

Company Name C & K Coal Company

Project 10860118-D1

Site Name Snyder-Sertik



AMD TREAT

Costs

AMD TREAT MAIN COST FORM

AMD TREAT

<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	\$16,631
Manganese Removal Bed			\$0
Oxic Limestone Channel			\$0
Limestone Bed			\$0
BIO Reactor			\$0
Passive Subtotal:			\$16,631
<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	1	0	\$5,000
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost			\$0
Ancillary Subtotal:			\$5,000
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$21,631
<u>Annual Costs</u>			
Sampling	1	0	\$597
Labor	1	0	\$910
Maintenance	1	0	\$757
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:			\$2,264
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 \$2.152**

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COMMENTS:

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AMD TREAT AEROBIC WETLANDS

Aerobic Wetlands Name

**Opening Screen
Water Parameters**

**Influent Water
Parameters
that Affect
Aerobic Wetlands**

Calculated Acidity
 62.20 mg/L
Alkalinity
 73.00 mg/L

Calculate Net
Acidity
(Acid-Alkalinity)
 Enter Net Acidity
manually
Net Acidity
(Hot Acidity)
 -10.80 mg/L

Design Flow
 5.00 gpm
Typical Flow
 2.00 gpm
Total Iron
 26.80 mg/L
Aluminum
 0.00 mg/L
Manganese
 10.55 mg/L
pH
 6.00 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 150 ft 4. Top Width at Freeboard 100 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 2.0 : 1.000 Rise of Slope

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 20.00 \$/yd3

15. Organic Matter Spreading Unit Cost 4.50 \$/yd3

16. Excavation Unit Cost 5.50 \$/yd3

17. Wetland Planting Unit Cost 3700 \$/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	150.00	ft
26. Width at Top of Freeboard	100.00	ft
27. Freeboard Volume	792	yd3
28. Water Surface Area	13,536	ft2
29. Water Volume	246	yd3
30. Organic Matter Volume	466	yd3
31. Excavation Volume	713	yd3
32. Clear and Grub Area	0.0	acres
33. Liner Area	0	ft2
34. Retention Time	165	hrs

Aerobic Cost Summaries

35. Organic Matter Cost	11,435	\$
36. Excavation Cost	3,922	\$
37. Liner Cost	0	\$
38. Clear and Grub Cost	0	\$
39. Wetland Planting Cost	1,274	\$

40. Total Cost 16,631 \$

Record Number 1 of 1



AMD TREAT PONDS

AMDTREAT

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 ft

9. Pond Width at Top of Freeboard ft

Run Rise

10. Slope Ratio of Pond Sides :

11. Freeboard Depth ft

12. Water Depth ft

13. Excavation Unit Cost \$/yd3

14. Total Length of Effluent
/ Influent Pipe ft

15. Unit Cost of Pipe \$/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

1 of 1

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Printed on 03/31/2008

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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 \$

Record Number 1 of 1

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Printed on 03/31/2008

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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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AMD TREAT

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 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. Wetland	16,631	1	16,631	20	3	9,091
2. Pond	5,000	1	5,000	20	3	2,733
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 \$