

Company Name C & K Coal Company

Project 16803030-D1

Site Name Smith Heasley



AMD TREAT

AMD TREAT MAIN COST FORM

AMDTREAT

Costs

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond			\$0
Anoxic Limestone Drain			\$0
Anaerobic Wetlands			\$0
Aerobic Wetlands	1	0	\$43,763
Manganese Removal Bed			\$0
Oxic Limestone Channel			\$0
Limestone Bed			\$0
BIO Reactor			\$0
Passive Subtotal:			\$43,763
<u>Active Treatment</u>			
Caustic Soda			\$0
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			\$0
<u>Ancillary Cost</u>			
Ponds	2	0	\$17,529
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost			\$0
Ancillary Subtotal:			\$17,529
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$61,292
<u>Annual Costs</u>			
Sampling	1	0	\$597
Labor	1	0	\$910
Maintenance	1	0	\$2,145
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:			\$3,652
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 \$0.603**

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COMMENTS:

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AMDTREAT

AMD TREAT AEROBIC WETLANDS

Aerobic Wetlands Name

**Opening Screen
Water Parameters**

**Influent Water
Parameters
that Affect
Aerobic Wetlands**

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

SIZING METHODS Select One

- Aerobic Wetland Based on Metal Removal Rates 1. Iron Removal Rate g/m2/day 2. Mn Removal Rate g/m2/day
- Aerobic Wetland Based on Dimensions 3. Top Length at Freeboard ft 4. Top Width at Freeboard ft
- Aerobic Wetland Based on Iron Oxidation Kinetics 5. Rate Constant moles/sec 6. Effluent Fe Concentration mg/l
- 7. Dissolved Oxygen mg/l 8. H2O Temperature °C

- 9. Length to Width Ratio Length : Width
- 10. Slope of Wetland Sides Run of Slope : Rise of Slope
- 11. Freeboard Depth ft
- 12. Free Standing Water Depth ft
- 13. Organic Matter Depth ft
- 14. Organic Matter Unit Cost \$/yd3
- 15. Organic Matter Spreading Unit Cost \$/yd3
- 16. Excavation Unit Cost \$/yd3
- 17. Wetland Planting Unit Cost \$/acre

Liner Cost

- No Liner
- Clay Liner
 - 18. Clay Liner Unit Cost \$/yd3
 - 19. Thickness of Clay Liner ft
- Synthetic Liner
 - 20. Synthetic Liner Unit Cost \$/yd2

21. Clearing and Grubbing?

- 22. Land Multiplier ratio
- 23. Clear/Grub Acres acres
- 24. Clear and Grub Unit Cost \$/acre

Aerobic Wetland Sizing Summaries

25. Length at Top of Freeboard	300.00	ft
26. Width at Top of Freeboard	125.00	ft
27. Freeboard Volume	2,013	yd3
28. Water Surface Area	34,986	ft2
29. Water Volume	640	yd3
30. Organic Matter Volume	1,235	yd3
31. Excavation Volume	1,875	yd3
32. Clear and Grub Area	0.0	acres
33. Liner Area	0	ft2
34. Retention Time	132	hrs

Aerobic Cost Summaries

35. Organic Matter Cost	30,263	\$
36. Excavation Cost	10,315	\$
37. Liner Cost	0	\$
38. Clear and Grub Cost	0	\$
39. Wetland Planting Cost	3,185	\$

40. Total Cost \$

Record Number 1 of 1

Company Name C & K Coal Company

Printed on 03/31/2008

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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 120.000 ft

9. Pond Width at Top of Freeboard 120.000 ft

Run Rise

10. Slope Ratio of Pond Sides 2.0 : 1

11. Freeboard Depth 2.0 ft

12. Water Depth 6.0 ft

13. Excavation Unit Cost 5.50 \$/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 \$/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. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard 120 ft

26. Width at Top of Freeboard 120 ft

27. Freeboard Volume 3,230 yd3

28. Water Volume 2,232 yd3

29. Estimated Annual Sludge 0 yd3/yr

30. Volume of Sludge per Removal 0 yd3/removal

31. Excavation Volume 1.38 acre ft

32. Excavation Volume 2,232 yd3

33. Clear and Grub Area 0.49 acres

34. Liner Area 0 yd2

35. Calculated Retention Time 461 hours

Ponds Sub-Totals per Pond

36. Excavation Cost 12,280 \$

37. Pipe Cost 0 \$

38. Liner Cost 0 \$

39. Clearing and Grubbing Cost 0 \$

40. Revegetation Cost 247 \$

41. Baffle Cost 0 \$

42. Estimated Cost 12,529 \$

Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity 113.38 mg/L

Alkalinity 180.00 mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity) -86.62 mg/L

Design Flow 16.30 gpm

Typical Flow 11.50 gpm

Total Iron 41.80 mg/L

Aluminum 0.00 mg/L

Manganese 21.10 mg/L

Record Number
1 of 2

Company Name C & K Coal Company

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AMD TREAT PONDS

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Pond Name

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 55.000 ft

9. Pond Width at Top of Freeboard 40.000 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 \$/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. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard 55 ft

26. Width at Top of Freeboard 40 ft

27. Freeboard Volume 278 yd3

28. Water Volume 141 yd3

29. Estimated Annual Sludge 0 yd3/yr

30. Volume of Sludge
per Removal 0 yd3/
removal

31. Excavation Volume 0.08 acre ft

32. Excavation Volume 141 yd3

33. Clear and Grub Area 0.07 acres

34. Liner Area 0 yd2

35. Calculated Retention Time 29 hours

Ponds Sub-Totals per Pond

36. Excavation Cost 638 \$

37. Pipe Cost 0 \$

38. Liner Cost 0 \$

39. Clearing and Grubbing Cost 0 \$

40. Revegetation Cost 37 \$

41. Baffle Cost 0 \$

42. Estimated Cost 676 \$

43. Accept Minimum Pond Cost?

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

44. Recommended Minimum Cost 5,000 \$

45. Total Cost 5,000 \$

Opening Screen
Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity

113.38 mg/L

Alkalinity

180.00 mg/L

Calculate Net
Acidity
(Acid-Alkalinity)

Enter Net Acidity
manually

Net Acidity
(Hot Acidity)

-66.62 mg/L

Design Flow

16.30 gpm

Typical Flow

11.50 gpm

Total Iron

41.80 mg/L

Aluminum

0.00 mg/L

Manganese

21.10 mg/L

Record Number

2 of 2

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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

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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 \$

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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 \$
- 10. Total Maintenance Cost \$

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

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AMD TREAT RECAPITIALIZATION COST

AMDTREAT

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. Wetland	43,763	1	43,763	20	3	23,923
2. Pond	17,529	1	17,529	20	3	9,582
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 \$