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Company Name C & K Coal Company
Project 16830114-SCF-37
Site Name Tremba Horner

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	$77,778
Manganese Removal Bed			$0
Oxic Limestone Channel			$0
Limestone Bed			$0
BIO Reactor			$0
Passive Subtotal:			**$77,778**
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	$5,000
Roads			$0
Land Access			$0
Ditching			$0
Engineering Cost			$0
Ancillary Subtotal:			**$5,000**
Other Cost (Capital Cost)			$0
Total Capital Cost:			**$82,778**
Annual Costs			
Sampling	1	0	$750
Labor	1	0	$910
Maintenance	1	0	$2,897
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:			**$4,557**
Other Cost			

Water Quality

Calculated Acidity	0.00	mg/L
Alkalinity	566.00	mg/L

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

Net Acidity (Hot Acidity)	-566.00	mg/L
Design Flow	20.07	gpm
Typical Flow	15.00	gpm
Total Iron	19.75	mg/L
Aluminum	0.00	mg/L
Manganese	6.48	mg/L
pH	6.70	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	0.00	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	0.0	tons/yr

Total Annual Cost: per 1000 Gal of H2O Treated **$0.577**

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COMMENTS:

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AMD TREAT

AEROBIC WETLANDS

AMDTREAT

Aerobic Wetlands Name

☑ **Opening Screen Water Parameters**

Influent Water Parameters that Affect Aerobic Wetlands

Calculated Acidity: 0.00 mg/L

Alkalinity: 566.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

○ Enter Net Acidity manually

Net Acidity (Hot Acidity): -566.00 mg/L

Design Flow: 20.07 gpm

Typical Flow: 15.00 gpm

Total Iron: 19.75 mg/L

Aluminum: 0.00 mg/L

Manganese: 6.48 mg/L

pH: 6.70 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: 323 ft — 4. Top Width at Freeboard: 200 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

	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	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	323.00	ft
26. Width at Top of Freeboard	200.00	ft
27. Freeboard Volume	3,502	yd3
28. Water Surface Area	61,498	ft2
29. Water Volume	1,129	yd3
30. Organic Matter Volume	2,202	yd3
31. Excavation Volume	3,332	yd3
32. Clear and Grub Area	0.0	acres
33. Liner Area	0	ft2
34. Retention Time	189	hrs

Aerobic Cost Summaries

35. Organic Matter Cost	53,965	$
36. Excavation Cost	18,326	$
37. Liner Cost	0	$
38. Clear and Grub Cost	0	$
39. Wetland Planting Cost	5,487	$
40. Total Cost	77,778	$

Record Number 1 of 1

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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 200.000 ft
  - 9. Pond Width at Top of Freeboard 46.000 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 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

☑ **Opening Screen Water Parameters**

Influent Water Parameters that Affect Ponds

Calculated Acidity 0.00 mg/L

Alkalinity 566.00 mg/L

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

Net Acidity (Hot Acidity) -566.00 mg/L

Design Flow 20.07 gpm

Typical Flow 15.00 gpm

Total Iron 19.75 mg/L

Aluminum 0.00 mg/L

Manganese 6.48 mg/L

Record Number 1 of 1

23. Revegetation Cost 1500.00 $/acre

24. Cost of Baffles 0 $

Calculated Pond Dimensions per Pond

- 25. Length at Top of Freeboard 200 ft
- 26. Width at Top of Freeboard 46 ft
- 27. Freeboard Volume 1,431 yd3
- 28. Water Volume 820 yd3
- 29. Estimated Annual Sludge 0 yd3/yr
- 30. Volume of Sludge per Removal 0 yd3/ removal
- 31. Excavation Volume 0.50 acre ft
- 32. Excavation Volume 820 yd3
- 33. Clear and Grub Area 0.31 acres
- 34. Liner Area 0 yd2
- 35. Calculated Retention Time 137 hours

Ponds Sub-Totals per Pond

- 36. Excavation Cost 4,515 $
- 37. Pipe Cost 0 $
- 38. Liner Cost 0 $
- 39. Clearing and Grubbing Cost 0 $
- 40. Revegetation Cost 158 $
- 41. Baffle Cost 0 $

☑ 42. Estimated Cost 4,674 $

☑ 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 $

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SAMPLING

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Sampling Name

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	0.33	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.33	samples/mo
5. Lab Cost Per Sample	27.00	$/sample
6. Number of Sample Points	4	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost		$

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	428	$
9. Yearly Travel Cost	139	$
10. Yearly Collection Cost	183	$
11. Sampling Cost	750	$

Record Number 1 of 1

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AMD TREAT

LABOR

Labor Name

(•) **Estimate Labor Cost**

1. Site Visits per Week	0.25	
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	910	$

Record Number 1 of 1

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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	0	$
7. Total Maintenance Passive Cost	2,722	$
8. Total Maintenance Ancillary Cost	175	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	2,897	$

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

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AMD TREAT
RECAPITIZALITION COST

AMDTREAT

Calculation Period 75 yrs Inflation Rate 3.10 % Net Return Rate 8.43 %

Recapitizalition Name

A.	B	C	D	E	F	G
Description of Item	Unit Cost Per Item	Quantity	Total Item Cost	Life Cycle	Number of Periods	Total PV
1. Wetland	77,778	1	77,778	20	3	42,518
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 82,778 $ PV Grand Total 45,251 $