

Company Name Avery Coal
 Project MP8 Treatment
 Site Name Victoria 1 Mine



AMDTREAT

AMD TREAT

AMD TREAT MAIN COST FORM

Costs

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
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	\$7,812
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			\$0
Ancillary Cost			
Ponds	3	0	\$17,726
Roads	1	0	\$6,202
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$3,174
Ancillary Subtotal:			\$27,102
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$34,914
Annual Costs			
Sampling	1	0	\$2,356
Labor	1	0	\$14,560
Maintenance	1	0	\$1,111
Pumping			\$0
Chemical Cost	1	0	\$7,873
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$3,637
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$29,537
Other Cost			

Water Quality

Calculated Acidity mg/L
 Alkalinity mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity) mg/L

Design Flow gpm
 Typical Flow gpm
 Total Iron mg/L
 Aluminum mg/L
 Manganese mg/L
 pH su
 Ferric Iron mg/L
 Ferrous Iron mg/L
 Sulfate mg/L
 Filtered Fe mg/L
 Filtered Al mg/L
 Filtered Mn mg/L
 Specific Conductivity uS/cm
 Total Dissolved Solids mg/L
 Dissolved Oxygen mg/L
 Typical Acid Loading tons/yr

**Total Annual Cost: per
 1000 Gal of H2O Treated \$0.561**

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Project MP8 Treatment

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COMMENTS:

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AMD TREAT CAUSTIC SODA

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Opening Screen Water Parameters

Caustic Soda Name

Influent Water Parameters that Affect Caustic Soda

Calculated Acidity mg/L
 Alkalinity mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually
 Net Acidity (Hot Acidity) mg/L

Design Flow gpm
 Typical Flow gpm

Total Iron mg/L
 Aluminum mg/L
 Manganese mg/L

- 1. Gallons of Caustic per Year gal/yr
- 2. Gallons of Caustic per Month gal/mo
- 3. Gallons of Caustic per Day gal/day
- 4. Titration?
- 5. Caustic Titration Volume gal caustic/gal water treated
- 6. Purity of Caustic Solution purity of 20% caustic solution %
- 7. Mixing Efficiency of Caustic Solution %
- 8. Tank Cost \$
- 9. Tank Volume gal
- 10. Delivery Frequency times/yr
- 11. Valve Unit Cost \$
- 12. Number of Valves nbr
- 13. Feeder Line Length ft
- 14. Feeder Line Unit Cost \$/ft
- 15. Installation of System Unit Cost \$/hr
- 16. Installation Hours hours

17. Automatic System?

- 18. PID pH Proportional Control \$
- 19. pH Probe \$
- 20. Chemical Metering Pump \$
- 21. Water Wheel Dispenser
- 22. Dispenser Cost \$

Caustic Sub-Totals

- 23. Number of Tanks Required nbr
- 24. Tank Cost \$
- 25. Automatic System or Wheel Dispenser Cost \$
- 26. Cost of Valves \$
- 27. Feeder Line Cost \$
- 28. Labor Cost \$

29. Total Capital Cost \$

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AMD TREAT PONDS

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Pond Name

Pond Design Based On:

Retention Time

1. Desired Retention Time hours

Sludge Removal

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	<input type="text" value="2.0"/>	<input type="text" value="1"/>
11. Freeboard Depth	<input type="text" value="2.0"/> ft	
12. Water Depth	<input type="text" value="4.0"/> ft	
13. Excavation Unit Cost	<input type="text" value="5.50"/> \$/yd3	
14. Total Length of Effluent / Inlet Pipe	<input type="text" value="0.00"/> ft	
15. Unit Cost of Pipe	<input type="text" value="10.00"/> \$/ft	

Liner Cost

No Liner

Clay Liner

16. Clay Liner Unit Cost \$/yd3

17. Thickness of Clay Liner 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 \$/acre

24. Cost of Baffles \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard ft

26. Width at Top of Freeboard ft

27. Freeboard Volume yd3

28. Water Volume yd3

29. Estimated Annual Sludge yd3/yr

30. Volume of Sludge per Removal yd3/removal

31. Excavation Volume acre ft

32. Excavation Volume yd3

33. Clear and Grub Area acres

34. Liner Area yd2

35. Calculated Retention Time hours

Ponds Sub-Totals per Pond

36. Excavation Cost \$

37. Pipe Cost \$

38. Liner Cost \$

39. Clearing and Grubbing Cost \$

40. Revegetation Cost \$

41. Baffle Cost \$

42. Estimated Cost \$

Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity mg/L

Alkalinity mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity) mg/L

Design Flow gpm

Typical Flow gpm

Total Iron mg/L

Aluminum mg/L

Manganese mg/L

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Company Name Avery Coal
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AMD TREAT PONDS

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Pond Name

Pond Design Based On:

Retention Time

1. Desired Retention Time 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	<input type="text" value="2.0"/>	:	<input type="text" value="1"/>
11. Freeboard Depth			<input type="text" value="2.0"/> ft
12. Water Depth			<input type="text" value="4.0"/> ft
13. Excavation Unit Cost			<input type="text" value="5.50"/> \$/yd3
14. Total Length of Effluent / Influent Pipe			<input type="text" value="0.00"/> ft
15. Unit Cost of Pipe			<input type="text" value="10.00"/> \$/ft

Liner Cost

No Liner

Clay Liner

16. Clay Liner Unit Cost \$/yd3

17. Thickness of Clay Liner 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 \$/acre

24. Cost of Baffles \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard ft

26. Width at Top of Freeboard ft

27. Freeboard Volume yd3

28. Water Volume yd3

29. Estimated Annual Sludge yd3/yr

30. Volume of Sludge per Removal yd3/removal

31. Excavation Volume acre ft

32. Excavation Volume yd3

33. Clear and Grub Area acres

34. Liner Area yd2

35. Calculated Retention Time hours

Ponds Sub-Totals per Pond

36. Excavation Cost \$

37. Pipe Cost \$

38. Liner Cost \$

39. Clearing and Grubbing Cost \$

40. Revegetation Cost \$

41. Baffle Cost \$

42. Estimated Cost \$

Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity mg/L

Alkalinity mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity) mg/L

Design Flow gpm

Typical Flow gpm

Total Iron mg/L

Aluminum mg/L

Manganese mg/L

Record Number
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Company Name Avery Coal
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AMD TREAT PONDS

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Pond Name Sludge

Pond Design Based On:

Retention Time

1. Desired Retention Time hours

2. Include Sludge Removal?

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	<input type="text" value="2.0"/>	<input type="text" value="1"/>
11. Freeboard Depth	<input type="text" value="2.0"/> ft	
12. Water Depth	<input type="text" value="4.0"/> ft	
13. Excavation Unit Cost	<input type="text" value="5.50"/> \$/yd3	
14. Total Length of Effluent / Inlet Pipe	<input type="text" value="0.00"/> ft	
15. Unit Cost of Pipe	<input type="text" value="10.00"/> \$/ft	

Liner Cost

No Liner

Clay Liner

16. Clay Liner Unit Cost \$/yd3

17. Thickness of Clay Liner 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 \$/acre

24. Cost of Baffles \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard ft

26. Width at Top of Freeboard ft

27. Freeboard Volume yd3

28. Water Volume yd3

29. Estimated Annual Sludge yd3/yr

30. Volume of Sludge per Removal yd3/removal

31. Excavation Volume acre ft

32. Excavation Volume yd3

33. Clear and Grub Area acres

34. Liner Area yd2

35. Calculated Retention Time hours

Ponds Sub-Totals per Pond

36. Excavation Cost \$

37. Pipe Cost \$

38. Liner Cost \$

39. Clearing and Grubbing Cost \$

40. Revegetation Cost \$

41. Baffle Cost \$

42. Estimated Cost \$

43. Accept Minimum Pond Cost?

The Recommended Minimum Construction Cost of Building a Pond is \$ 5,000

44. Recommended Minimum Cost \$

45. Total Cost \$

Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity mg/L

Alkalinity mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity) mg/L

Design Flow gpm

Typical Flow gpm

Total Iron mg/L

Aluminum mg/L

Manganese mg/L

**Record Number
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Company Name Avery Coal
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AMD TREAT ROADS



Road Name

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

14. Reveg Unit Cost \$/acre
15. Culvert Unit Cost \$/ft
16. Culvert Length ft

Roads Sub-Totals

17. Road Surface Cost \$
18. GeoTextile Cost \$
19. Silt Fence Cost \$
20. Culvert Cost \$
21. Revegetation Cost \$
22. Survey Cost \$
23. Clear and Grub Cost \$

24. Total Cost \$

Record Number 1 of 1

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**AMD TREAT
ENGINEERING COST**

1. Capital Cost * \$

2. Per Cent of Capital Cost %

3. Actual Engineering Cost \$

4. Total Engineering Cost \$

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

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AMD TREAT SAMPLING

Sampling Name

Estimate Sampling Cost

1. Unit Labor Cost \$/hr

2. Collection Time per Sample hours/sample

3. Travel Time hr

4. Sample Frequency samples/mo

5. Lab Cost Per Sample \$/sample

6. Number of Sample Points points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost \$

Sampling Sub-Totals

8. Yearly Sample Analysis Cost \$

9. Yearly Travel Cost \$

10. Yearly Collection Cost \$

11. Sampling Cost \$

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LABOR

Labor Name

Estimate Labor Cost

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

Enter Established Annual Labor Cost

5. Actual Annual Labor Cost \$

6. Total Cost \$

Record Number 1 of 1

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MAINTANENCE

Estimate Maintenance Cost

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

Enter Established Annual Maintenance Cost

5. Annual Maintenance Cost \$

Maintenance Sub-Totals

- 6 Total Maintenance Active Cost \$
- 7. Total Maintenance Passive Cost \$
- 8. Total Maintenance Ancillary Cost \$
- 9. Total Maintenance Other Capital Cost \$

\$

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

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AMD TREAT CHEMICAL COST

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Chemical Cost Name:

Opening Screen Water Parameters

Influent Water Parameters that Affect Chemical Cost

Calculated Acidity
 mg/L
 Alkalinity
 mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually
 Net Acidity (Hot Acidity)
 mg/L

Design Flow
 gpm
 Typical Flow
 gpm
 Total Iron
 mg/L
 Aluminum
 mg/L
 Manganese
 mg/L

Record Number

- 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 of caustic / 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 Unit Cost \$/gal

- E. Anhydrous Ammonia ?
 21. Titration?
 22. Ammonia Titration 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	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
34. Total Pebble Lime Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
35. Total Caustic Soda Cost	<input type="text" value="7,873"/> \$	<input type="text" value="11,247"/> gals
36. Total Anhydrous Ammonia Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
37. Total Soda Ash Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
38. Total Known Chemical Cost	<input type="text" value="0"/> \$	
39. Total Flocculent Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> gals

40. Selected Chemical: **CAUSTIC SODA**

Annual Chemical Cost \$

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AMD TREAT SLUDGE REMOVAL

Opening Screen
Water Parameters

Sludge Removal Name

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity mg/L

Alkalinity mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity) mg/L

Design Flow gpm

Typical Flow gpm

Total Iron mg/L

Aluminum mg/L

Manganese mg/L

Selection for Method of Removing Sludge

1. Select One

Sludge Removal by \$ per Gallon

2. Sludge Removal Unit Cost \$/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 \$

Concentrations from Main Water Quality Screen

14. Iron Concentration mg/L

15. Manganese Concentration mg/L

16. Aluminum Concentration mg/L

17. Total Miscellaneous Concentration mg/L

18. Percent Solids %

19. Sludge Density lbs/gal

20. Titration?

21. Gal. of Sludge per Gal of Water Treated

22. Estimated Sludge Volume yd³/yr

Cost for Sludge Removal Types

23. Removal by \$ per Gallon	<input style="width: 50px;" type="text" value="3,637"/> \$
24. Removal by Vacuum Truck	<input style="width: 50px;" type="text" value="0"/> \$
25. Removal by Mechanical Excavation	<input style="width: 50px;" type="text" value="0"/> \$
26. Removal by Lagoon Cleaner	<input style="width: 50px;" type="text" value="0"/> \$
27. Actual Sludge Removal Cost	<input style="width: 50px;" type="text" value="0"/> \$

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost \$

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AMD TREAT RECAPITALIZATION COST

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Calculation Period yrs Inflation Rate % Net Return Rate %

Recapitalization Name

A Description of Item	B Unit Cost Per Item	C Quantity	D Total Item Cost	E Life Cycle	F Number of Periods	G Total PV
1. Causlic Tank	2,000	1	2,000	30	2	1,249
2. Auto Dispenser System	5,425	1	5,425	15	5	9,200
3. Valves	100	1	100	15	5	170
4. Feeder Line	7	1	7	15	5	12
5.	0	0	0	0	0	0
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
8.	0	0	0	0	0	0
9.	0	0	0	0	0	0
10.	0	0	0	0	0	0
11.	0	0	0	0	0	0
12.	0	0	0	0	0	0
13.	0	0	0	0	0	0
14.	0	0	0	0	0	0
15.	0	0	0	0	0	0
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0

Total Capital Cost \$ PV Grand Total \$