Mine Drainage: Storage — **PROJECT NO.: 152215.FS.02**
9 Level AMD Pumping Installation — **ESTIMATE BY: J. Winters**
Order of Magnitude Cost Opinion — **N.Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
SUBTOTAL				$579,158	
MISC ALLOWANCE	10%			$57,916	
SUBTOTAL				$637,074	
CONTINGENCY	30%			$191,122	
SUBTOTAL				$828,196	
MOBILIZATION	15%			$124,229	
CONSTRUCTION TOTAL				$952,425	
SALES TAX ON MATERIALS	5.0%			$18,370	
ENGINEERING AND SUPPORT	20%			$190,485	
CONST MANAGEMENT	8%			$76,194	
CAPITAL TOTAL (ROUNDED)				$1,240,000	
ANNUAL O&M COST			$126,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				$1,564,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				$2,804,000	

NOTE: The above cost opinion is in February 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 Costs
Storage from 30 feet below 11 Level and up
Bunker Hill
Acid Mine Drainage: Storage

DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: J. Winters
N.Gulensoy

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Mucking out diversion and main channels	1	YR		10,000		$10,000	Allowance.
Maintenance of electrical system for pumps	1	YR		50,000		$10,000	Allowance.
Diversion system maintenance	1	YR	2,000	4,800		$6,800	allowance $2k materials and 16hrs/mo for 6 months
Pumping System Inspection	365	HR	0	50		$18,250	asm 1 hr/day, 365 days/yr @ $50/hr labor
Pump removal and replacement	1	YR	5,000	22,385	672	$28,057	asm 1 time/year & 120hrs/time + material allowance
Pump maintenance	1	YR	20,000	18,620	3,168	$41,788	asm 1 time/year & 80hrs/time + material allowance
						$114,896	
Contingency	10%					$11,490	
Total Annual Cost						**$126,385**	

NOTE:
Pumping cost of extra minewater above11 Level is not included in this cost estimate due to infrequent pumping and unknown quantities of water.

NEXT

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 operatiion-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 operatiion-assume 2-8hr repairs/ year @ $50
						$27,750	
Contingency	10%					$2,775	
Total Annual Cost						**$30,525**	

NOTE:

NEXT

Bunker Hill
Mine Water
Upgrade HDS Plant & Add Media Filters (2,500gpm) (Equivalent to Phase I 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
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 cantelever
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) (Equivalent to Phase I 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
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 cantelever
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) (Equivalent to Phase I 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
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
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 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 2(
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) (Equivalent to Phase I 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
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			**$763,000**		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				**$9,468,000**	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				**$17,666,000**	

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.

O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
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	90,707	0	$90,707	asm 2% of subtotal after allowance of HDS upgrade
HDS Effluent Pump Station	1	YR	46,800	0	0	$46,800	
Media Filters	1	YR	97,500	0	0	$97,500	
Backwash Pumping	1	YR	8,775	0	0	$8,775	
Building (not incl HDS)	1	YR	0	2,400	0	$2,400	
						$755,182	
Contingency	10%					$75,518	
Subtotal						**$831,000**	
Lime Savings Estimated at 10% Reduction in Lime Use						($34,000)	Annual lime cost without mitigations estimated at $335,000/year
Total Annual Cost With Savings						**$797,000**	
NPV of Annual O&M Costs (30 years @ 7%)						**$9,890,000**	

NEXT

Alternatives 3 and 4
Option A

Bunker Hill — **DATE: 11/22/2000**
Acid Mine Drainage — **PROJECT NO.: 152215.FS.02**
Disposal of Raw Sludge in CIA Disposal Beds — **ESTIMATE BY: D. Bunte**
Order of Magnitude Cost Opinion (Quantity reduced by 10%) — **N. Gulensoy**

DESCRIPTION	QTY	QTY Reduced by 10%	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	22,500	C. Y.	3.00	$67,500
Subgrade Preparation	5	5	Acres	3,000.00	$13,500
Subgrade Stabilization	10,500	9,450	C. Y.	4.00	$37,800
Liner Protection Sand	8250	7,425	C. Y.	10.00	$74,250
Drain Rock	1,950	1,755	C. Y.	18.00	$31,590
Ditch Lining Geotextile	21,200	19,080	S. Y.	1.65	$31,482
G C L	18,100	16,290	S. Y.	4.05	$65,975
H D P E Geomembrane	18,100	16,290	S. Y.	5.40	$87,966
H D P E Pipe, 10"	550	495	L. F.	23.00	$11,385
Erosion Control Matting	11800	10,620	S.Y.	1.50	$15,930
Perf Pipe, 4"	2000	1,800	L. F.	2.00	$3,600
Perf Pipe, 6"	580	522	L. F.	3.00	$1,566
HDPE Pipe, 6"	130	117	L. F.	2.50	$293
Strip Drains	700	630	L. F.	1.75	$1,103
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	43,500	C. Y.	10	$435,000
Chain Link Fence and Gates (not reduced)	2000	2,000	L.F.	12	$24,000
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	15	$22,500
SUBTOTAL					**$1,117,738**
MISC ALLOWANCE	**10%**				**$111,774**
SUBTOTAL					**$1,229,512**
CONTINGENCY	**30%**				**$368,854**
SUBTOTAL					**$1,598,366**
MOBILIZATION	**15%**				**$239,755**
CONSTRUCTION TOTAL					**$1,838,121**
SALES TAX ON MATERIALS	**5.0%**				**$28,216**
ENGINEERING AND SUPPORT	**20%**				**$367,624**
CONSTRUCTION MANAGEMENT	**8%**				**$147,050**
CAPITAL COST FIRST BED (ROUNDED)					**$2,380,000**
CAPITAL COST FOR NEW CELLS IN FUTURE YEARS (DOES NOT INCLUDE PUMPING AND PIPING COST)					
Sludge Disposal Bed (per each)					
Excavation	25,000	22,500	C. Y.	3.00	$67,500
Subgrade Preparation	5	5	Acres	3,000.00	$13,500

NEXT