

Company Name C & K Coal  
 Project SBG 32  
 Site Name Bell - Woodcock



**AMD TREAT**

**Costs AMD TREAT MAIN COST FORM**

**AMDTREAT**

<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:			<b>\$0</b>
<u>Active Treatment</u>			
Caustic Soda	1	0	\$12,387
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			<b>\$0</b>
<u>Ancillary Cost</u>			
Ponds	1	0	\$18,388
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$3,078
Ancillary Subtotal:			<b>\$21,466</b>
Other Cost (Capital Cost)			\$0
Total Capital Cost:			<b>\$33,853</b>
<u>Annual Costs</u>			
Sampling	2	0	\$1,226
Labor	1	0	\$10,920
Maintenance	1	0	\$372
Pumping			\$0
Chemical Cost	1	0	\$165,796
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$5,264
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			<b>\$183,578</b>
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 **\$1.163**

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**AMDTREAT**

**AMD TREAT  
CAUSTIC SODA**

Caustic Soda Name

**Opening Screen  
Water Parameters**

**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  \$

**Record Number 1 of 1**

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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

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  100.000 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"/> 4.0	ft
13. Excavation Unit Cost	<input type="text"/> 2.50	\$/yd3
14. Total Length of Effluent / Influent 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  200 ft

27. Width at Top of Freeboard  100 ft

28. Freeboard Volume  3,687 yd3

29. Water Volume  2,292 yd3

30. Estimated Annual Sludge  0 yd3/yr

31. Volume of Sludge  0 yd3/  
per Removal

32. Excavation Volume  1.42 acre ft

33. Excavation Volume  2,292 yd3

34. Clear and Grub Area  0.68 acres

35. Liner Area  0 yd2

36. Calculated Retention Time  19 hours

### Ponds Sub-Totals per Pond

37. Excavation Cost  17,197 \$

38. Pipe Cost  158 \$

39. Liner Cost  0 \$

40. Clearing and Grubbing Cost  0 \$

41. Revegetation Cost  1,033 \$

42. Baffle Cost  0 \$

43. Estimated Cost  18,388 \$

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)  200.00 mg/L

Design Flow  400.00 gpm

Typical Flow  300.00 gpm

Total Iron  10.60 mg/L

Aluminum  15.40 mg/L

Manganese  6.90 mg/L

Record Number  
1 of 1

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**AMD TREAT  
ENGINEERING COST**



**AMDTREAT**

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  \$

Record Number 1 of 2

Company Name C & K Coal

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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 2 of 2

Company Name C & K Coal

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AMDTREAT

## AMD TREAT

### 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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AMDTREAT

### AMD TREAT

### 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





## AMD TREAT CHEMICAL COST

**AMDTREAT**

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**

33. Total Hydrated Lime Cost  \$

34. Total Pebble Lime Cost  \$

35. Total Caustic Soda Cost  \$

36. Total Limestone Cost  \$

37. Total Anhydrous Ammonia Cost  \$

38. Total Soda Ash Cost  \$

39. Total Known Chemical Cost  \$

40. Selected Chemical: **CAUSTIC SODA**

Annual Chemical Cost  \$

**Annual Amount of Chemicals Consumed**

33. Total Hydrated Lime Cost  lbs

34. Total Pebble Lime Cost  lbs

35. Total Caustic Soda Cost  gals

36. Total Limestone Cost  tons

37. Total Anhydrous Ammonia Cost  lbs

38. Total Soda Ash Cost  lbs

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**AMDTREAT**

## 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

**AMDTREAT**

Calculation Period  yrs Inflation Rate  % Net Return Rate  %

Recapitalization 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. replace entire caustic system	30,775	1	30,775	25	3	26,914
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  \$