

Company Name PA Energy

Project MD1

Site Name Horsehill



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
<u>Active Treatment</u>			
Caustic Soda	1	0	\$6,387
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			\$0
<u>Ancillary Cost</u>			
Ponds	1	0	\$5,000
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$2,277
Ancillary Subtotal:			\$7,277
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$13,664
<u>Annual Costs</u>			
Sampling	2	0	\$1,226
Labor	1	0	\$10,920
Maintenance	1	0	\$192
Pumping			\$0
Chemical Cost	1	0	\$6,590
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$495
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$19,423
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

**Total Annual Cost: per
 1000 Gal of H2O Treated \$2.461**

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AMD TREAT CAUSTIC SODA

AMDTREAT

**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 | <input type="text" value="5,272.32"/> | gal/yr |
| 2. Gallons of Caustic per Month | <input type="text" value="439.36"/> | gal/mo |
| 3. Gallons of Caustic per Day | <input type="text" value="14.44"/> | gal/day |
| <input type="checkbox"/> 4. Titration? | | |
| 5. Caustic Titration Volume | <input type="text"/> | gal caustic/gal water treated |
| 6. Purity of Caustic Solution | <input type="text" value="99.00"/> | purity of 20% caustic solution |
| 7. Mixing Efficiency of Caustic Solution | <input type="text" value="80.00"/> | % |
| 8. Tank Cost | <input type="text" value="2000"/> | \$ |
| 9. Tank Volume | <input type="text" value="2500"/> | gal |
| 10. Delivery Frequency | <input type="text" value="12"/> | times/yr |
| 11. Valve Unit Cost | <input type="text" value="50.00"/> | \$ |
| 12. Number of Valves | <input type="text" value="2"/> | nbr |
| 13. Feeder Line Length | <input type="text" value="20"/> | ft |
| 14. Feeder Line Unit Cost | <input type="text" value="0.35"/> | \$/ft |
| 15. Installation of System Unit Cost | <input type="text" value="35.00"/> | \$/hr |
| 16. Installation Hours | <input type="text" value="8"/> | hours |

17. Automatic System?

- | | | |
|---|--------------------------------------|----|
| 18. PID pH Proportional Control | <input type="text"/> | \$ |
| 19. pH Probe | <input type="text"/> | \$ |
| 20. Chemical Metering Pump | <input type="text"/> | \$ |
| <input checked="" type="checkbox"/> 21. Water Wheel Dispenser | | |
| 22. Dispenser Cost | <input type="text" value="4000.00"/> | \$ |

Caustic Sub-Totals

- | | | |
|--|------------------------------------|-----|
| 23. Number of Tanks Required | <input type="text" value="1"/> | nbr |
| 24. Tank Cost | <input type="text" value="2,000"/> | \$ |
| 25. Automatic System or Wheel Dispenser Cost | <input type="text" value="4,000"/> | \$ |
| 26. Cost of Valves | <input type="text" value="100"/> | \$ |
| 27. Feeder Line Cost | <input type="text" value="7"/> | \$ |
| 28. Labor Cost | <input type="text" value="280"/> | \$ |

29. Total Capital Cost \$

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AMD TREAT PONDS

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Pond Name settling ponds

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 70.000 ft

9. Pond Width at Top of Freeboard 70.000 ft

	Run	Rise
10. Slope Ratio of Pond Sides	<input type="text"/> 2.0	: <input type="text"/> 1
11. Freeboard Depth	<input type="text"/> 2.0	ft
12. Water Depth	<input type="text"/> 6.0	ft
13. Excavation Unit Cost	<input type="text"/> 2.50	\$/yd3
14. Total Length of Effluent / Inlet Pipe	<input type="text"/> 20.00	ft
15. Unit Cost of Pipe	<input type="text"/> 7.90	\$/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 1500.00 \$/acre

24. Number of Ponds for this Design 3 number

25. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

26. Length at Top of Freeboard 70 ft

27. Width at Top of Freeboard 70 ft

28. Freeboard Volume 889 yd3

29. Water Volume 566 yd3

30. Estimated Annual Sludge 0 yd3/yr

31. Volume of Sludge per Removal 0 yd3/removal

32. Excavation Volume 0.35 acre ft

33. Excavation Volume 566 yd3

34. Clear and Grub Area 0.16 acres

35. Liner Area 0 yd2

36. Calculated Retention Time 63 hours

Ponds Sub-Totals per Pond

37. Excavation Cost 4,246 \$

38. Pipe Cost 158 \$

39. Liner Cost 0 \$

40. Clearing and Grubbing Cost 0 \$

41. Revegetation Cost 253 \$

42. Baffle Cost 0 \$

43. Estimated Cost 4,658 \$

44. Accept Minimum Pond Cost?

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

45. Recommended Minimum Cost 5,000 \$

46. Total Cost 5,000 \$

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) 159.00 mg/L

Design Flow 30.00 gpm

Typical Flow 15.00 gpm

Total Iron 2.75 mg/L

Aluminum 19.50 mg/L

Manganese 38.70 mg/L

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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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AMDTREAT

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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AMDTREAT

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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AMD TREAT

LABOR

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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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MAINTENANCE

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 \$
- 10. Total Maintenance Cost \$

* Ancillary Cost does not 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

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 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

D. Limestone ?

18. Limestone Purity %

19. Limestone Efficiency %

20. Limestone Unit Cost \$/ton

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

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="6,590"/> \$	<input type="text" value="5,272"/> gals
36. Total Limestone Cost <input type="text" value="116"/> \$	<input type="text" value="9"/> tons
37. Total Anhydrous Ammonia Cost <input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
38. Total Soda Ash Cost <input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
39. Total Known Chemical Cost <input type="text" value="0"/> \$	

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

1. Select One Selection for Method of Removing Sludge

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 \$

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 \$

24. Removal by Vacuum Truck \$

25. Removal by Mechanical Excavation \$

26. Removal by Lagoon Cleaner \$

27. Actual Sludge Removal Cost \$

Sludge Removal Sub-Totals

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

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AMD TREAT RECAPITIALIZATION 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. replace all caustic components	11,387	1	11,387	25	3	9,958
2.	0	0	0	0	0	0
3.	0	0	0	0	0	0
4.	0	0	0	0	0	0
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 \$