TABLES

Table 1: Richard Mine Treatment Alternatives
Active Treatment Techniques

Treatment Method	Technically Feasible	Advantages	Disadvantages	Capital Cost	Operating Cost
Gas Injection of Anhydrous Ammonia	Yes	• Minimal energy input • Rapid, efficient mixing • Treats high iron concentration	• Frequent long term maintenance • Hazardous agent • Overtreatment is detrimental to downstream areas	Low	Low
Caustic Soda	Yes	• Minimal energy input • History of success • Low sludge volume	• High chemical costs • Poor sludge properties • Freezing potential • Dangerous chemical handling	Low	Low
Lime Dispensing Doser with Settling Pond	Yes	• Minimal energy input • Safe Handling • Low sludge volume	• Clogging of doser • Need elevation difference for channel aeration	Low	Low
Hydrated Lime with Mechanical Mixing	Yes	• Easy handling • Cost effective	• Higher sludge production • Space requirements • Higher capital costs than other alkaline materails	Moderate	Low
Activated Iron Solids	Yes	• Minimal alkaline addition • High density sludge	• Proprietary technology • Minimal treatment history • Minimal technogical support	Moderate/High	Moderate/High
Reverse Osmosis	Yes	• High quality effluent	• High energy input • Sludge high in metal and pollutant content	High	High
Rotating Cylinder Treatment System	Yes	• Modular system is mobile and can operate in series • Highly efficient mixing and alkaline material utilization	• Proprietary technology • Minimal treatment history • Minimal technogical support • High flow	Moderate/High	Moderate/High
Municipal Waste Water Treatment Plant	Yes	• No discharge to stream • Utilization of existing treatment system	• Long transmission lines • Treatment plants will most likely require upgrades • Pretreatment most likely to be required	Moderate	Moderate/High

Table 2: Richard Mine Treatment Alternatives
Passive Treatment Techniques

Treatment Method	Technically Feasible	Advantages	Disadvantages	Capital Cost	Operating Cost
Aerobic Wetlands	No	• Minimal energy input	• Large area required • Cannot be used for net acidic conditions	High	Low
Anaerobic Wetlands	No	• Minimal energy input	• Will not work as stand along system	High	Low
Anoxic Limestone Drains	No	• Low cost of materials • Low O & M • Simple construction	• Slow reaction time • High sludge production • Large system required	High	Low
Successive Alkalinity Producing System	No	• Low cost of materials	• Large system required • Not functional for high acidititly unless put in series	High	Low

Table 3: Richard Mind Treatment Alternatives
Other Alternatives

Treatment Method	Technically Feasible	Advantages	Disadvantages	Capital Cost	Operating Cost
Conveying Drainage to Larger Body of Water	Yes	• No sludge generation • Eliminates current point source	• Right of way required • Long transmission system • No treatment • Redundant system required	Moderate	Moderate
Recirculation of AMD back into Mine	Yes	• Eliminates current point source	• Right of way required • Long transmission system • No treatment • Redundant system required	Moderate	Moderate

Table 4: Water Quality Data
Richard Mine AMD Discharge

Source	Date	Discharge (gpm)	pH	Acidity Conc. (mg/L)	Load (lb/day)	Al Conc. (mg/L)	Load (lb/day)	Fe Conc. (mg/L)	Load (lb/day)	Fe^{3+}(%)	Mn Conc. (mg/L)	Load (lb/day)
NRCS	10/23/1997	150	2.9	628	1132	84	151	147	265	17%	3.2	6
	11/21/1997	150	3.1	818	1475	46	83	171	308	15%	3.7	7
Stewart and Skousen	6/25/1999	135	3.59	1020	1658	95	155	114	185		4.3	7
	7/15/1999	136	3.55	1210	1978	88	143	201	329		4.3	7
	8/17/1999	122	3.6	1140	1674	78	115	205	301		4.3	6
	9/23/1999	138	3.63	1250	2076	61	101	209	346		3.9	6
	10/25/1999	120	3.95	1145	1657	62	90	193	279		3.9	6
	11/20/1999	101	3.96	1024	1243	68	83	218	265		4.5	5
	12/21/1999	98	4.07	998	1178	60	71	200	236		3.9	5
	1/31/2000	135	4.15	1040	1683	62	100	182	294		3.6	6
	2/24/2000		3.97	618		60		115			3.1	
	3/31/2000	122	3.89	881	1289	55	81	96	140		2.7	4
	4/25/2000	123	3.66	885	1313	80	119	148	220		3.5	5
	5/24/2000	572	4.2	650	4468	82	567	190	1304		4.5	31
	6/21/2000	233	3.48	930	2605	72	202	176	493		3.7	10
	7/26/2000		3.58	917		82		172			3.8	
	8/24/2000	336	3.89	1017	4105	71	286	178	719		3.9	16
	9/20/2000	224	3.97	1297	3491	63	170	167	448		3.6	10
Christ	10/29/2001	214	4.1	930	2391	78	200	233	600	12%	5	13
	10/3/2001		4.2	791		76		204		4%	5.1	
WVDEP	5/6/2003	310	4.2	866	3224	68	257	180	678	36%	3.4	13
	6/6/2005	260	3.9	595	1861	73	227	174	544	-	3.7	11
Mack and Skousen	1/13/2006	735	3.77	922	8132	57	503	151	1332		10.2	90
	2/1/2006	NM	NM	673		60		156			3.3	
	2/10/2006	794	3.7	NO LAB DATA RECEIVED								
	2/17/2006	754	3.95	799	7229	68	615	164	1484		3.57	32
	3/16/2006	594	4.2	810	5774	57	406	140	998		2.91	21
	4/2/2006	412	4.3	965	4771	57	282	147	727		3.12	15
	4/14/2006	576	4.3	826	5709	48	332	136	940		2.84	20
GAI	6/15/2006	377	3.79	667	3018	68	308	179	810		3.2	14
Mininum		**98**	**2.9**	**595**	**1132**	**46**	**71**	**96**	**140**	**4%**	**2.7**	**4**
Maximum		**794**	**4.3**	**1297**	**8132**	**95**	**615**	**233**	**1484**	**36%**	**10.2**	**90**
Average		**305**	**4**	**907**	**3005**	**68**	**226**	**171**	**570**	**0**	**4**	**15**

Table 5: Water Quality Data
Deckers Creek

Average Conditions							
Location	**Flow (gpm)**	**pH**	**Alkalinity (mg/L)**	**Acidity (mg/L)**	**Total AL (mg/L)**	**Total FE (mg/L)**	**Total MN (mg/L)**
Deckers Creek above at Dellslow	14600	7.04	21.6	6.57	0.71	0.61	0.23
Richard Mine at Primary Discharge	305	4	0	907	68	171	4
Deckers Creek below at Sabraton	29000	6.71	17.35	10.6	1.8	3.51	0.34
Minimum Conditions							
Location	**Flow (gpm)**	**pH**	**Alkalinity (mg/L)**	**Acidity (mg/L)**	**Total AL (mg/L)**	**Total FE (mg/L)**	**Total MN (mg/L)**
Deckers Creek above at Dellslow	19000	6	3	0	0.17	0.1	0.02
Richard Mine at Primary Discharge	98	2.9	0	595	46	96	2.7
Deckers Creek below at Sabraton	2300	5.7	6	0	0.02	0.9	0.18
Maximum Conditions							
Location	**Flow (gpm)**	**pH**	**Alkalinity (mg/L)**	**Acidity (mg/L)**	**Total AL (mg/L)**	**Total FE (mg/L)**	**Total MN (mg/L)**
Deckers Creek above at Dellslow		7.9	41.4	66	2.1	2.7	0.32
Richard Mine at Primary Discharge	794	4.3	0	1297	95	233	10.2
Deckers Creek below at Sabraton		7.3	48.2	37.7	5.76	11.6	0.51

Table 6: Cost Analysis
Gas Injection of Anhydrous Ammonia

Gas Injection of Anhydrous Ammonia			
Chemical Dispersion System			
Description	**Quantity**	**Unit Cost**	**Cost**
Excavation	LS	$5,000.00	$5,000.00
Concrete	35 yd^3	$200.00/$yd^3$	$7,000.00
Tank	1 ea	$30,000.00/ea	$30,000.00
Misc Valves & Piping	LS	$3,185.00	$3,185.00
Misc Automation	LS	$6,925.00	$6,925.00
Safety Items	LS	$1,095.00	$1,095.00
Fencing	1300 lf	$18.00/lf	$23,400.00
Misc Appurtenances	LS	$4,000.00	$4,000.00
		System Subtotal	**$80,605.00**
Pond			
Excavation	8725 yd^3	$4.50/$yd^3$	$39,262.50
Clay Liner	510 yd^3	$10.00/$yd^3$	$5,100.00
Clearing & Grubbing	2.50 acres	$1,250.00/acre	$3,125.00
Revegetation	0.75 acres	$1,500.00/acre	$1,125.00
		Pond Subtotal	**$48,612.50**
Road			
Road Surface	500 lf	$20.00/lf	$10,000.00
Revegetation	0.05 acres	$1,500.00/acre	$75.00
Clearing & Grubbing	0.25 acres	$1,250.00/acre	$312.50
		Road Subtotal	**$10,387.50**
		Capital Cost Subtotal	**$139,605.00**
Land Access			
Land Access/Purchase	3.10 acres	$40,000.00/acre	$124,000.00
Survey & Title Search	LS	$5,000.00	$5,000.00
		Land Subtotal	**$129,000.00**
Engineering and Construction Administration Cost			
Engineering Cost	17% of Capital Cost		
		Engineering Subtotal	**$23,735.00**
Contingency Cost			
Contingency Cost	10% of Capital & Land Access Cost		
		Contingency Subtotal	**$26,860.50**
		Total Estimated Cost	**$319,200.50**
Annual Costs			
Sampling	LS	$2,115.00	$2,115.00
Labor - Flow Monitoring & Tank Refill	LS	$4,550.00	$4,550.00
Maintenance	LS	$3,332.00	$4,190.00
Chemical Cost	527710 lb	$0.15/lb	$79,156.50
Sludge Removal	1329320 gal	$0.05/gal	$66,466.00
Contingency Cost	10% of Annual Costs		$15,647.75
		Total Annual Costs	**$172,125.25**
Total Annual Cost per 1000 gal of Water Treated over 20 Years ***(Based on 2007 dollars)***			**$1.173**
		Total Cost over 20 Years	$3,761,705.50

Table 7: Cost Analysis
Lime Dispensing Doser

Lime Dispensing Doser

Description	Quantity	Unit Cost	Cost
Chemical Dispersion System			
Excavation	1245 yd^3	$4.50/$yd^3$	$5,602.50
Aggregate	1670 yd^3	$18.00/$yd^3$	$30,060.00
Clearing & Grubbing	0.25 acres	$1,250.00/acre	$312.50
Silo System	1 ea	$85,000.00/ea	$85,000.00
Fencing	1300 lf	$18.00/lf	$23,400.00
Misc Appurtenances	LS	$4,000.00	$4,000.00
		System Subtotal	**$148,375.00**
Pond			
Excavation	8725 yd^3	$4.50/$yd^3$	$37,237.50
Clay Liner	510 yd^3	$10.00/$yd^3$	$5,100.00
Clearing & Grubbing	2.50 acres	$1250.00/acre	$3,125.00
Revegetation	0.75 acres	$1,500.00/acre	$1,125.00
		Pond Subtotal	**$46,587.50**
Road			
Road Surface	500 lf	$20.00/lf	$10,000.00
Revegetation	0.05 acres	$1,500.00/acre	$75.00
Clearing & Grubbing	0.25 acres	$1,250.00/acre	$312.50
		Road Subtotal	**$10,387.50**
		Capital Cost Subtotal	**$205,350.00**
Land Access			
Land Access/Purchase	3.10 acres	$40,000.00/acre	$124,000.00
Survey & Title Search	LS	$5,000.00	$5,000.00
		Land Subtotal	**$129,000.00**
Engineering and Construction Administration			
Engineering Cost	17% of Capital Cost		
		Engineering Subtotal	**$33,145.00**
Contingency Cost			
Contingency Cost	10% of Capital & Land Access Cost		
		Contingency Subtotal	**$33,435.00**

Total Estimated Cost	**$390,542.50**

Annual Costs			
Sampling	LS	$2,115.00	$2,115.00
Labor - Flow Monitoring & Silo Refill	LS	$4,550.00	$4,550.00
Maintenance	LS	$5,726.00	$6,800.00
Chemical Cost	966260 lb	$0.05/lb	$48,313.00
Sludge Removal	1329320 gal	$0.05/gal	$66,466.00
Contingency Cost	10% of Annual Costs		$12,824.40
		Total Annual Costs	**$141,068.40**

Total Annual Cost per 1000 gal of Water Treated over 20 Years ***(Based on 2007 dollars)***	**$1.002**
Total Cost of 20 Years	$3,211,910.50

Table 8: Cost Analysis
Hydrated Lime with Mechanical Mixing

Hydrated Lime with Mechanical Mixing

Description	Quantity	Unit Cost	Cost
Chemical Dispersion System			
Silo	LS	$32,000	$32,000.00
Clarifier	LS	$221,116.00	$221,116.00
Excavation	LS	$5,000	$5,000.00
Concrete	175 yd^3	$200.00/$yd^3$	$35,000.00
Motorized Mixer & Aeration	LS	$2,000.00	$2,000.00
Slide Gate	5 ea	$750.00/ea	$3,750.00
Electric Control Panel	LS	$2,000.00/ea	$2,000.00
Building	225 ft^2	10.00/ft^2	$2,250.00
Clearing & Grubbing	2 acres	$1,250.00/acre	$2,500.00
Fencing	1300 lf	$18.00/lf	$23,400.00
Misc Appurtenances	LS	$4,000.00	$4,000.00
		System Subtotal	**$333,016.00**
Pond			
Excavation	8720 yd^3	$4.50/$yd^3$	$39,240.00
Clay Liner	510 yd^3	$10.00/$yd^3$	$5,100.00
Clearing & Grubbing	2.5 acres	$1,250.00/acre	$3,125.00
Revegetation	1.0 acres	$1,500.00/acre	$1,500.00
		Pond Subtotal	**$48,965.00**
Road			
Road Surface	500 lf	$20.00/lf	$10,000.00
Revegetation	.05 acres	$1,500.00/acre	$75.00
Clearing & Grubbing	.25 acres	$1,250.00/acre	$312.50
		Road Subtotal	**$10,387.50**
		Capital Cost Subtotal	**$392,368.50**
Land Access			
Land Access/Purchase	3.0 acres	$40,000.00/acre	$120,000.00
Survey & Title Search	LS	$5,000.00	$5,000.00
		Land Subtotal	**$125,000.00**
		Subtotal	**$517,368.50**
Engineering and Construction Administration Cost			
Engineering Cost	17% of Capital Cost		
		Engineering Subtotal	**$66,705.00**
Contingency Cost			
Contingency Cost	10% of Capital & Land Access Cost		
		Contingency Subtotal	**$51,736.85**

Total Estimated Cost	**$635,810.35**

Annual Costs			
Sampling	LS	$2,115.00	$2,115.00
Labor - Flow Monitoring & Tank Refill	LS	$4,550.00	$4,550.00
Maintenance	LS	$11,595.00	$11,595.00
Chemical Cost	1,250,250 lb	$0.05/lb	$62,512.50
Sludge Removal	1,329,350 gal	$0.05/gal	$66,467.50
Contingency - 10%	10% of Annual Costs		$14,724.00
		Total Annual Costs	**$161,964.00**

Total Annual Cost per 1000 gal of Water Treated over 20 Years *(Based on 2007 dollars)*	**$1.209**
Total Cost over 20 years	$3,875,090.35

Table 9: Cost Analysis
Activated Iron Solids

Activated Iron Solids			
Chemical Dispersion System			
Description	**Quantity**	**Unit Cost**	**Cost**
PLAR System	LS	$225,000	$225,000.00
AIS System	LS	$260,000	$260,000.00
Polymer System	LS	$30,000.00	$30,000.00
PL Disers and Silo	LS	$80,000.00	$80,000.00
Control Panel	LS	$40,000.00	$40,000.00
Flow Headworks	LS	$15,000.00	$15,000.00
Solids Handling Facilities	LS	$60,000.00	$60,000.00
Installation Costs	LS	$100,000.00	$100,000.00
Control Building	200 sf	$65.00/sf	$13,000.00
Concrete	35 yd^3	$200.00/$yd^3$	$7,000.00
Fencing	1300 lf	$18.00/lf	$23,400.00
Misc Appurtenances	LS	$4,000.00	$4,000.00
Excavation	LS	$5,000.00	$5,000.00
		System Subtotal	**$862,400.00**
Road			
Road Surface	500 lf	$20.00/lf	$10,000.00
Revegetation	.05 acres	$1,500.00/acre	$75.00
Clearing & Grubbing	.25 acres	$1,250.00/acre	$312.50
		Road Subtotal	**$10,387.50**
		Capital Cost Subtotal	**$872,787.50**
Land Access			
Land Access/Purchase	3.0 acres	$40,000.00/acre	$120,000.00
Survey & Title Search	LS	$5,000.00	$5,000.00
		Land Subtotal	**$125,000.00**
Engineering and Construction Administration Cost			
Engineering Cost	17% of Capital Cost		
		Engineering Subtotal	**$146,610.00**
Contingency Cost			
Contingency Cost	10% of Capital & Land Access Cost		
		Contingency Subtotal	**$98,740.00**

Total Estimated Cost	**$1,243,137.50**

Annual Costs			
Sampling	LS	$2,115.00	$2,115.00
Maintenance	LS	$10,000.00	$10,000.00
Pulverized Limestone	LS	$16,000.00	$16,000.00
Polymer	LS	$3,000.00	$3,000.00
Electricity	LS	$15,000.00	$15,000.00
Solids Disposal	LS	$50,000.00	$50,000.00
Contingency - 10%	10% of Annual Costs		$9,611.50
		Total Annual Costs	**$105,726.50**

Total Annual Cost per 1000 gal of Water Treated over 20 Years ***(Based on 2007 dollars)***	**$1.047**
Total Cost Over 20 Years	$3,357,667.50

Table 10: Cost Analysis
Conveying Drainage to Monongahela River

Conveying Drainage to Monongahela River

Chemical Dispersion System			
Description	**Quantity**	**Unit Cost**	**Cost**
12" Diameter Pipe	29850 ft	$22.00/lf	$656,700.00
Precast Manholes	71 ea	$2,500.00/ea	$177,500.00
Stream Crossings	4 ea	$10,000.00/ea	$40,000.00
Revegetation	21 acres	$1,500.00/acre	$31,500.00
Clearing & Grubbing	21 acres	$1250.00/acre	$26,250.00
Ashpalt Trail Repair	15000 sf	$2.00/sf	$30,000.00
Bore and Jack	200 lf	$300.00/lf	$60,000.00
Rock/Riprap	LS	$100,000.00	$100,000.00
Misc Excavation	LS	$50,000.00	$50,000.00
Misc Appurtenances	LS	$50,000.00	$50,000.00
		System Subtotal	**$1,221,950.00**
		Capital Cost Subtotal	**$1,221,950.00**
Land Access			
Land Access/Easement	21.0 acres	$15,000.00/acre	$315,000.00
Survey & Title Search	LS	$20,000.00	$20,000.00
		Land Subtotal	**$335,000.00**
Engineering and Construction Administration Cost			
Engineering Cost	17% of Capital Cost		
		Engineering Subtotal	**$207,730.00**
Contingency Cost			
Contingency Cost	10% of Capital & Land Access Cost		
		Contingency Subtotal	**$155,695.00**

Total Estimated Cost $1,920,375.00

Annual Costs			
Sampling	LS	$2,115.00	$2,115.00
Maintenance	LS	$11,595.00	$11,595.00
Quarterly Line Flushing	LS	$7,500.00	$30,000.00
Contingency - 10%	10% of Annual Costs		$4,159.50
		Total Annual Costs	**$47,869.50**

Total Annual Cost per 1000 gal of Water Treated over 20 Years ***(Based on 2007 dollars)*** **$0.898**

Total Cost Over 20 Years $2,877,765.00

APPENDIX A

AMD Treat Analyses

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Ammonia

AMD TREAT

Costs — AMD TREAT MAIN COST FORM

AMDTREAT

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$0**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia	1	0	$54,094
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds	1	1	$48,165
Roads	1	0	$10,171
Land Access	1	0	$124,110
Ditching			$0
Engineering Cost	1	0	$23,962
Ancillary Subtotal:			**$206,408**
Other Cost (Capital Cost)			$28,521
Total Capital Cost:			**$289,023**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$4,550
Maintenance	1	0	$4,933
Pumping			$0
Chemical Cost	1	0	$79,156
Oxidant Chem Cost			$0
Sludge Removal	1	0	$66,466
Other Cost (Annual Cost)			$15,650
Land Access (Annual Cost)			$0
Total Annual Cost:			**$173,418**
Other Cost	1	0	

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L
◉ Calculate Net Acidity (Acid-Alkalinity)		
○ Enter Net Acidity manually		
Net Acidity (Hot Acidity)	657.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$0.659**

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Ammonia
COMMENTS:

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

AMD TREAT

ANHYDROUS AMMONIA

AMDTREAT

Anhydrous Ammonia Name: 8000 Gallon Tank

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Anhydrous Ammonia

Calculated Acidity: 0.00 mg/L

Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 68.40 mg/L

Manganese: 3.20 mg/L

1. Ammonia Purity	99.00	%
2. Mixing Efficiency of Ammonia	95.00	%
☐ 3. Titration?		
4. Ammonia Titration Volume		gal amm/ gal water treated
TANK SIZE		
◉ 8000 Gallon Tank?		
5. Length of Footer	29.00	ft
6. Width of Footer	12.00	ft
7. Depth of Footer	2.50	ft
8. Excavation Unit Cost	100.00	$/yd3
9. Concrete Unit Cost	200.00	$/yd
10. Cost of 8000 Gallon Tank	30,000	$
○ 1000 Gallon Tank?		
11. Cost of 1000 Gallon Tank		$
12. Number of Tanks	1	ea
13. Schedule 80 Line Unit Cost	1.00	$/ft
14. Feet of Feeder Line	40.00	ft
15. Needle Valve Unit Cost	132.00	$
16. Nbr. of Needle Valves	1.00	ea
17. Pressure Regulator Unit Cost	320.00	$
18. Nbr. of Pressure Regulators	1	ea
19. Vaporizer Unit Cost	0.00	$
20. Nbr. of Vaporizers	0	ea
21. Check Valve Unit Cost	93.00	$
22. Nbr. of Check Valve	1	ea
23. Globe Valve Unit Cost	300.00	$
24. Nbr. Globe Valves	1	ea
25. Vaporizer Control Unit Cost	2300.00	$
26. Nbr. Control Box for the Tank Vaporizer	1	ea
☑ 27. Automated System ?		
28. PID pH Controller Unit Cost	1875.00	$
29. Nbr. PID pH Controllers	1	ea
30. Proportional Valve Unit Cost	3800.00	$
31. Nbr. Proportional Valves	1	ea
32. pH Probe Unit Cost	750.00	$
33. Nbr. pH Probe	1	ea
34. Metal Enclosure for Prop. Valve Unit Cost	500.00	$
35. Nbr. Metal Enclosure for Prop. Valve	1	ea
Safety Items		
36. Eye Wash Station Unit Cost	350.00	$
37. Nbr. Eye Wash Station	1	ea
38. Twin Cylinder Oxygen Kit Unit Cost	450.00	$
39. Nbr. Twin Cylinder Oxygen Kit	1	ea
40. Gas Mask Unit Cost	275.00	$
41. Nbr. of Gas Masks	1	ea
42. Package of 2 Mask Cartridges Unit Cost	20.00	$
43. Nbr. of Packages.of 2 Mask Cartridges	1	ea
44. Pounds of Ammonia per Year	527,709	lbs/yr
45. Gallons of Ammonia per Day	272	gal/ day

Anhydrous Ammonia Cost Summaries

46. Excavation Cost	3,222	$
47. Concrete Cost	9,667	$
48. Cost of Tanks	30,000	$
49. Steel Feeder Line Cost	40	$
50. Needle Valve Cost	132	$
51. Pressure Regulator Cost	320	$
52. Vaporizer Cost	0	$
53. Check Valve Cost	93	$
54. Globe Valve Cost	300	$
55. Vaporizer Control Cost	2,800	$
56. PID pH Controller Cost	1,875	$
57. Proportional Valve Cost	3,800	$
58. pH Probe Cost	750	$
59. Prop. Valve Enclosure Cost	500	$
60. Cost of Safety Items	1,095	$
61. Total Cost	54,094	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

Printed on 03/15/2007

AMD TREAT

PONDS

AMDTREAT

Pond Name: 24 Hour retention time

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity: 0.00 mg/L

Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 68.40 mg/L

Manganese: 3.20 mg/L

Record Number
1 of 2

Pond Design Based On:

◉ Retention Time

1. Desired Retention Time: 24.0 hours

☑

3. Sludge Removal Frequency: 1.00 times/year

☐ 4. Titration?

5. Sludge Rate: gal sludge/ gal H2O

6. Percent Solids: 30.00 %

7. Sludge Density: 8.35 lbs./gal

○ Pond Size

8. Pond Length at Top of Freeboard: ft

9. Pond Width at Top of Freeboard: ft

	Run		Rise
10. Slope Ratio of Pond Sides	2.0	:	

11. Freeboard Depth: 2.0 ft

12. Water Depth: 4.0 ft

13. Excavation Unit Cost: 4.50 $/yd3

14. Total Length of Effluent / Influent Pipe: 0.00 ft

15. Unit Cost of Pipe: 0.00 $/ft

Liner Cost

○ No Liner

◉ Clay Liner

16. Clay Liner Unit Cost: 10.00 $/yd3

17. Thickness of Clay Liner: 1.0 ft

○ Synthetic Liner

18. Synthetic Liner Unit Cost: $/yd2

☑ 19. Clearing and Grubbing?

◉ 20. Land Multiplier: 1.50 ratio

○ 21. Clear/Grub Acres: acres

22. Clear and Grub Unit Cost: 1250.00 $/acre

23. Revegetation Cost: 1500.00 $/acre

24. Cost of Baffles: 0 $

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard: 353 ft

26. Width at Top of Freeboard: 180 ft

27. Freeboard Volume: 12,782 yd3

28. Water Volume: 8,218 yd3

29. Estimated Annual Sludge: 1,088 yd3/yr

30. Volume of Sludge per Removal: 1,088 yd3/ removal

31. Excavation Volume: 5.09 acre ft

32. Excavation Volume: 8,218 yd3

33. Clear and Grub Area: 2.19 acres

34. Liner Area: 2,000 yd2

35. Calculated Retention Time: 24 hours

Ponds Sub-Totals per Pond

36. Excavation Cost: 39,260 $

37. Pipe Cost: 0 $

38. Liner Cost: 5,064 $

39. Clearing and Grubbing Cost: 2,743 $

40. Revegetation Cost: 1,097 $

41. Baffle Cost: 0 $

42. Estimated Cost: 48,165 $

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.50	$/yd3
5. GeoTextile Length	0	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	0	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☐ 9. Surveying?		
10. Survey Rate		acres/day
11. Survey Unit Cost		$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre

14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	9,861	$
18. GeoTextile Cost	0	$
19. Silt Fence Cost	0	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	0	$
23. Clear and Grub Cost	256	$
24. Total Cost	10,174	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

Printed on 03/15/2007

AMDTREAT

AMD TREAT

LAND ACCESS

Land Access Name 5 acres

Buy

1. Cost per Acre 40000.00 $

2. Number of Acres 3.10 acres

3. Closing Cost 110.00 $

Lease

4. Annual Lease Cost [redacted] $

6. Buy Total Cost 124110 $

7. Lease Total Cost 100 $

8. Selected Cost 124110 $ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	140,951	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	23,962	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

Printed on 03/15/2007

AMDTREAT

AMD TREAT

SAMPLING

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2115	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

Printed on 03/15/2007

AMD TREAT

LABOR

Labor Name: Flow monitoring / tank refill

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	4.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	4,550	$

Record Number 1 of 1

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

AMD TREAT

MAINTANENCE

◉ **Estimate Maintenance Cost**

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

○ **Enter Established Annual Maintenance Cost**

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	13893	$
7. Total Maintenance Passive Cost	0	$
8. Total Maintenance Ancillary Cost	2,041	$
9. Total Maintenance Other Capital Cost	998	$
10. Total Maintenance Cost	16933	$

* Ancillary Cost does int include Cost for
Land Access and Engineering Cost

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Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Ammonia

AMD TREAT
CHEMICAL COST

AMDTREAT

Chemical Cost Name: Anhydrous Ammonia

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Chemical Cost

Calculated Acidity: 0.00 mg/L
Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm
Typical Flow: 500.00 gpm
Total Iron: 79.00 mg/L
Aluminum: 68.00 mg/L
Manganese: 5.20 mg/L

Record Number
1 of 1

○ A. Hydrated Lime ?
☐ 1 Titration?
2. Hydrated Lime Titration Amount — lbs of hydrated lime / gal of H2O
3. Hydrated Lime Purity — %
4. Mixing Efficiency of Hydrated Lime — %
5. Hydrated Lime Unit Cost — $/lb

○ B. Pebble Quick Lime ?
☐ 6. Titration?
7. Pebble Lime Titration Amount — lbs of Pebble Lime / gal of H2O
8. Pebble Lime Purity — %
9. Mixing Efficiency of Pebble Lime — %
◍ Delivered in Bags
10. Pebble Lime Bag Unit Cost — $/lb
◍ Bulk Delivery
11. Pebble Lime Bulk Unit Cost — $/lb

○ C. Caustic Soda ?
☐ 12. Titration?
13. Caustic Titration Amount — gal ofcaustic / gal H2O
14. Caustic Purity — purity of 20% caustic solution
15. Mixing Efficiency of Caustic — %
◍ Non-Bulk Delivery
16. Caustic Non-Bulk Unit Cost — $/gal
◍ Bulk Delivery
17. Caustic Bulk Unit Cost — $/gal

☐ 18. Flocculents?
19. Flocculent Consumption — gal/hr
20. Flocculent UnitCost — $/gal

◉ E. Anhydrous Ammonia ?
☐ 21. Titration?
22. AmmoniaTitration Amount — lbs of ammonia / gal H2O
23. Ammonia Purity: 99.00 %
24. Mixing Efficiency of Ammonia: 95.00 %
Non-Bulk Delivery
25. Ammonia Non-Bulk Unit Cost — $/lb
◉ Bulk Delivery
26. Ammonia Bulk Unit Cost: 0.19 $/lb

○ F. Soda Ash ?
☐ 27. Titration?
28 Soda Ash Titration Amount — lbs of soda ash / gal of H2O
29. Soda Ash Purity — %
30. Mixing Efficiency of Soda Ash — %
31 Soda Ash Unit Cost — $/lb

○ G. Known Chemical Cost ?
32. Known Annual Chemical Cost — $

Chemical Cost Sub-Totals			Annual Amount of Chemicals Consumed	
33. Total Hydrated Lime Cost	62,512	$	1,250,238	lbs
34. Total Pebble Lime Cost	48,313	$	966,266	lbs
35. Total Caustic Soda Cost	297,875	$	5957.50	gals
36. Total Anhydrous Ammonia Cost	79,156	$	527,709	lbs
37. Total Soda Ash Cost	364,689	$	2,604,919	lbs
38. Total Known Chemical Cost	0	$		
39. Total Flocculent Cost	0	$	0	gals

40. Selected Chemical:
Annual Chemical Cost: 79,156 $

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Ammonia

AMD TREAT

SLUDGE REMOVAL

AMDTREAT

☐ Opening Screen Water Parameters

Sludge Removal Name

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity 1,170.00 mg/L
Alkalinity 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity) 1,367.00 mg/L

Design Flow 1,000.00 gpm
Typical Flow 500.00 gpm
Total Iron 179 mg/L
Aluminum 68 mg/L
Manganese 3 mg/L

1. Select One — Selection for Method of Removing Sludge

◉ Sludge Removal by $ per Gallon
2. Sludge Removal Unit Cost 0.05 $/gal

○ Sludge Removal by Vacuum Truck
3. Vacuum Truck Unit Cost $/hr
4. Mobilization Cost $
5. Hours to be Used hr

○ Sludge Removal by Mechanical Excavation
6. Mechanical Excavation Unit Rate $/hr
7. Mobilization Cost $
8. Hours to be Used hr

○ Sludge Removal by Lagoon Cleaner
9. Lagoon Cleaning Unit Rate $/hr
10. Mobilization Cost $
11. Hours to be Used hr

○ Actual Sludge Removal Cost
12. Actual Sludge Removal Cost $

13. Off Site Disposal Cost 0.00 $

Record Number 1 of 1

Concentrations from Main Water Quality Screen

14. Iron Concentration 179.00 mg/L
15. Manganese Concentration 3.20 mg/L
16. Aluminum Concentration 68.40 mg/L

17. Total Miscellaneous Concentration 0 mg/L
18. Percent Solids 5.00 %
19. Sludge Density 8.33 lbs/gal
☐ 20. Titration?
21. Gal. of Sludge per Gal of Water Treated gal

22. Estimated Sludge Volume 6582 yd3/yr

Cost for Sludge Removal Types

23. Removal by $ per Gallon 66,466 $
24. Removal by Vacuum Truck 0 $
25. Removal by Mechanical Excavation 0 $
26. Removal by Lagoon Cleaner 0 $
27. Actual Sludge Removal Cost 0 $

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost 66,466 $

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Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Ammonia

AMD TREAT

OTHER COST

AMDTREAT

Oher Cost Name: Miscellaneous

	A. Description of Item	B. Unit Cost Per Item	C. Quantity	D. Total Item Cost	E. Capital Cost / Annual Cost
1.	Misc. Appurtenances	4,000.00	1	4,000	Capital Cost
2.	Contingency	24,520.50	1	24,520	Capital Cost
3.	Contingency	15,650.00	1	15,650	Annual Cost
4.		0.00	0	0	Capital Cost
5.		0.00	0	0	Capital Cost
6.		0.00	0	0	Capital Cost
7.		0.00	0	0	Capital Cost
8.		0.00	0	0	Capital Cost
9.		0.00	0	0	Capital Cost
10.		0.00	0	0	Capital Cost
11.		0.00	0	0	Capital Cost
12.		0.00	0	0	Capital Cost
13.		0.00	0	0	Capital Cost
14.		0.00	0	0	Capital Cost
15.		0.00	0	0	Capital Cost

Record Number 1 of 1

Curent Capital Cost 28,521 $

Current Annual Cost 15,650 $

Total Capital Cost 28,521 $

Total Annual Cost 15,650 $

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Caustic Soda

AMD TREAT

Costs — AMD TREAT MAIN COST FORM

AMDTREAT

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$0**
Active Treatment			
Caustic Soda	1	0	$62,952
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds	1	1	$48,165
Roads	1	0	$10,032
Land Access	1	0	$120,110
Ditching			$0
Engineering Cost	1	0	$20,595
Ancillary Subtotal:			**$198,902**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$261,854**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$4,550
Maintenance	1	0	$4,240
Pumping			$0
Chemical Cost	1	0	$238,300
Oxidant Chem Cost			$0
Sludge Removal	1	0	$66,466
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$315,671**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L
◉ Calculate Net Acidity (Acid-Alkalinity)		
○ Enter Net Acidity manually		
Net Acidity (Hot Acidity)	667.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$1.200**

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Caustic Soda
COMMENTS:

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Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Caustic Soda

AMD TREAT

CAUSTIC SODA

AMDTREAT

☐ Opening Screen Water Parameters

Caustic Soda Name

Influent Water Parameters that Affect Caustic Soda

Calculated Acidity: 0.00 mg/L
Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm
Typical Flow: 500.00 gpm
Total Iron: 5.75 mg/L
Aluminum: 69.40 mg/L
Manganese: 5.20 mg/L

1. Gallons of Caustic per Year	655,325.63	gal/yr
2. Gallons of Caustic per Month	54,610.26	gal/mo
3. Gallons of Caustic per Day	1,795.41	gal/day
☐ 4. Titration?		
5. Caustic Titration Volume		gal caustic/gal water treated
6. Purity of Caustic Solution	99.00	purity of 20% caustic solution
7. Mixing Efficiency of Caustic Solution	90.00	%
8. Tank Cost	8000	$
9. Tank Volume	8000	gal
10. Delivery Frequency	12	times/yr
11. Valve Unit Cost	50.00	$
12. Number of Valves	8	nbr
13. Feeder Line Length	20	ft
14. Feeder Line Unit Cost	0.35	$/ft
15. Installation of System Unit Cost	35.00	$/hr
16. Installation Hours	32	hours

☑ 17. Automatic System?		
18. PID pH Proportional Control	1875	$
19. pH Probe	550	$
20. Chemical Metering Pump	3000	$
☐ 21. Water Wheel Dispenser		
22. Dispenser Cost		$

Caustic Sub-Totals

23. Number of Tanks Required	7	nbr
24. Tank Cost	56,000	$
25. Automatic System or Wheel Dispenser Cost	5,425	$
26. Cost of Valves	400	$
27. Feeder Line Cost	7	$
28. Labor Cost	1,120	$
29. Total Capital Cost	62,952	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

Printed on 03/15/2007

AMD TREAT

PONDS

AMDTREAT

Pond Name: 24 Hour retention time

Pond Design Based On:

- (•) Retention Time
  - 1. Desired Retention Time: 24.0 hours
  - [x]
  - 3. Sludge Removal Frequency: 1.00 times/year
  - [ ] 4. Titration?
    - 5. Sludge Rate: gal sludge/ gal H2O
    - 6. Percent Solids: 30.00 %
    - 7.Sludge Density: 8.35 lbs./gal
- ( ) Pond Size
  - 8. Pond Length at Top of Freeboard: ft
  - 9. Pond Width at Top of Freeboard: ft

Run : Rise

10. Slope Ratio of Pond Sides: 2.0 : 1
11. Freeboard Depth: 2.0 ft
12. Water Depth: 4.0 ft
13. Excavation Unit Cost: 4.50 $/yd3
14. Total Length of Effluent / Influent Pipe: 0.00 ft
15. Unit Cost of Pipe: 0.00 $/ft

Liner Cost

- ( ) No Liner
- (•) Clay Liner
  - 16. Clay Liner Unit Cost: 10.00 $/yd3
  - 17. Thickness of Clay Liner: 1.0 ft
- ( ) Synthetic Liner
  - 18. Synthetic Liner Unit Cost: $/yd2

[x] 19. Clearing and Grubbing?

- (•) 20. Land Multiplier: 1.50 ratio
- ( ) 21. Clear/Grub Acres: acres
- 22. Clear and Grub Unit Cost: 1250.00 $/acre

23. Revegetation Cost: 1500.00 $/acre

24. Cost of Baffles: 0 $

[ ] Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity: 0.00 mg/L

Alkalinity: 0.00 mg/L

- ( ) Calculate Net Acidity (Acid-Alkalinity)
- (•) Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 68.40 mg/L

Manganese: 3.20 mg/L

Record Number 1 of 2

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard: 353 ft
26. Width at Top of Freeboard: 180 ft
27. Freeboard Volume: 12,732 yd3
28. Water Volume: 8,218 yd3
29. Estimated Annual Sludge: 1,086 yd3/yr
30. Volume of Sludge per Removal: 1,086 yd3/ removal
31. Excavation Volume: 5.09 acre ft
32. Excavation Volume: 8,218 yd3
33. Clear and Grub Area: 2.19 acres
34. Liner Area: 72,000 yd2
35. Calculated Retention Time: 24 hours

Ponds Sub-Totals per Pond

36. Excavation Cost: 39,260 $
37. Pipe Cost: 0 $
38. Liner Cost: 5,064 $
39. Clearing and Grubbing Cost: 2,743 $
40. Revegetation Cost: 1,097 $
41. Baffle Cost: 0 $

42. Estimated Cost: 48,165 $

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.00	$/yd3
5. GeoTextile Length	0	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	0	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☐ 9. Surveying?		
10. Survey Rate		acres/day
11. Survey Unit Cost		$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre
14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	9,722	$
18. GeoTextile Cost	0	$
19. Silt Fence Cost	0	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	0	$
23. Clear and Grub Cost	258	$
24. Total Cost	10,032	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

Printed on 03/15/2007

AMD TREAT

LAND ACCESS

AMDTREAT

Land Access Name 5 acres

Buy

1. Cost per Acre	40000.00	$
2. Number of Acres	3.00	acres
3. Closing Cost	110.00	$

Lease

4. Annual Lease Cost		$

6. Buy Total Cost	120110	$
7. Lease Total Cost	1500	$
8. Selected Cost	120110	$

Capital Cost

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	121,149	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	20595	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

Printed on 03/15/2007

AMD TREAT

SAMPLING

AMDTREAT

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1,800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2,115	$

Record Number 1 of 1

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

AMD TREAT

LABOR

Labor Name: Flow monitoring / tank refill

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	4.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	4,550	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

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AMD TREAT

MAINTANENCE

Estimate Maintenance Cost

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	2,203	$
7. Total Maintenance Passive Cost	0	$
8. Total Maintenance Ancillary Cost	2,036	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	4,240	$

* Ancillary Cost does int include Cost for
Land Access and Engineering Cost

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Caustic Soda

AMD TREAT
CHEMICAL COST

AMDTREAT

Chemical Cost Name: Caustic Soda

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Chemical Cost

Calculated Acidity: 0.00 mg/L
Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm
Typical Flow: 500.00 gpm
Total Iron: 179.00 mg/L
Aluminum: 68.40 mg/L
Manganese: 39.20 mg/L

Record Number
1 of 1

○ A. Hydrated Lime ?
- ☐ 1 Titration?
- 2. Hydrated Lime Titration Amount: lbs of hydrated lime / gal of H2O
- 3. Hydrated Lime Purity: %
- 4. Mixing Efficiency of Hydrated Lime: %
- 5. Hydrated Lime Unit Cost: $/lb

○ B. Pebble Quick Lime ?
- ☐ 6. Titration?
- 7. Pebble Lime Titration Amount: lbs of Pebble Lime / gal of H2O
- 8. Pebble Lime Purity: %
- 9. Mixing Efficiency of Pebble Lime: %

◉ Delivered in Bags
- 10. Pebble Lime Bag Unit Cost: $/lb

◉ Bulk Delivery
- 11. Pebble Lime Bulk Unit Cost: $/lb

◉ C. Caustic Soda ?
- ☐ 12. Titration?
- 13. Caustic Titration Amount: gal ofcaustic / gal H2O
- 14. Caustic Purity: purity of 20% caustic solution
- 15. Mixing Efficiency of Caustic: %

○ Non-Bulk Delivery
- 16. Caustic Non-Bulk Unit Cost: $/gal

◉ Bulk Delivery
- 17. Caustic Bulk Unit Cost: 0.40 $/gal

☐ 18. Flocculents?
- 19. Flocculent Consumption: gal/hr
- 20. Flocculent UnitCost: $/gal

○ E. Anhydrous Ammonia ?
- ☐ 21. Titration?
- 22. AmmoniaTitration Amount: lbs of ammonia / gal H2O
- 23. Ammonia Purity: %
- 24. Mixing Efficiency of Ammonia: %

◉ Non-Bulk Delivery
- 25. Ammonia Non-Bulk Unit Cost: $/lb

◉ Bulk Delivery
- 26. Ammonia Bulk Unit Cost: $/lb

○ F. Soda Ash ?
- ☐ 27. Titration?
- 28 Soda Ash Titration Amount: lbs of soda ash / gal of H2O
- 29. Soda Ash Purity: %
- 30. Mixing Efficiency of Soda Ash: %
- 31 Soda Ash Unit Cost: $/lb

○ G. Known Chemical Cost ?
- 32. Known Annual Chemical Cost: $

Chemical Cost Sub-Totals			Annual Amount of Chemicals Consumed	
33. Total Hydrated Lime Cost	8215.2	$	1250238	lbs
34. Total Pebble Lime Cost	4913.3	$	966256	lbs
35. Total Caustic Soda Cost	238,300	$	595,750	gals
36. Total Anhydrous Ammonia Cost	79,156	$	527,709	lbs
37. Total Soda Ash Cost	364,889	$	2,604,919	lbs
38. Total Known Chemical Cost	0	$		
39. Total Flocculent Cost	0	$	0	gals

40. Selected Chemical:
Annual Chemical Cost: 238,300 $

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Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Caustic Soda

AMD TREAT

SLUDGE REMOVAL

AMDTREAT

☐ Opening Screen Water Parameters

Sludge Removal Name

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity 0.00 mg/L

Alkalinity 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity) 667.00 mg/L

Design Flow 1000.00 gpm

Typical Flow 500.00 gpm

Total Iron 179 mg/L

Aluminum 68 mg/L

Manganese 3 mg/L

1. Select One — Selection for Method of Removing Sludge

◉ Sludge Removal by $ per Gallon

2. Sludge Removal Unit Cost 0.05 $/gal

○ Sludge Removal by Vacuum Truck

3. Vacuum Truck Unit Cost $/hr

4. Mobilization Cost $

5. Hours to be Used hr

○ Sludge Removal by Mechanical Excavation

6. Mechanical Excavation Unit Rate $/hr

7. Mobilization Cost $

8. Hours to be Used hr

○ Sludge Removal by Lagoon Cleaner

9. Lagoon Cleaning Unit Rate $/hr

10. Mobilization Cost $

11. Hours to be Used hr

○ Actual Sludge Removal Cost

12. Actual Sludge Removal Cost $

13. Off Site Disposal Cost 0.00 $

Record Number 1 of 1

Concentrations from Main Water Quality Screen

14. Iron Concentration 179.00 mg/L

15. Manganese Concentration 3.20 mg/L

16. Aluminum Concentration 68.40 mg/L

17. Total Miscellaneous Concentration 0 mg/L

18. Percent Solids 5.00 %

19. Sludge Density 8.33 lbs/gal

☐ 20. Titration?

21. Gal. of Sludge per Gal of Water Treated gal

22. Estimated Sludge Volume 6,582 yd3/yr

Cost for Sludge Removal Types

23. Removal by $ per Gallon 66,466 $

24. Removal by Vacuum Truck 0 $

25. Removal by Mechanical Excavation 0 $

26. Removal by Lagoon Cleaner 0 $

27. Actual Sludge Removal Cost 0 $

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost 66,466 $

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMD TREAT

AMD TREAT MAIN COST FORM

Costs

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$0**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime	1	0	$120,952
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds	1	1	$45,421
Roads	1	0	$11,421
Land Access	1	0	$124,110
Ditching			$0
Engineering Cost	1	0	$36,191
Ancillary Subtotal:			**$217,143**
Other Cost (Capital Cost)			$35,095
Total Capital Cost:			**$373,190**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$4,550
Maintenance	1	0	$7,451
Pumping			$0
Chemical Cost	1	0	$48,313
Oxidant Chem Cost			$0
Sludge Removal	1	0	$66,466
Other Cost (Annual Cost)			$12,825
Land Access (Annual Cost)			$0
Total Annual Cost:			**$141,720**
Other Cost	1	0	

AMDTREAT

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L
◉ Calculate Net Acidity (Acid-Alkalinity)		
Enter Net Acidity manually		
Net Acidity (Hot Acidity)	-66.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$0.538**

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Quick Lime
COMMENTS:

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMD TREAT
PEBBLE QUICK LIME

AMDTREAT

Pebble Quick Lime Name:

☐ **Opening Screen Water Parameters**

Influent Water Parameters that Affect Pebble Quick Lime

Calculated Acidity: 0.000 mg/L
Alkalinity: 0.000 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm
Typical Flow: 500.00 gpm
Total Iron: 79.00 mg/L
Aluminum: 64.40 mg/L
Manganese: 4.120 mg/L

Record Number 1 of 1

1. Annual Pebble Quick Lime: 486.1 tons/yr
2. Pebble Quick Lime 50 Lbs Bags: 529 per day
3. Pounds per Hour of Pebble Quick Lime: 110.363279 lbs/hr
4. Refill Frequency for 1 Ton Bin: 0.755 days
5. Refill Frequency for 35 Ton Silo: 26.442 days
6. Purity of Pebble Quick Lime: 94.00 %
7. Mixing Efficency of Pebble Quick Lime: 90.00 %
☐ 8. Titration?
9. Pebble Quick Lime Titration Amount: 1.2 lbs of Pebble Lime /gal of H2O
10. Excavation Unit Cost: 4.50 $/yd3
11. Aggregate Unit Cost: 18.00 $/yd3
12. Aggregate Placement Unit Cost: 15.00 $/yd3

13. Ditching System

◉ **Default Ditching System Based on Flow**
14. Default Ditch Length: 700 ft
15. Default Ditch Bottom Width: 10 ft
16. Default Ditch Depth: 3 ft

○ **Custom Ditching System**
17. Ditch Length: 0 ft
18. Ditch Bottom Width: 0 ft
19. Ditch Depth: 0 ft
20. Slope Ratio of Ditch Sides: Run 0 : Rise 0
21. Rock Depth in Ditch: 0 ft
22. Length of Rock Lined Ditch: 0 ft

☑ **23. Clearing and Grubbing?**

◉ 24a. Land Multiplier: 1.5 ratio
○ 24b. Clear/Grub Acres: 0.2 acres
25. Clear and Grub Cost: 1250 $/acre

26. Select One Delivery System

○ 1 Ton Bin System: 0 $
◉ 35 Ton Silo System: 85000 $

☐ 27. Electric Mixer ?
28. Electric Mixer System Cost: 0 $
☐ 29. Slaker ?
30. Slaker Cost: 0 $

Pebble Quick Lime Sub-Totals

31. Clear Grub Area: 0.2 acres
32. Storage System Cost: 85,000 $
33. Electric Mixer Cost: 0 $
34. Aggregate Cost: 30,050 $
35. Ditch Excavation Cost: 5,699 $
36. Clear and Grub Cost: 301 $
37. Slaker Cost: 0 $

38. Total Cost: 120,952 $

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMD TREAT

PONDS

AMDTREAT

Pond Name: 24 Hour retention time

☐ **Opening Screen Water Parameters**

Influent Water Parameters that Affect Ponds

Calculated Acidity: 0.000 mg/L

Alkalinity: 0.000 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 367.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 68.40 mg/L

Manganese: 3.20 mg/L

Record Number 1 of 2

Pond Design Based On:

◉ Retention Time

1. Desired Retention Time: 24.0 hours

☑

3. Sludge Removal Frequency: 1.00 times/year

☐ 4. Titration?

5. Sludge Rate: gal sludge/ gal H2O

6. Percent Solids: 30.00 %

7. Sludge Density: 8.35 lbs./gal

○ Pond Size

8. Pond Length at Top of Freeboard: ft

9. Pond Width at Top of Freeboard: ft

	Run	Rise
10. Slope Ratio of Pond Sides	2.0	:

11. Freeboard Depth: 2.0 ft

12. Water Depth: 4.0 ft

13. Excavation Unit Cost: 4.50 $/yd3

14. Total Length of Effluent / Influent Pipe: 0.00 ft

15. Unit Cost of Pipe: 0.00 $/ft

Liner Cost

○ No Liner

◉ Clay Liner

16. Clay Liner Unit Cost: 10.00 $/yd3

17. Thickness of Clay Liner: 1.0 ft

○ Synthetic Liner

18. Synthetic Liner Unit Cost: $/yd2

☐ 19. Clearing and Grubbing?

20. Land Multiplier: ratio

21. Clear/Grub Acres: acres

22. Clear and Grub Unit Cost: $/acre

23. Revegetation Cost: 1500.00 $/acre

24. Cost of Baffles: 0 $

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard	353	ft
26. Width at Top of Freeboard	180	ft
27. Freeboard Volume	1,278.2	yd3
28. Water Volume	3,216	yd3
29. Estimated Annual Sludge	1,088	yd3/yr
30. Volume of Sludge per Removal	1,088	yd3/ removal
31. Excavation Volume	5.09	acre ft
32. Excavation Volume	8,216	yd3
33. Clear and Grub Area	2.19	acres
34. Liner Area	2,000	yd2
35. Calculated Retention Time	24	hours

Ponds Sub-Totals per Pond

36. Excavation Cost	39,260	$
37. Pipe Cost	0	$
38. Liner Cost	3,064	$
39. Clearing and Grubbing Cost	0	$
40. Revegetation Cost	1,097	$
41. Baffle Cost	0	$

42. Estimated Cost: 45,421 $

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	40.00	$/yd3
5. GeoTextile Length	0	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	0	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☐ 9. Surveying?		
10. Survey Rate		acres/day
11. Survey Unit Cost		$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre

Record Number 1 of 1

14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	11,111	$
18. GeoTextile Cost	0	$
19. Silt Fence Cost	0	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	0	$
23. Clear and Grub Cost	258	$
24. Total Cost	11,421	$

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

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AMD TREAT

LAND ACCESS

AMDTREAT

Land Access Name 3 acres

Buy

1. Cost per Acre	40000.00	$
2. Number of Acres	3.10	acres
3. Closing Cost	110.00	$

Lease

4. Annual Lease Cost		$

6. Buy Total Cost	124110	$
7. Lease Total Cost	100	$
8. Selected Cost	124110	$ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	212,889	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	36,191	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMD TREAT

SAMPLING

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2115	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMD TREAT

LABOR

Labor Name: Flow monitoring / silo refill

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	4.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	1,550	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

Printed on 03/15/2007

AMD TREAT

MAINTANENCE

Estimate Maintenance Cost

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	4,233	$
7. Total Maintenance Passive Cost	0	$
8. Total Maintenance Ancillary Cost	1,989	$
9. Total Maintenance Other Capital Cost	1,228	$
10. Total Maintenance Cost	7,451	$

* Ancillary Cost does int include Cost for
Land Access and Engineering Cost

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Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

AMD TREAT
CHEMICAL COST

AMDTREAT

Chemical Cost Name:

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Chemical Cost

Calculated Acidity: 0.00 mg/L

Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1050.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 79.00 mg/L

Aluminum: 58.40 mg/L

Manganese: 3.20 mg/L

Record Number

1 of 1

○ A. Hydrated Lime ?

☒ 1 Titration?

2. Hydrated Lime Titration Amount: lbs of hydrated lime / gal of H2O

3. Hydrated Lime Purity: %

4. Mixing Efficiency of Hydrated Lime: %

5. Hydrated Lime Unit Cost: $/lb

◉ B. Pebble Quick Lime ?

☐ 6. Titration?

7. Pebble Lime Titration Amount: lbs of Pebble Lime / gal of H2O

8. Pebble Lime Purity: 94.00 %

9. Mixing Efficiency of Pebble Lime: 90.00 %

○ Delivered in Bags

10. Pebble Lime Bag Unit Cost: $/lb

◉ Bulk Delivery

11. Pebble Lime Bulk Unit Cost: 0.0500 $/lb

○ C. Caustic Soda ?

☒ 12. Titration?

13. Caustic Titration Amount: gal ofcaustic / gal H2O

14. Caustic Purity: 99.00 purity of 20% caustic solution

15. Mixing Efficiency of Caustic: 99.00 %

◉ Non-Bulk Delivery

16. Caustic Non-Bulk Unit Cost: $/gal

◉ Bulk Delivery

17. Caustic Bulk Unit Cost: $/gal

☐ 18. Flocculents?

19. Flocculent Consumption: gal/hr

20. Flocculent UnitCost: $/gal

○ E. Anhydrous Ammonia ?

☒ 21. Titration?

22. AmmoniaTitration Amount: lbs of ammonia / gal H2O

23. Ammonia Purity: %

24. Mixing Efficiency of Ammonia: %

◉ Non-Bulk Delivery

25. Ammonia Non-Bulk Unit Cost: $/lb

◉ Bulk Delivery

26. Ammonia Bulk Unit Cost: $/lb

○ F. Soda Ash ?

☒ 27. Titration?

28 Soda Ash Titration Amount: lbs of soda ash / gal of H2O

29. Soda Ash Purity: %

30. Mixing Efficiency of Soda Ash: %

31 Soda Ash Unit Cost: $/lb

○ G. Known Chemical Cost ?

32. Known Annual Chemical Cost: $

Chemical Cost Sub-Totals			Annual Amount of Chemicals Consumed	
33. Total Hydrated Lime Cost	0	$	0	lbs
34. Total Pebble Lime Cost	48,313	$	966,256	lbs
35. Total Caustic Soda Cost	297,875	$	595,750	gals
36. Total Anhydrous Ammonia Cost	0	$	0	lbs
37. Total Soda Ash Cost	0	$	0	lbs
38. Total Known Chemical Cost	0	$		
39. Total Flocculent Cost	0	$	0	gals

40. Selected Chemical:

Annual Chemical Cost: 48,313 $

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

AMD TREAT

SLUDGE REMOVAL

AMDTREAT

☐ Opening Screen Water Parameters

Sludge Removal Name

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity 0.00 mg/L

Alkalinity 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity) 667.00 mg/L

Design Flow 1000.00 gpm

Typical Flow 500.00 gpm

Total Iron 179 mg/L

Aluminum 68 mg/L

Manganese 3 mg/L

1. Select One — Selection for Method of Removing Sludge

◉ Sludge Removal by $ per Gallon

2. Sludge Removal Unit Cost 0.05 $/gal

○ Sludge Removal by Vacuum Truck

3. Vacuum Truck Unit Cost $/hr

4. Mobilization Cost $

5. Hours to be Used hr

○ Sludge Removal by Mechanical Excavation

6. Mechanical Excavation Unit Rate $/hr

7. Mobilization Cost $

8. Hours to be Used hr

○ Sludge Removal by Lagoon Cleaner

9. Lagoon Cleaning Unit Rate $/hr

10. Mobilization Cost $

11. Hours to be Used hr

○ Actual Sludge Removal Cost

12. Actual Sludge Removal Cost $

13. Off Site Disposal Cost 0.00 $

Record Number 1 of 1

Concentrations from Main Water Quality Screen

14. Iron Concentration 179.00 mg/L

15. Manganese Concentration 3.20 mg/L

16. Aluminum Concentration 68.40 mg/L

17. Total Miscellaneous Concentration 0 mg/L

18. Percent Solids 5.00 %

19. Sludge Density 8.33 lbs/gal

☐ 20. Titration?

21. Gal. of Sludge per Gal of Water Treated gal

22. Estimated Sludge Volume 6,582 yd3/yr

Cost for Sludge Removal Types

23. Removal by $ per Gallon 66,466 $

24. Removal by Vacuum Truck 0 $

25. Removal by Mechanical Excavation 0 $

26. Removal by Lagoon Cleaner 0 $

27. Actual Sludge Removal Cost 0 $

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost 66,466 $

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Quick Lime

AMDTREAT

AMD TREAT

OTHER COST

Oher Cost Name: Miscellaneous

	A. Description of Item	B. Unit Cost Per Item	C. Quantity	D. Total Item Cost	E. Capital Cost / Annual Cost
1.	Misc. Appurtenances	4,000.00	1	4,000	Capital Cost
2.	Contingency	31,095.00	1	31,095	Capital Cost
3.	Contingency	12,825.00	1	12,825	Annual Cost
4.		0.00	0	0	Capital Cost
5.		0.00	0	0	Capital Cost
6.		0.00	0	0	Capital Cost
7.		0.00	0	0	Capital Cost
8.		0.00	0	0	Capital Cost
9.		0.00	0	0	Capital Cost
10.		0.00	0	0	Capital Cost
11.		0.00	0	0	Capital Cost
12.		0.00	0	0	Capital Cost
13.		0.00	0	0	Capital Cost
14.		0.00	0	0	Capital Cost
15.		0.00	0	0	Capital Cost

Record Number 1 of 1

Curent Capital Cost 35,095 $

Current Annual Cost 12,825 $

Total Capital Cost 35,095 $

Total Annual Cost 12,825 $

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Hydrated Lime

AMD TREAT

AMD TREAT MAIN COST FORM

Costs

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$0**
Active Treatment			
Caustic Soda			$0
Hydrated Lime	1	0	$305,195
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds	1	1	$48,165
Roads	1	0	$10,866
Land Access	1	0	$120,110
Ditching			$0
Engineering Cost	1	0	$70,997
Ancillary Subtotal:			**$250,138**
Other Cost (Capital Cost)			$53,400
Total Capital Cost:			**$608,733**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$4,550
Maintenance	1	0	$14,617
Pumping			$0
Chemical Cost	1	0	$62,512
Oxidant Chem Cost			$0
Sludge Removal	1	0	$66,466
Other Cost (Annual Cost)			$14,725
Land Access (Annual Cost)			$0
Total Annual Cost:			**$165,500**
Other Cost	1	0	

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L

◉ Calculate Net Acidity (Acid-Alkalinity)
Enter Net Acidity manually

Net Acidity (Hot Acidity)	667.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$0.629**

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Hydrated Lime
COMMENTS:

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

AMD TREAT

HYDRATED LIME

AMDTREAT

Hydrated Lime Name

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Hydrated Lime

Calculated Acidity: 667.0000 mg/L

Alkalinity: 0.0000 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 178.00 mg/L

Aluminum: 89.40 mg/L

Manganese: 41.20 mg/L

Record Number 1 of 1

1. Annual Hydrated Lime: 1,250,238.4 lbs/yr
2. Annual Hydrated Lime: 625.1 tons/yr
3. Daily Hydrated Lime: 3,425.3 lbs/day
4. Pounds per Hour of Hydrated Lime: 142,721.282 lbs/hr

5. Purity of Hydrated Lime: 96 %

6 Mixing Efficency of Hydrated Lime: 90 %

☐ 7. Titration?

8. Titration Amount: lbs of hydrated lime /gal of h2o

9. Mechanical Aeration System: 0.00 $

Silo Storage System		Quantity	Price		Refill Freq. Days
10.	☐ 20 Ton			$	14
11.	☐ 35 Ton			$	20
12.	☑ 50 Ton	1	32000	$	29
13.	☐ 60 Ton			$	35

14. Clarifier

○ Cost of Clarifier $

○ Cost Est based on Clarifier Diameter

15. Diameter ft

16. Cost Mulipler

◉ Cost Est based on Flow

17. Design Flow: 1000.00 gpm

18. Estimated Diameter: 55.27 ft

19. Cost Mulipler: 4000.0

20. Vibrator Air Sweep: 0

21. Pneumatic Air Sweep: 0

22. Blower Blocks: 0

23. Mixing Tank (Assumes a Two Cell Mixing Tank)

○ Mixing Tank Cost $

○ Cost Est based on Volume of Mixing Tank

24. Tank Volume gal

◉ Cost Est. based on Desired Retention Time

25. Mixing Tank Volume: 5,000.3 gal

26. Design Flow: 1000.00 gpm

27. Retention Time: 5.0 min

Specifications of Concrete Tank

28. Tank Wall Thickness: 1.00 ft

29. Tank Bottom Thickness: 1.00 ft

30. Tank Freeboard: 2.00 ft

31. Construction Labor Cost: 6000 $

32. Concrete Unit Cost: 200 $/yd3

33. Excavation Unit Cost: 100 $/yd3

34. Number of Motorized Mixers: 2 qty

35. Unit Cost of Motorized Mixer: 1000 $

36. Number of Slide Gates: 5 qty

37. Unit Cost of Slide Gate: 750 $

38. Cost of Electric Panel: 2000 $

39. Control Building

○ Cost of Control Building $

◉ Cost Est. Based on Building Area

40. Building Length: 15 ft

41. Building Width: 15 ft.

42. Building Unit Cost: 10.0 $/ft2

☐ 43. Polymer Feed System $

☑ 44. Clearing and Grubbing?

45. Clear and Grub Area: 2.00 acres

46. Clear and Grub Costs: 1250.00 $/acre

Hydrated Lime Sizing Summaries

47. Tank Length: 87 ft

48. Tank Width: 87 ft

49. Tank Depth: 11 ft

50. Excavation Volume for Mixing Tank: 49.5 yd3

51. Volume of Concrete for Mixing Tank: 178 ft3

Hydrated Lime Cost Summaries

52. Silo(s) Cost: 32000 $

53. Clarifier Cost: 221.16 $

54. Mixing Tank Cost: 0 $

55. Construction Labor (Mixing Tank): 6,000 $

56. Excavation Cost (Mixing Tank): 4951 $

57. Concrete Cost (MixingTank): 34628 $

58. Motorized Mixer & Aeration Cost: 2000 $

59. Sweep and Blower Cost: 0 $

60. Slide Gate Cost: 3750 $

61. Electric Control Panel Cost: 2000 $

62. Building Cost: 2,250 $

63. Polymer Feed System: 0 $

64. Clear and Grub Cost: 2500 $

65. Total Cost: 305,195 $

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

Printed on 03/15/2007

AMD TREAT

PONDS

AMDTREAT

Pond Name: 24 Hour retention time

Pond Design Based On:

- (•) Retention Time
  - 1. Desired Retention Time: 24.0 hours
- [x]
  - 3. Sludge Removal Frequency: 1.00 times/year
  - [ ] 4. Titration?
    - 5. Sludge Rate: gal sludge/ gal H2O
    - 6. Percent Solids: 30.00 %
    - 7. Sludge Density: 8.35 lbs./gal
- ( ) Pond Size
  - 8. Pond Length at Top of Freeboard: ft
  - 9. Pond Width at Top of Freeboard: ft

	Run	Rise
10. Slope Ratio of Pond Sides	2.0	: 1

- 11. Freeboard Depth: 2.0 ft
- 12. Water Depth: 4.0 ft
- 13. Excavation Unit Cost: 4.50 $/yd3
- 14. Total Length of Effluent / Influent Pipe: 0.00 ft
- 15. Unit Cost of Pipe: 0.00 $/ft

Liner Cost

- ( ) No Liner
- (•) Clay Liner
  - 16. Clay Liner Unit Cost: 10.00 $/yd3
  - 17. Thickness of Clay Liner: 1.0 ft
- ( ) Synthetic Liner
  - 18. Synthetic Liner Unit Cost: $/yd2

[x] 19. Clearing and Grubbing?

- (•) 20. Land Multiplier: 1.50 ratio
- ( ) 21. Clear/Grub Acres: acres
- 22. Clear and Grub Unit Cost: 1250.00 $/acre

- 23. Revegetation Cost: 1500.00 $/acre
- 24. Cost of Baffles: 0 $

[ ] **Opening Screen Water Parameters**

Influent Water Parameters that Affect Ponds

Calculated Acidity: 0.00 mg/L

Alkalinity: 0.00 mg/L

( ) Calculate Net Acidity (Acid-Alkalinity)

(•) Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 68.40 mg/L

Manganese: 3.20 mg/L

Record Number
1 of 2

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard	353	ft
26. Width at Top of Freeboard	180	ft
27. Freeboard Volume	2,762	yd3
28. Water Volume	5,218	yd3
29. Estimated Annual Sludge	1,088	yd3/yr
30. Volume of Sludge per Removal	1088	yd3/ removal
31. Excavation Volume	5.09	acre ft
32. Excavation Volume	8,218	yd3
33. Clear and Grub Area	2.49	acres
34. Liner Area	72000	yd2
35. Calculated Retention Time	24	hours

Ponds Sub-Totals per Pond

36. Excavation Cost	39,260	$
37. Pipe Cost	0	$
38. Liner Cost	5,064	$
39. Clearing and Grubbing Cost	2,743	$
40. Revegetation Cost	1,097	$
41. Baffle Cost	0	$

42. Estimated Cost: 48,165 $

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	38.00	$/yd3
5. GeoTextile Length	0	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	0	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☐ 9. Surveying?		
10. Survey Rate		acres/day
11. Survey Unit Cost		$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre

14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	10,556	$
18. GeoTextile Cost	0	$
19. Silt Fence Cost	0	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	0	$
23. Clear and Grub Cost	258	$
24. Total Cost	10,866	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

Printed on 03/15/2007

AMD TREAT

LAND ACCESS

Land Access Name 5 acres

Buy

1. Cost per Acre 40000.00 $
2. Number of Acres 3.00 acres
3. Closing Cost 110.00 $

Lease

4. Annual Lease Cost $

6. Buy Total Cost 120110 $

7. Lease Total Cost 1.00 $

8. Selected Cost 120110 $ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

Printed on 03/15/2007

AMD TREAT

ENGINEERING COST

1. Capital Cost *	417,627	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	70,997	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

Printed on 03/15/2007

AMD TREAT

SAMPLING

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost		$

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1,800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2,115	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

Printed on 03/15/2007

AMD TREAT

LABOR

Labor Name Flow monitoring / tank refill

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	4.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	1,550	$

Record Number 1 of 1

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

AMD TREAT

MAINTANENCE

◉ **Estimate Maintenance Cost**

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

○ **Enter Established Annual Maintenance Cost**

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	10,682	$
7. Total Maintenance Passive Cost	0	$
8. Total Maintenance Ancillary Cost	2,066	$
9. Total Maintenance Other Capital Cost	1,369	$
10. Total Maintenance Cost	14,617	$

* Ancillary Cost does int include Cost for Land Access and Engineering Cost

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Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Hydrated Lime

AMD TREAT
CHEMICAL COST

AMDTREAT

Chemical Cost Name: Hydrated Lime

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Chemical Cost

Calculated Acidity: 0.00 mg/L
Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1,000.00 gpm
Typical Flow: 500.00 gpm
Total Iron: 73.00 mg/L
Aluminum: 68.40 mg/L
Manganese: 53.60 mg/L

Record Number
1 of 1

◉ A. Hydrated Lime ?
☐ 1 Titration?
2. Hydrated Lime Titration Amount: [redacted] lbs of hydrated lime / gal of H2O
3. Hydrated Lime Purity: 96.00 %
4. Mixing Efficiency of Hydrated Lime: 90.00 %
5. Hydrated Lime Unit Cost: 0.0500 $/lb

○ B. Pebble Quick Lime ?
☐ 6. Titration?
7. Pebble Lime Titration Amount: [redacted] lbs of Pebble Lime / gal of H2O
8. Pebble Lime Purity: [redacted] %
9. Mixing Efficiency of Pebble Lime: [redacted] %

◍ Delivered in Bags
10. Pebble Lime Bag Unit Cost: [redacted] $/lb
◍ Bulk Delivery
11. Pebble Lime Bulk Unit Cost: [redacted] $/lb

○ C. Caustic Soda ?
☐ 12. Titration?
13. Caustic Titration Amount: [redacted] gal ofcaustic / gal H2O
14. Caustic Purity: [redacted] purity of 20% caustic solution
15. Mixing Efficiency of Caustic: [redacted] %

◍ Non-Bulk Delivery
16. Caustic Non-Bulk Unit Cost: [redacted] $/gal
◍ Bulk Delivery
17. Caustic Bulk Unit Cost: [redacted] $/gal

☐ 18. Flocculents?
19. Flocculent Consumption: [redacted] gal/hr
20. Flocculent UnitCost: [redacted] $/gal

○ E. Anhydrous Ammonia ?
☐ 21. Titration?
22. AmmoniaTitration Amount: [redacted] lbs of ammonia / gal H2O
23. Ammonia Purity: [redacted] %
24. Mixing Efficiency of Ammonia: [redacted] %

◍ Non-Bulk Delivery
25. Ammonia Non-Bulk Unit Cost: [redacted] $/lb
◍ Bulk Delivery
26. Ammonia Bulk Unit Cost: [redacted] $/lb

○ F. Soda Ash ?
☐ 27. Titration?
28 Soda Ash Titration Amount: [redacted] lbs of soda ash / gal of H2O
29. Soda Ash Purity: [redacted] %
30. Mixing Efficiency of Soda Ash: [redacted] %
31 Soda Ash Unit Cost: [redacted] $/lb

○ G. Known Chemical Cost ?
32. Known Annual Chemical Cost: [redacted] $

Chemical Cost Sub-Totals			Annual Amount of Chemicals Consumed	
33. Total Hydrated Lime Cost	62,512	$	1,286,288	lbs
34. Total Pebble Lime Cost	48,313	$	966,266	lbs
35. Total Caustic Soda Cost	238,300	$	596,760	gals
36. Total Anhydrous Ammonia Cost	79,156	$	527,709	lbs
37. Total Soda Ash Cost	664,689	$	2,604,919	lbs
38. Total Known Chemical Cost	0	$		
39. Total Flocculent Cost	0	$	0	gals

40. Selected Chemical:
Annual Chemical Cost: 62,512 $

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Hydrated Lime

AMD TREAT

SLUDGE REMOVAL

AMDTREAT

☐ Opening Screen Water Parameters

Sludge Removal Name

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity: 270.00 mg/L
Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 267.00 mg/L

Design Flow: 1,000.00 gpm
Typical Flow: 1,000.00 gpm
Total Iron: 179 mg/L
Aluminum: 68 mg/L
Manganese: 3 mg/L

1. Select One — Selection for Method of Removing Sludge

◉ Sludge Removal by $ per Gallon
2. Sludge Removal Unit Cost: 0.05 $/gal

○ Sludge Removal by Vacuum Truck
3. Vacuum Truck Unit Cost: $/hr
4. Mobilization Cost: $
5. Hours to be Used: hr

○ Sludge Removal by Mechanical Excavation
6. Mechanical Excavation Unit Rate: $/hr
7. Mobilization Cost: $
8. Hours to be Used: hr

○ Sludge Removal by Lagoon Cleaner
9. Lagoon Cleaning Unit Rate: $/hr
10. Mobilization Cost: $
11. Hours to be Used: hr

○ Actual Sludge Removal Cost
12. Actual Sludge Removal Cost: $

13. Off Site Disposal Cost: 0.00 $

Record Number 1 of 1

Concentrations from Main Water Quality Screen

14. Iron Concentration: 179.00 mg/L
15. Manganese Concentration: 3.20 mg/L
16. Aluminum Concentration: 68.40 mg/L

17. Total Miscellaneous Concentration: 0 mg/L
18. Percent Solids: 5.00 %
19. Sludge Density: 8.33 lbs/gal
☐ 20. Titration?
21. Gal. of Sludge per Gal of Water Treated: gal

22. Estimated Sludge Volume: 6,582 yd3/yr

Cost for Sludge Removal Types

23. Removal by $ per Gallon: 66,466 $
24. Removal by Vacuum Truck: 0 $
25. Removal by Mechanical Excavation: 0 $
26. Removal by Lagoon Cleaner: 0 $
27. Actual Sludge Removal Cost: 0 $

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost: 66,466 $

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Hydrated Lime

AMDTREAT

AMD TREAT

OTHER COST

Oher Cost Name: Miscellaneous

	A. Description of Item	B. Unit Cost Per Item	C. Quantity	D. Total Item Cost	E. Capital Cost / Annual Cost
1.	Misc. Appurtenances	4,000.00	1	4,000	Capital Cost
2.	Contingency	49,400.00	1	49,400	Capital Cost
3.	Contingency	14,725.00	1	14,725	Annual Cost
4.		0.00	0	0	Capital Cost
5.		0.00	0	0	Capital Cost
6.		0.00	0	0	Capital Cost
7.		0.00	0	0	Capital Cost
8.		0.00	0	0	Capital Cost
9.		0.00	0	0	Capital Cost
10.		0.00	0	0	Capital Cost
11.		0.00	0	0	Capital Cost
12.		0.00	0	0	Capital Cost
13.		0.00	0	0	Capital Cost
14.		0.00	0	0	Capital Cost
15.		0.00	0	0	Capital Cost

Record Number
1 of 1

Curent Capital Cost 53,400 $
Current Annual Cost 14,725 $

Total Capital Cost 53,400 $
Total Annual Cost 14,725 $

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Aerobic Wetland

AMD TREAT

Costs — AMD TREAT MAIN COST FORM

AMDTREAT

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands	1	0	$15,343
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$15,343**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds			$0
Roads	1	0	$10,765
Land Access	1	0	$40,110
Ditching			$0
Engineering Cost	1	0	$4,439
Ancillary Subtotal:			**$55,314**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$70,657**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$1,820
Maintenance	1	0	$914
Pumping			$0
Chemical Cost			$0
Oxidant Chem Cost			$0
Sludge Removal			$0
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$4,849**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L

(•) Calculate Net Acidity (Acid-Alkalinity)
( ) Enter Net Acidity manually

Net Acidity (Hot Acidity)	667.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$0.018**

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Aerobic Wetland

COMMENTS:

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Aerobic Wetland

AMD TREAT

AEROBIC WETLANDS

AMDTREAT

Aerobic Wetlands Name

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Aerobic Wetlands

Calculated Acidity: 667.00 mg/L
Alkalinity: 0.0000 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm
Typical Flow: 1000.00 gpm
Total Iron: 179.00 mg/L
Aluminum: 69.40 mg/L
Manganese: 3.20 mg/L
pH: 3.79 su

SIZING METHODS Select One

○ Aerobic Wetland Based on Metal Removal Rates
◉ Aerobic Wetland Based on Dimensions
○ Aerobic Wetland Based on Iron Oxidation Kinetics

1. Iron Removal Rate: g/m2/day
2. Mn Removal Rate: g/m2/day
3. Top Length at Freeboard: 200 ft
4. Top Width at Freeboard: 50 ft
5. Rate Constant: moles/sec
6. Effluent Fe Concentration: mg/l
7. Dissolved Oxygen: mg/l
8. H2O Temperature: °C

	Length	Width
9. Length to Width Ratio		

	Run of Slope	Rise of Slope
10. Slope of Wetland Sides	2.0	1.000

11. Freeboard Depth: 1.50 ft
12. Free Standing Water Depth: 0.50 ft
13. Organic Matter Depth: 1.00 ft
14. Organic Matter Unit Cost: 19.00 $/yd3
15. Organic Matter Spreading Unit Cost: 3.50 $/yd3
16. Excavation Unit Cost: 11.50 $/yd3
17. Wetland Planting Unit Cost: 3600 $/acre

Liner Cost

○ No Liner
◉ Clay Liner
18. Clay Liner Unit Cost: 10.00 $/yd3
19. Thickness of Clay Liner: 0.50 ft
○ Synthetic Liner
20. Synthetic Liner Unit Cost: $/yd2

☑ 21. Clearing and Grubbing?
◉ 22. Land Multiplier: 1.5 ratio
○ 23. Clear/Grub Acres: acres
24. Clear and Grub Unit Cost: 1250 $/acre

Aerobic Wetland Sizing Summaries

25. Length at Top of Freeboard	200.00 ft
26. Width at Top of Freeboard	50.00 ft
27. Freeboard Volume	514 yd3
28. Water Surface Area	9,536 ft2
29. Water Volume	153 yd3
30. Organic Matter Volume	284 yd3
31. Excavation Volume	435 yd3
32. Clear and Grub Area	0.3 acres
33. Liner Area	13,374 ft2
34. Retention Time	0 hrs

Aerobic Cost Summaries

35. Organic Matter Cost	5,384 $
36. Excavation Cost	5,005 $
37. Liner Cost	2,745 $
38. Clear and Grub Cost	430 $
39. Wetland Planting Cost	826 $
40. Total Cost	14,349 $

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Aerobic Wetland

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AMD TREAT

ROADS

AMDTREAT

Road Name: 500 feet of Road

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.00	$/yd3
5. GeoTextile Length	250	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	200	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☑ 9. Surveying?		
10. Survey Rate	1.0	acres/day
11. Survey Unit Cost	650	$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre
14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	9,722	$
18. GeoTextile Cost	208	$
19. Silt Fence Cost	200	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	325	$
23. Clear and Grub Cost	258	$
24. Total Cost	10,765	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Aerobic Wetland

Printed on 03/15/2007

AMDTREAT

AMD TREAT

LAND ACCESS

Land Access Name

Buy

1. Cost per Acre	40000.00	$
2. Number of Acres	1.00	acres
3. Closing Cost	110.00	$

Lease

4. Annual Lease Cost		$

6. Buy Total Cost	40110	$
7. Lease Total Cost	1.00	$
8. Selected Cost	40110	$ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Aerobic Wetland

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	26,109	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	4439	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Aerobic Wetland

Printed on 03/15/2007

AMD TREAT

SAMPLING

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2115	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Aerobic Wetland

Printed on 03/15/2007

AMDTREAT

AMD TREAT

LABOR

Labor Name

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	1.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	1,820	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Aerobic Wetland

Printed on 03/15/2007

AMD TREAT

MAINTANENCE

◉ **Estimate Maintenance Cost**

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

○ **Enter Established Annual Maintenance Cost**

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	0	$
7. Total Maintenance Passive Cost	537	$
8. Total Maintenance Ancillary Cost	376	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	913	$

* Ancillary Cost does int include Cost for
Land Access and Engineering Cost

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Anaerobic Wetla

AMD TREAT

AMD TREAT MAIN COST FORM

AMDTREAT

Costs

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands	1	0	$5,182,105
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$5,182,105**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			$0
Ancillary Cost			
Ponds			$0
Roads	1	0	$10,765
Land Access	1	0	$3,400,110
Ditching			$0
Engineering Cost	1	0	$882,788
Ancillary Subtotal:			**$4,293,663**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$9,475,768**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$1,820
Maintenance	1	0	$181,750
Pumping			$0
Chemical Cost			$0
Oxidant Chem Cost			$0
Sludge Removal	1	0	$66,466
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$252,151**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L

(•) Calculate Net Acidity (Acid-Alkalinity)
( ) Enter Net Acidity manually

Net Acidity (Hot Acidity)	567.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated $0.958

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Anaerobic Wetla

COMMENTS:

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Anaerobic Wetla

AMD TREAT

ANAEROBIC WETLANDS

AMDTREAT

Anaerobic Wetlands Name

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect Anaerobic Wetlands

Calculated Acidity: 667.0000 mg/L

Alkalinity: 0.0000 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 1500.000 gpm

Total Iron: 179.00 mg/L

Aluminum: 88.40 mg/L

Manganese: 3.20 mg/L

SIZING METHODS Select One

◉ Anaerobic Wetland Based on Metal Removal Rates

○ Anaerobic Wetland Based on Dimensions

1. Iron Removal Rate: 5.0 g/m2/day
2. Mn Removal Rate: 0.5 g/m2/day
3. Top Length at Freeboard: ft
4. Top Width at Freeboard: ft

	Length		Width
5. Length to Width Ratio	3.00	:	1.00
	Run of Slope		Rise of Slope
6. Slope of Wetland Sides	2.0	:	1.00
7. Freeboard Depth	3.00	ft	
8. Free Standing Water Depth	0.50	ft	
9. Organic Matter Thickness	1.00	ft	
10. Organic Matter Unit Cost	19.00	$/yd3	
11. Organic Matter Spreading Cost	3.50	$/yd3	
12. Limestone Depth	1.00	ft	
13. Density of Loose Limestone	96	lbs/ft3	
14. Limestone Unit Cost	12.00	$/ton	
15. Excavation Unit Cost	4.50	$/yd3	
16. Wetland Planting Unit Cost	3600	$/acre	

☑ 17. Clearing and Grubbing?

◉ 18a. Land Multiplier: 1.5 ratio

○ 18b. Clear/Grub Acres: acres

19. Clear and Grub Unit Cost: 1250 $/acre

Liner Cost

○ No Liner

◉ Clay Liner

20. Clay Liner Unit Cost: 10.00 $/yd3

21. Thickness of Clay Liner: 0.50 ft

○ Synthetic Liner

22. Synthetic Liner Unit Cost: $/yd2

Anaerobic Wetland Sizing Summaries

23. Length at Top of Freeboard	2725.32	ft
24. Width at Top of Freeboard	908.44	ft
25. Freeboard Volume	272.67	yd3
26. Water Surface Area	2132.332	ft2
27. Water Volume	44.976	yd3
28. Organic Matter Volume	89.952	yd3
29. Limestone Volume	85.019	yd3
30. Tons of Limestone	114.388	tons
31. Excavation Volume	23.747	yd3
32. Clear and Grub Area	85	acres
33. Liner Area	2514.275	ft2

Anaerobic Cost Summaries

34. Organic Matter Cost	2,014.626	$
35. Limestone Cost	384.427	$
36. Excavation Cost	1,005.966	$
37. Liner Cost	465.605	$
38. Clear and Grub Cost	106.666	$
39. Wetland Planting Cost	204.611	$
40. Total Cost	5182.795	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Anaerobic Wetla

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name 500 feet of Road

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.00	$/yd3
5. GeoTextile Length	250	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	200	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☑ 9. Surveying?		
10. Survey Rate	1.0	acres/day
11. Survey Unit Cost	650	$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre
14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	9722	$
18. GeoTextile Cost	208	$
19. Silt Fence Cost	200	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	325	$
23. Clear and Grub Cost	258	$
24. Total Cost	10765	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Anaerobic Wetla

Printed on 03/15/2007

AMD TREAT

LAND ACCESS

AMDTREAT

Land Access Name

Buy

1. Cost per Acre 40000.00 $

2. Number of Acres 85.00 acres

3. Closing Cost 110.00 $

Lease

4. Annual Lease Cost $

6. Buy Total Cost 3400110 $

7. Lease Total Cost 1.00 $

8. Selected Cost 3400110 $ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Anaerobic Wetla

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	5,192,870	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	882,788	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Anaerobic Wetla

Printed on 03/15/2007

AMD TREAT

SAMPLING

AMDTREAT

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1,800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2,115	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Anaerobic Wetla

Printed on 03/15/2007

AMD TREAT

LABOR

Labor Name

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	1.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	1820	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Anaerobic Wetla

Printed on 03/15/2007

AMD TREAT

MAINTANENCE

Estimate Maintenance Cost

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	0	$
7. Total Maintenance Passive Cost	131,374	$
8. Total Maintenance Ancillary Cost	376	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	131,750	$

* Ancillary Cost does int include Cost for
Land Access and Engineering Cost

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Anaerobic Wetla

AMD TREAT

SLUDGE REMOVAL

AMDTREAT

☐ Opening Screen Water Parameters

Sludge Removal Name

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity: 0.00 mg/L
Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity): 467.00 mg/L

Design Flow: 1,000.00 gpm
Typical Flow: 500.00 gpm
Total Iron: 179 mg/L
Aluminum: 68 mg/L
Manganese: 3 mg/L

1. Select One — Selection for Method of Removing Sludge

◉ Sludge Removal by $ per Gallon
2. Sludge Removal Unit Cost: 0.05 $/gal

○ Sludge Removal by Vacuum Truck
3. Vacuum Truck Unit Cost: $/hr
4. Mobilization Cost: $
5. Hours to be Used: hr

○ Sludge Removal by Mechanical Excavation
6. Mechanical Excavation Unit Rate: $/hr
7. Mobilization Cost: $
8. Hours to be Used: hr

○ Sludge Removal by Lagoon Cleaner
9. Lagoon Cleaning Unit Rate: $/hr
10. Mobilization Cost: $
11. Hours to be Used: hr

○ Actual Sludge Removal Cost
12. Actual Sludge Removal Cost: $

13. Off Site Disposal Cost: 0.00 $

Record Number 1 of 1

Concentrations from Main Water Quality Screen

14. Iron Concentration: 179.00 mg/L
15. Manganese Concentration: 3.20 mg/L
16. Aluminum Concentration: 68.40 mg/L

17. Total Miscellaneous Concentration: 0 mg/L
18. Percent Solids: 5.00 %
19. Sludge Density: 8.33 lbs/gal
☐ 20. Titration?
21. Gal. of Sludge per Gal of Water Treated: gal

22. Estimated Sludge Volume: 6,583 yd3/yr

Cost for Sludge Removal Types

23. Removal by $ per Gallon: 66,466 $
24. Removal by Vacuum Truck: 0 $
25. Removal by Mechanical Excavation: 0 $
26. Removal by Lagoon Cleaner: 0 $
27. Actual Sludge Removal Cost: 0 $

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost: 66,466 $

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Oxic Limestone

AMD TREAT

AMD TREAT MAIN COST FORM

AMDTREAT

Costs

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel	1	0	$6,841
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$6,841**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds			$0
Roads	1	0	$10,032
Land Access	1	0	$40,110
Ditching			$0
Engineering Cost	1	0	$2,868
Ancillary Subtotal:			**$53,010**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$59,851**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$2,730
Maintenance	1	0	$591
Pumping			$0
Chemical Cost			$0
Oxidant Chem Cost			$0
Sludge Removal			$0
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$5,436**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L
(•) Calculate Net Acidity (Acid-Alkalinity)		
( ) Enter Net Acidity manually		
Net Acidity (Hot Acidity)	-667.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated $0.020

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - Oxic Limestone
COMMENTS:

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Oxic Limestone

Printed on 03/15/2007

AMD TREAT

Oxic Limestone Channel (OLC)

AMDTREAT

Oxic Limestone Channel Name

1. Ditch Length Rock	100	ft
2. Bottom Width of the Ditch	4.0	ft
3. Ditch Depth	3.00	ft
4. Geo Textile Unit Cost	0.50	$/yd2
5. Length of GeoTextile	100	ft
6. Slope Ratio of Ditch Sides (Run : Rise)	2.00 : 1.00	
☐ 7. Surveying?		
8. Survey Rate		acres/day
9. Survey Unit Cost		$/day
☑ 10. Clearing and Grubbing?		
11. Clear and Grub Cost	1250.00	$/acre

12. Ditch Depth of Limestone	1.00	ft
13. Cost of Limestone	18.00	$/yd3
14. Cost to Place Limestone	8.00	$/yd3
15. Excavation Unit Cost	45.00	$/yd3
16. Revegetation Unit Cost	1500.00	$/acre

OLC Sub-Totals

17. Excavation Cost	5,000	$
18. Survey Cost	0	$
19. Clear and Grub Cost	55	$
20. Limestone Cost	1,677	$
21. Filter Fabric Cost	97	$
22. Revegetation Cost	12	$
23. Total Cost	6,841	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Oxic Limestone

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.00	$/yd3
5. GeoTextile Length	0	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	0	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☐ 9. Surveying?		
10. Survey Rate		acres/day
11. Survey Unit Cost		$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre

14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	9,722	$
18. GeoTextile Cost	0	$
19. Silt Fence Cost	0	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	0	$
23. Clear and Grub Cost	258	$
24. Total Cost	10,032	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Oxic Limestone

Printed on 03/15/2007

AMD TREAT

LAND ACCESS

Land Access Name

Buy

1. Cost per Acre 40000.00 $

2. Number of Acres 1.00 acres

3. Closing Cost 110.00 $

Lease

4. Annual Lease Cost $

6. Buy Total Cost 40110 $

7. Lease Total Cost 1.00 $

8. Selected Cost 40110 $ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Oxic Limestone

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	16,873	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	2,868	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Oxic Limestone

Printed on 03/15/2007

AMD TREAT

SAMPLING

AMDTREAT

Sampling Name

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2115	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Oxic Limestone

Printed on 03/15/2007

AMDTREAT

AMD TREAT

LABOR

Labor Name

◉ **Estimate Labor Cost**

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	2.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

○ **Enter Established Annual Labor Cost**

5. Actual Annual Labor Cost		$

6. Total Cost	2,730	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - Oxic Limestone

Printed on 03/15/2007

AMD TREAT

MAINTANENCE

Estimate Maintenance Cost

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	0	$
7. Total Maintenance Passive Cost	239	$
8. Total Maintenance Ancillary Cost	351	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	591	$

* Ancillary Cost does int include Cost for
Land Access and Engineering Cost

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - ALD

AMD TREAT

AMD TREAT MAIN COST FORM

AMDTREAT

Costs

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain	1	0	$12,324
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$12,324**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds			$0
Roads	1	0	$10,765
Land Access	1	0	$40,110
Ditching			$0
Engineering Cost	1	0	$3,925
Ancillary Subtotal:			**$54,800**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$67,124**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$1,820
Maintenance	1	0	$808
Pumping			$0
Chemical Cost			$0
Oxidant Chem Cost			$0
Sludge Removal			$0
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$4,743**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L

(•) Calculate Net Acidity (Acid-Alkalinity)
Enter Net Acidity manually

Net Acidity (Hot Acidity)	667.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated $0.018

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - ALD
COMMENTS:

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - ALD

AMD TREAT

ANOXIC LIMESTONE DRAIN (ALD)

AMDTREAT

ALD Name: Acidity Neutralization

SIZING METHODS Select One

1. Tons of Limestone Needed	71.557	○ ALD Based on Acidity Neutralization			
2. Tons of Limestone Needed	18.481	○ ALD Based on Retention Time	5. Retention Time		hours
3. Tons of Limestone Needed	0	○ ALD Based on Tons Limestone Entered	6. Limestone Needed		tons
4. Tons of Limestone Needed	215	◉ ALD Based on Dimensions Entered	7. Top Length ALD	100.00	ft
			8. Top Width ALD	10.00	ft

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect ALD

Calculated Acidity: 0.00 mg/L

Alkalinity: 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.0000 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 68.40 mg/L

Manganese: 3.20 mg/L

9. System Life		years
10. Limestone Purity	85.00	%
11. Limestone Efficiency		%
12. % Void Space of Limestone Bed	35.00	%
13. Limestone Depth	4.00	ft
14. Density of Loose Limestone	107.53	lbs/ft3
15. Limestone Unit Cost	15.00	$/ton
16. Limestone Placement Unit Cost	12.00	$/yd3
17. Soil Cover Depth	2.00	ft
18. Length to Width Ratio (Length : Width)	4.00 : 1	
19. Excavation Unit Cost	23.00	$/yd3
20. Soil Replacement Unit Cost	4.50	$/yd3
21. Liner Unit Cost	5.00	$/yd2
22. Total Length of Effluent / Influent Pipe	0.00	ft
23. Unit Cost of Pipe	0.00	$/ft

☑ 24. Clearing and Grubbing?

◉ 25a. Land Multiplier: 1.5 ratio

○ 25b. Clear/Grub Acres: acres

26. Clear and Grub Unit Cost: 1250 $/acre

ALD Sizing Summaries

27.Top Width	10.00	ft
28. Top Length	100.00	ft
29. Limestone Surface Area	1,000.0	ft2
30. Limestone Volume	148	yd3
31. Excavation Volume	222.2	yd3
32. Clear & Grub Area	0.03	acres
33. Liner Area	356	ft2
34. Theoretical Retention Time	0.17	hrs

ALD Cost Summaries

35. Limestone Cost	3,225	$
36. Excavation Cost	5,111	$
37. Limestone Placement Cost	1,777	$
38. PipeCost	0	$
39. Liner Cost	1,833	$
40. Clear and Grub Cost	43	$
41. Soil Replacement Cost	333	$
42. Total Cost	12,324	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - ALD

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name 500 feet of Road

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.00	$/yd3
5. GeoTextile Length	250	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	200	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☑ 9. Surveying?		
10. Survey Rate	1.0	acres/day
11. Survey Unit Cost	650	$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre

14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	9,722	$
18. GeoTextile Cost	208	$
19. Silt Fence Cost	200	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	325	$
23. Clear and Grub Cost	258	$
24. Total Cost	10,765	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - ALD

Printed on 03/15/2007

AMD TREAT

LAND ACCESS

AMDTREAT

Land Access Name

Buy

1. Cost per Acre	40000.00	$
2. Number of Acres	1.00	acres
3. Closing Cost	110.00	$

Lease

4. Annual Lease Cost		$

6. Buy Total Cost	40110	$
7. Lease Total Cost	1.00	$
8. Selected Cost	40110	$ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - ALD

Printed on 03/15/2007

AMD TREAT

ENGINEERING COST

1. Capital Cost *	23,089	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	3,925	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - ALD

Printed on 03/15/2007

AMD TREAT

SAMPLING

AMDTREAT

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1,800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$

11. Sampling Cost 2,115 $

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - ALD

Printed on 03/15/2007

AMDTREAT

AMD TREAT

LABOR

Labor Name

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	1.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	1820	$

Record Number 1 of 1

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - ALD

AMD TREAT

MAINTANENCE

Estimate Maintenance Cost

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	0	$
7. Total Maintenance Passive Cost	431	$
8. Total Maintenance Ancillary Cost	376	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	806	$

* Ancillary Cost does int include Cost for Land Access and Engineering Cost

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - LSB

Printed on 03/15/2007

AMDTREAT

AMD TREAT

Costs AMD TREAT MAIN COST FORM

Passive Treatment	A	S	
Vertical Flow Pond			$0
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed	1	0	$10,167,817
BIO Reactor			$0
Passive Subtotal:			**$10,167,817**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds			$0
Roads	1	0	$16,974
Land Access	1	0	$4,000,110
Ditching	1	0	$6,926
Engineering Cost	1	0	$1,732,592
Ancillary Subtotal:			**$5,756,602**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$15,924,419**
Annual Costs			
Sampling	1	0	$488
Labor	1	0	$1,365
Maintenance	1	0	$356,710
Pumping			$0
Chemical Cost			$0
Oxidant Chem Cost			$0
Sludge Removal			$0
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$358,563**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L
◉ Calculate Net Acidity (Acid-Alkalinity)		
○ Enter Net Acidity manually		
Net Acidity (Hot Acidity)	567.00	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	0.00	mg/L
Filtered Al	0.00	mg/L
Filtered Mn	0.00	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	0.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.00	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$1.363**

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - LSB
COMMENTS:

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

Printed on 03/15/2007

AMD TREAT
LIMESTONE BED (LSB)

AMDTREAT

Limestone Bed Name

☐ Opening Screen Water Parameters

Influent Water Parameters that Affect LSB

Calculated Acidity: 1000 mg/L

Alkalinity: 300.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 75.00 mg/L

Aluminum: 6340 mg/L

Manganese: 320 mg/L

Record Number

1 of 1

SIZING METHODS Select One

1. Tons of Limestone Needed	71,555	○	LSB Based on Acidity Neutralization
2. Tons of Limestone Needed	1179	○	LSB Based on Retention Time
3. Tons of Limestone Needed	136838	○	LSB Based on Alkalinity Generation Rate
4. Tons of Limestone Needed	71,555	◉	LSB Based on Tons Limestone Entered
5. Tons of Limestone Needed	166	○	LSB Based on Dimensions

6. Retention Time: hours

7. Alkalinity Generation Rate: g/m2/day

8. Limestone Needed: 71,555 tons

9. Length at Top of Freeboard: ft

10. Width at Top of Freeboard: ft

11. % Void Space of LS. Bed: 90.00 %

12. System Life: years

13. Limestone Purity: 85.00 %

14. Limestone Efficiency: %

15. Density of Loose Limestone: 165.4 lbs/ft3

16. Limestone Unit Cost: 12.00 $/ton

17. LS Placement Unit Cost: 0.00 $/yd3

18. Slope of Pond Sides: Run of Slope 2.0 : Rise of Slope

19. Freeboard Depth: 3.00 ft

20. Free Standing Water Depth: 2.0 ft

24. Limestone Depth: 3.0 ft

25. Excavation Unit Cost: 4.50 $/yd3

23. Siphon System Cost: 5000.00 $

Liner Cost

○ No Liner

◉ Clay Liner

11. Clay Liner Unit Cost: 10.00 $/yd3

12. Thickness of Clay Liner: 0.5 ft

○ Synthetic Liner

13. Synthetic Liner Unit Cost: $/yd2

☐ 29. Clearing and Grubbing?

30a. Land Multiplier: ratio

30b. Clear/Grub Acres: acres

31. Clear and Grub Unit Cost: $/acre

32. Nbr. of Valves: 0 nbr

33. Unit Cost of Valves: 0.00 $ ea.

○ AMDTreat Piping Costs

34. Total Length of Effluent / Influent Pipe: ft

35. Pipe Install Rate: ft/hr

36. Labor Rate: $/hr

37. Segment Len. of Trunk Pipe: ft/pipe seg.

38. Trunk Pipe Cost: $/ft

39. Trunk Coupler Cost: $/coupler

40. Spur Cost: $/ft

41. Spur Coupler Cost: $/spur

42. "T" Connector Cost: $/T coupler

43. Segment Len. of Spur Pipe: ft/pipe seg.

44. Spur Pipe Spacing: ft

◉ Custom Piping Costs

	Length		Diameter		Unit Cost	
45. Pipe #1	0.00	ft	0.0	in	0.00	$
46. Pipe #2	0.00	ft	0.0	in	0.00	$
47. Pipe #3	0.00	ft	0.0	in	0.00	$

LSB Sizing Summaries

48. Length at Top of Freeboard	2430.72	ft
49. Width at Top of Freeboard	1225.36	ft
50. Freeboard Volume	826.51	yd3
51. Water Surface Area	2,934,752	ft2
52. Total Water Volume	1,626,990	yd3
54. Limestone Surface Area	2,965,789	ft2
55. Limestone Volume	320,461.23	yd3
56. Excavation Volume	1,944,452	yd3
57. Clear and Grub Area	0.00	acr.
58. Liner Area	342,2913	ft2
59. Theoretical Retention Time	670.87	hrs

LSB Cost Summaries

60. Siphon System Cost	5000	$
61. Limestone Cost	858,669	$
62. Limestone Placement Cost	0	$
63. Excavation Cost	8,750,035	$
64. Liner Cost	684.11	$
65. Clear and Grub Cost	0	$
66. Valve Cost	0	$
67. Pipe Cost	0	$
68. Total Cost	10,167,818	$

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name: 500 ft road w/e&s controls

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.00	$/yd3
5. GeoTextile Length	500	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	200	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☑ 9. Surveying?		
10. Survey Rate	1.0	acres/day
11. Survey Unit Cost	650	$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre
14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	200	ft

Roads Sub-Totals

17. Road Surface Cost	9,722	$
18. GeoTextile Cost	417	$
19. Silt Fence Cost	200	$
20. Culvert Cost	6,000	$
21. Revegetation Cost	52	$
22. Survey Cost	325	$
23. Clear and Grub Cost	258	$
24. Total Cost	16,974	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

Printed on 03/15/2007

AMD TREAT

LAND ACCESS

AMDTREAT

Land Access Name

Buy

1. Cost per Acre 40000.00 $
2. Number of Acres 100.00 acres
3. Closing Cost 110.00 $

Lease

4. Annual Lease Cost $

6. Buy Total Cost 4000110 $
7. Lease Total Cost 1.00 $

8. Selected Cost 4000110 $ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

Printed on 03/15/2007

AMD TREAT

DITCHING

AMDTREAT

Ditching Name

1. Ditch Length Rock	200	ft
2. Ditch Length Grass	0	ft
3. Bottom Width of Ditch	4.0	ft
4. Ditch Depth	3.00	ft
5. Geo Textile Unit Cost	0.50	$/yd2
6. Length of Geo Textile	100	ft

7. Slope Ratio of Ditch Sides — Run 2.00 : Rise 1.00

☐ 8. Surveying?

9. Survey Rate		acres/day
10. Survey Unit Cost		$/day

☐ 11. Clearing and Grubbing?

12. Clear and Grub Cost		$/acre

Record Number 1 of 1

13. Ditch Depth of Rock	1.50	ft
14. Cost of Ditch Surface Rock	18.00	$/yd3
15. Cost to Place Rock	12.00	$/yd3
16. Excavation Unit Cost	4.50	$/yd3
17. Length of Silt Fence	0.00	ft
18. Unit Cost of Silt Fence	1.00	$/ft
19. Revegetation Unit Cost	1500.00	$/acre

Ditching Sub-Totals

20. Excavation Cost	1,000	$
21. Survey Cost	0	$
22. Clear and Grub Cost	0	$
23. Aggregate Cost	5,805	$
24. Filter Fabric Cost	97	$
25. Silt Fence Cost	0	$
26. Revegetation Cost	24	$
27. Total Cost	6,926	$

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	10,191,717	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	1732,592	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

Printed on 03/15/2007

AMDTREAT

AMD TREAT

SAMPLING

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	0.50	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	25.00	$/sample
6. Number of Sample Points	3	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost $

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	225	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	158	$
11. Sampling Cost	488	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

Printed on 03/15/2007

AMDTREAT

AMD TREAT

LABOR

Labor Name Monthly Monitoring

Estimate Labor Cost

1. Site Visits per Week	0.25	
2. Site Labor Time per Visit	1.00	hours
3. Travel Time per Visit	2.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	1,365	$

Record Number 1 of 1

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - LSB

AMD TREAT

MAINTANENCE

Estimate Maintenance Cost

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	0	$
7. Total Maintenance Passive Cost	355,874	$
8. Total Maintenance Ancillary Cost	836	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	356,710	$

* Ancillary Cost does int include Cost for Land Access and Engineering Cost

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - VFP

Printed on 03/15/2007

AMDTREAT

AMD TREAT

Costs AMD TREAT MAIN COST FORM

Passive Treatment	A	S	
Vertical Flow Pond	1	0	$1,517,888
Anoxic Limestone Drain			$0
Anaerobic Wetlands			$0
Aerobic Wetlands			$0
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$1,517,888**
Active Treatment			
Caustic Soda			$0
Hydrated Lime			$0
Pebble Quick Lime			$0
Ammonia			$0
Oxidants			$0
Soda Ash			$0
Active Subtotal:			**$0**
Ancillary Cost			
Ponds	1	0	$39,894
Roads	1	0	$10,765
Land Access	1	0	$56,110
Ditching			$0
Engineering Cost	1	0	$266,653
Ancillary Subtotal:			**$373,422**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$1,891,310**
Annual Costs			
Sampling	1	0	$2,115
Labor	1	0	$1,820
Maintenance	1	0	$54,899
Pumping			$0
Chemical Cost			$0
Oxidant Chem Cost			$0
Sludge Removal	1	0	$66,466
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$125,300**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	0.00	mg/L
◉ Calculate Net Acidity (Acid-Alkalinity)		
○ Enter Net Acidity manually		
Net Acidity (Hot Acidity)	667.80	mg/L
Design Flow	1000.00	gpm
Typical Flow	500.00	gpm
Total Iron	179.00	mg/L
Aluminum	68.40	mg/L
Manganese	3.20	mg/L
pH	3.79	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	1280.00	mg/L
Filtered Fe	164.00	mg/L
Filtered Al	60.70	mg/L
Filtered Mn	2.86	mg/L
Specific Conductivity	0.00	uS/cm
Total Dissolved Solids	1990.00	mg/L
Dissolved Oxygen	0.00	mg/L
Typical Acid Loading	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$0.476**

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - VFP
COMMENTS:

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

Printed on 03/15/2007

AMD TREAT
VERTICAL FLOW POND (VFP)

AMDTREAT

VFP Name

☐ **Opening Screen Water Parameters**

Influent Water Parameters that Affect VFP

Calculated Acidity: 5000 mg/L

Alkalinity: 0.000 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 59.40 mg/L

Manganese: 6.20 mg/L

Record Number

1 of 1

SIZING METHODS Select One

1. Tons of Limestone Needed	54,064	○ VFP Based on Acidity Neutralization
2. Tons of Limestone Needed	191,715	○ VFP Based on Retention Time
3. Tons of Limestone Needed	252,494	○ VFP Based on Alkalinity Generation Rate
4. Tons of Limestone Needed	54,064	◉ VFP Based on Tons Limestone Entered
5. Tons of Limestone Needed	1,792	○ VFP Based on Dimensions

6. Retention Time: 48.00 hours

7. Alkalinity Generation Rate: g/m2/day

8. Limestone Needed: 54,064 tons

9. Length at Top of Freeboard: ft

10. Width at Top of Freeboard: ft

11. % Void Space of LS. Bed	35.00	%
12. System Life	20.00	years
13. Limestone Purity	90.00	%
14. Limestone Efficiency	60.00	%
15. Density of Loose Limestone	107.53	lbs/ft3
16. Limestone Unit Cost	12.00	$/ton
17. LS Placement Unit Cost	0.00	$/yd3

Run of Slope : Rise of Slope

18. Slope of Pond Sides	2.0 : 1	
19. Freeboard Depth	3.00	ft
20. Free Standing Water Depth	2.0	ft
21. Organic Matter Depth	1.0	ft
22. Organic Matter Unit Cost	19.00	$/yd3
23. Organic Matter Spreading Unit Cost	3.50	$/yd3
24. Limestone Depth	3.0	ft
25. Excavation Unit Cost	4.50	$/yd3

Liner Cost

○ No Liner

◉ Clay Liner

11. Clay Liner Unit Cost: 4.50 $/yd3

12. Thickness of Clay Liner: 0.5 ft

○ Synthetic Liner

13. Synthetic Liner Unit Cost: $/yd2

☑ 29. Clearing and Grubbing?

◉ 30a. Land Multiplier	1.50	ratio
○ 30b. Clear/Grub Acres		acres
31. Clear and Grub Unit Cost	1256.00	$/acre
32. Nbr. of Valves	0	nbr
33. Unit Cost of Valves	0.00	$ ea.

◉ AMDTreat Piping Costs

34. Total Length of Effluent / Influent Pipe	20	ft
35. Pipe Install Rate	11.00	ft/hr
36. Labor Rate	35.00	$/hr
37. Segment Len. of Trunk Pipe	20	ft/pipe seg.
38. Trunk Pipe Cost	6.70	$/ft
39. Trunk Coupler Cost	6.60	$/coupler
40. Spur Cost	1.83	$/ft
41. Spur Coupler Cost	2.43	$/spur
42. "T" Connector Cost	90.00	$/T coupler
43. Segment Len. of Spur Pipe	20	ft/pipe seg.
44. Spur Pipe Spacing	10.0	ft

○ Custom Piping Costs

	Length	Diameter	Unit Cost
45. Pipe #1	ft	in	$
46. Pipe #2	ft	in	$
47. Pipe #3	ft	in	$

VFP Sizing Summaries

48. Length at Top of Freeboard	561.75	ft
49. Width at Top of Freeboard	437.87	ft
50. Freeboard Volume	40,886	yd3
51. Water Surface Area	557,632	ft2
52. Total Water Volume	28,117	yd3
53. Organic Matter Volume	12,780	yd3
54. Limestone Surface Area	342,598	ft2
55. Limestone Volume	37,243.00	yd3
56. Excavation Volume	76,141.75	yd3
57. Clear and Grub Area	12.8	acr.
58. Liner Area	45,503.8	ft2
59. Theoretical Retention Time	48.67	hrs

VFP Cost Summaries

60. Organic Matter Cost	242,832	$
61. Limestone Cost	648,768	$
62. Limestone and Organic Matter Placement Cost	42,732	$
63. Excavation Cost	342,637	$
64. Liner Cost	3,524	$
65. Clear and Grub Cost	16,130	$
66. Valve Cost	0	$
67. Pipe Cost	161,264	$
68. Total Cost	1,517,888	$

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

Printed on 03/15/2007

AMD TREAT

PONDS

AMDTREAT

Pond Name

Pond Design Based On:

- (•) Retention Time
  - 1. Desired Retention Time: 24.0 hours
- ☐
  - 3. Sludge Removal Frequency: times/year
  - ☐ 4. Titration?
    - 5. Sludge Rate: gal sludge/ gal H2O
    - 6. Percent Solids: %
    - 7. Sludge Density: lbs./gal
- ( ) Pond Size
  - 8. Pond Length at Top of Freeboard: ft
  - 9. Pond Width at Top of Freeboard: ft

	Run	Rise
10. Slope Ratio of Pond Sides	2.0	:

- 11. Freeboard Depth: 2.0 ft
- 12. Water Depth: 4.0 ft
- 13. Excavation Unit Cost: 4.50 $/yd3
- 14. Total Length of Effluent / Influent Pipe: 0.00 ft
- 15. Unit Cost of Pipe: 0.00 $/ft

Liner Cost

- ( ) No Liner
- (•) Clay Liner
  - 16. Clay Liner Unit Cost: 10.00 $/yd3
  - 17. Thickness of Clay Liner: 1.0 ft
- ( ) Synthetic Liner
  - 18. Synthetic Liner Unit Cost: $/yd2

☐ 19. Clearing and Grubbing?

- 20. Land Multiplier: ratio
- 21. Clear/Grub Acres: acres
- 22. Clear and Grub Unit Cost: $/acre

23. Revegetation Cost: 1500.00 $/acre

24. Cost of Baffles: 0 $

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard	330	ft
26. Width at Top of Freeboard	169	ft
27. Freeboard Volume	11,139	yd3
28. Water Volume	7,129	yd3
29. Estimated Annual Sludge	0	yd3/yr
30. Volume of Sludge per Removal	0	yd3/ removal
31. Excavation Volume	4.41	acre ft
32. Excavation Volume	7,129	yd3
33. Clear and Grub Area	1.92	acres
34. Liner Area	1,867	yd2
35. Calculated Retention Time	24	hours

Ponds Sub-Totals per Pond

36. Excavation Cost	34,708	$
37. Pipe Cost	0	$
38. Liner Cost	4,723	$
39. Clearing and Grubbing Cost	0	$
40. Revegetation Cost	961	$
41. Baffle Cost	0	$
42. Estimated Cost	39,694	$

☐ **Opening Screen Water Parameters**

Influent Water Parameters that Affect Ponds

Calculated Acidity: 0.00 mg/L

Alkalinity: 0.00 mg/L

( ) Calculate Net Acidity (Acid-Alkalinity)

(•) Enter Net Acidity manually

Net Acidity (Hot Acidity): 667.00 mg/L

Design Flow: 1000.00 gpm

Typical Flow: 500.00 gpm

Total Iron: 179.00 mg/L

Aluminum: 68.40 mg/L

Manganese: 3.20 mg/L

Record Number
1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

Printed on 03/15/2007

AMD TREAT

ROADS

AMDTREAT

Road Name: 500 feet of Road

1. Road Length	500	ft
2. Road Width	15	ft
3. Road Depth	1.00	ft
4. Aggregate Unit Cost	35.00	$/yd3
5. GeoTextile Length	250	ft
6. GeoTextile Unit Cost	0.50	$/yd2
7. Length of Silt Fence	200	ft
8. Unit Cost of Silt Fence	1.00	$/ft
☑ 9. Surveying?		
10. Survey Rate	1.0	acres/day
11. Survey Unit Cost	650	$/day
☑ 12. Clearing and Grubbing?		
13. Clear and Grub Cost	1250	$/acre
14. Reveg Unit Cost	1500.00	$/acre
15. Culvert Unit Cost	30.00	$/ft
16. Culvert Length	0	ft

Roads Sub-Totals

17. Road Surface Cost	9,722	$
18. GeoTextile Cost	208	$
19. Silt Fence Cost	200	$
20. Culvert Cost	0	$
21. Revegetation Cost	52	$
22. Survey Cost	325	$
23. Clear and Grub Cost	258	$
24. Total Cost	10,765	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

Printed on 03/15/2007

AMD TREAT

LAND ACCESS

AMDTREAT

Land Access Name

Buy

1. Cost per Acre	4000.00	$
2. Number of Acres	14.00	acres
3. Closing Cost	110.00	$

Lease

4. Annual Lease Cost		$

6. Buy Total Cost	56110	$
7. Lease Total Cost	1.00	$
8. Selected Cost	56110	$ **Capital Cost**

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

Printed on 03/15/2007

AMDTREAT

AMD TREAT

ENGINEERING COST

1. Capital Cost *	1,568,547	$
(•) 2. Per Cent of Capital Cost	17.00	%
( ) 3. Actual Engineering Cost		$
4. Total Engineering Cost	266,653	$

*** Total Capital Cost minus Engineering and Land Access Capital Cost**

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

Printed on 03/15/2007

AMD TREAT

SAMPLING

AMDTREAT

Sampling Name Quarterly Sampling

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	1.00	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.25	samples/mo
5. Lab Cost Per Sample	300.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost		$

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	1,800	$
9. Yearly Travel Cost	105	$
10. Yearly Collection Cost	210	$
11. Sampling Cost	2,115	$

Record Number 1 of 1

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

Printed on 03/15/2007

AMD TREAT

LABOR

Labor Name

Estimate Labor Cost

1. Site Visits per Week	0.50	
2. Site Labor Time per Visit	1.00	hours
3. Travel Time per Visit	1.00	hours
4. Unit Labor Cost	35.00	$/hour

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost		$

6. Total Cost	1,820	$

Record Number 1 of 1

Printed on 03/15/2007

Company Name NRCS

Project Richard Mine AMD

Site Name Richard Mine - VFP

AMD TREAT

MAINTANENCE

Estimate Maintenance Cost

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	3.50	%
3. Percent of Ancillary Cost *	3.50	%
4. Percent of Other Capital Cost	3.50	%

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	0	$
7. Total Maintenance Passive Cost	53,126	$
8. Total Maintenance Ancillary Cost	1,773	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	54,899	$

* Ancillary Cost does int include Cost for Land Access and Engineering Cost .

Printed on 03/15/2007

Company Name NRCS
Project Richard Mine AMD
Site Name Richard Mine - VFP

AMD TREAT

SLUDGE REMOVAL

AMDTREAT

☐ Opening Screen Water Parameters

Sludge Removal Name

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity 0.00 mg/L
Alkalinity 0.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)
◉ Enter Net Acidity manually
Net Acidity (Hot Acidity) 667.00 mg/L

Design Flow 1000.00 gpm
Typical Flow 500.00 gpm
Total Iron 179 mg/L
Aluminum 68 mg/L
Manganese 3 mg/L

1. Select One — Selection for Method of Removing Sludge

◉ Sludge Removal by $ per Gallon
2. Sludge Removal Unit Cost 0.05 $/gal

○ Sludge Removal by Vacuum Truck
3. Vacuum Truck Unit Cost $/hr
4. Mobilization Cost $
5. Hours to be Used hr

○ Sludge Removal by Mechanical Excavation
6. Mechanical Excavation Unit Rate $/hr
7. Mobilization Cost $
8. Hours to be Used hr

○ Sludge Removal by Lagoon Cleaner
9. Lagoon Cleaning Unit Rate $/hr
10. Mobilization Cost $
11. Hours to be Used hr

○ Actual Sludge Removal Cost
12. Actual Sludge Removal Cost $

13. Off Site Disposal Cost 0.00 $

Record Number 1 of 1

Concentrations from Main Water Quality Screen

14. Iron Concentration 179.00 mg/L
15. Manganese Concentration 3.20 mg/L
16. Aluminum Concentration 68.40 mg/L

17. Total Miscellaneous Concentration 0 mg/L
18. Percent Solids 5.00 %
19. Sludge Density 8.33 lbs/gal
☐ 20. Titration?
21. Gal. of Sludge per Gal of Water Treated gal

22. Estimated Sludge Volume 6,582 yd3/yr

Cost for Sludge Removal Types

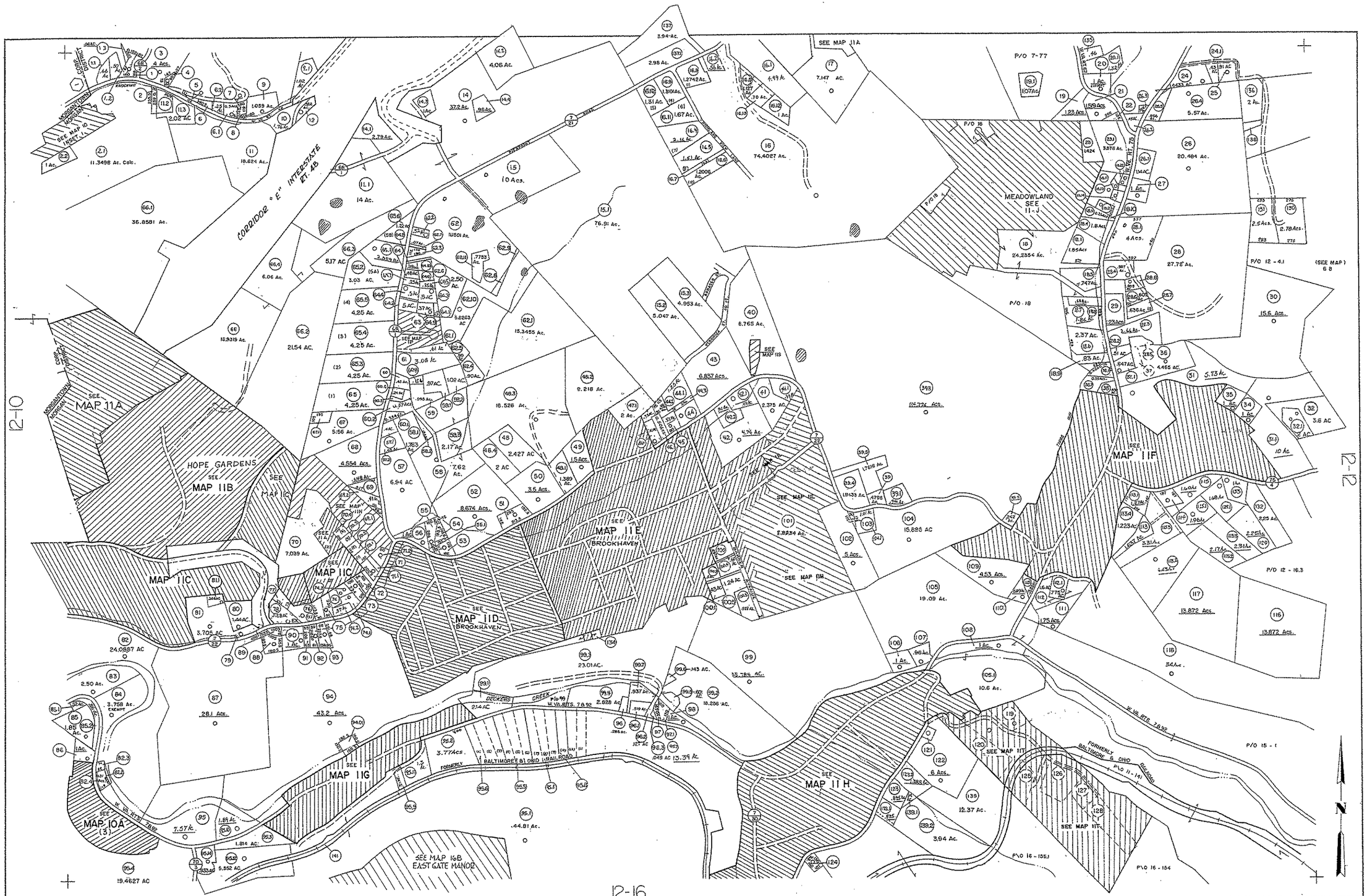
23. Removal by $ per Gallon 66,466 $
24. Removal by Vacuum Truck 0 $
25. Removal by Mechanical Excavation 0 $
26. Removal by Lagoon Cleaner 0 $
27. Actual Sludge Removal Cost 0 $

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost 66,466 $

APPENDIX B

Drawings



For Tax Purposes Only

Prepared by
American Air Surveys, Inc.
Pittsburgh, Pa.

Legend

Property line		Original lot line	
Edge of pavement or roadway		Deed lot number (in parentheses)	(15)
Corporation line		Parcel or index number in circle	(99)
District line		Improvement	o
County line		Railroad	
Stream		District Number	(13)
		Scaled Dimension	5

Revisions

1	2-15-62 CORRECTED		9	OGIS 7/11/92	DSH	17	
2	Sept. 5, 1973	DAF	10	O.G.I.S 6-1-96	J.E.B	18	
3	8/8/79	HAN & JAO	11	S.I.S INC - JWM 9/97		19	
4	7/82	JLH	12	3-15-2003 JEB		20	
5	Issued to 7-1-80		13			21	
6	7/1/86	R.L.B	14			22	
7	Rev. to 1-1-89	R.E.B.	15			23	
8	10-1-98	J.E.B	16			24	

COUNTY OF MONONGALIA

Office of Assessor

MORGANTOWN, W. VA.

MORGAN DISTRICT

District 12 Map No. 11

Date, Aerial Photography: 1960 Date, Map: March 30, 1961

Photo No.: 104, 106 Scale: 1" = 400'