12/5/2007

C&O Coal CO 56823108 Burkholder

This is an intermittent flow discharge that only flows about 3 months a year. Flow is typically less than 5 gpm. Water analysis over the past few years is showing an improvement in raw water quality. The company currently uses lime for treatment but with the intermittent flow a caustic system would probably be better so that is what I calculated. I also included a Chemstream water wheel. Since the discharge only flows 3 months a year I only calculated sampling of the upstream and downstream as quarterly and sampled the raw and final 4 times/year which in the calculation looks like it is quarterly. Labor was calculated as once a week for 3 months or 12 times a year so the calculation looks like it is monthly.
If someone were to argue about the cost being too low the only real additions could be to visit the site more often to verify that the discharge is in fact not flowing and to add a value for additional sludge removal. Since these are both annual costs they may add significantly to the trust/bond depending on the value added.

Printed on 12/05/2007

Company Name C&O Coal Co
Project MD1
Site Name Burkholder

AMD TREAT

AMD TREAT MAIN COST FORM

Costs

Passive Treatment	A	S	
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**
Active Treatment			
Caustic Soda	1	0	$3,387
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:			**$8,387**
Annual Costs			
Sampling	2	0	$812
Labor	1	0	$837
Maintenance	1	0	$119
Pumping			$0
Chemical Cost	1	0	$108
Oxidant Chem Cost			$0
Sludge Removal	1	0	$16
Other Cost (Annual Cost)			$0
Land Access (Annual Cost)			$0
Total Annual Cost:			**$1,892**
Other Cost			

Water Quality

Calculated Acidity	35.00	mg/L
Alkalinity	12.00	mg/L

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

Net Acidity (Hot Acidity)	50.00	mg/L
Design Flow	30.00	gpm
Typical Flow	3.00	gpm
Total Iron	1.00	mg/L
Aluminum	2.50	mg/L
Manganese	6.00	mg/L
pH	4.50	su
Ferric Iron	0.00	mg/L
Ferrous Iron	0.00	mg/L
Sulfate	350.00	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

Total Annual Cost: per 1000 Gal of H2O Treated **$1.199**

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

Printed on 12/05/2007

AMD TREAT

CAUSTIC SODA

AMDTREAT

☑ **Opening Screen Water Parameters**

Caustic Soda Name: prposed caustic system

Influent Water Parameters that Affect Caustic Soda

Calculated Acidity: 35.00 mg/L

Alkalinity: 12.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

○ Enter Net Acidity manually

Net Acidity (Hot Acidity): 50.00 mg/L

Design Flow: 30.00 gpm

Typical Flow: 3.00 gpm

Total Iron: 1.00 mg/L

Aluminum: 2.50 mg/L

Manganese: 6.00 mg/L

1. Gallons of Caustic per Year	294.74	gal/yr
2. Gallons of Caustic per Month	24.56	gal/mo
3. Gallons of Caustic per Day	0.80	gal/day
☐ 4. Titration?		
5. Caustic Titration Volume		gal caustic/gal water treated
6. Purity of Caustic Solution	99.00	purity of 20% caustic solution
7. Mixing Efficiency of Caustic Solution	90.00	%
8. Tank Cost	500	$
9. Tank Volume	500	gal
10. Delivery Frequency	1	times/yr
11. Valve Unit Cost	50.00	$
12. Number of Valves	2	nbr
13. Feeder Line Length	20	ft
14. Feeder Line Unit Cost	0.35	$/ft
15. Installation of System Unit Cost	35.00	$/hr
16. Installation Hours	8	hours

☐ 17. Automatic System?		
18. PID pH Proportional Control		$
19. pH Probe		$
20. Chemical Metering Pump		$
☑ 21. Water Wheel Dispenser		
22. Dispenser Cost	2500.00	$

Caustic Sub-Totals

23. Number of Tanks Required	1	nbr
24. Tank Cost	500	$
25. Automatic System or Wheel Dispenser Cost	2,500	$
26. Cost of Valves	100	$
27. Feeder Line Cost	7	$
28. Labor Cost	280	$
29. Total Capital Cost	3,387	$

Record Number 1 of 1

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

Printed on 12/05/2007

AMD TREAT

PONDS

AMDTREAT

Pond Name: treatment 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: 75.000 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	6.0			ft
13. Excavation Unit Cost	2.50			$/yd3
14. Total Length of Effluent / Influent Pipe	20.00			ft
15. Unit Cost of Pipe	2.75			$/ft

Liner Cost

- ○ No Liner
- ◉ Clay Liner
  - 16. Clay Liner Unit Cost: 4.00 $/yd3
  - 17. Thickness of Clay Liner: 1.0 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: 35.00 mg/L

Alkalinity: 12.00 mg/L

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

Net Acidity (Hot Acidity): 50.00 mg/L

Design Flow: 30.00 gpm

Typical Flow: 3.00 gpm

Total Iron: 1.00 mg/L

Aluminum: 2.50 mg/L

Manganese: 6.00 mg/L

Record Number 1 of 1

23. Revegetation Cost	1500.00	$/acre
24. Number of Ponds for this Design	2	number
25. Cost of Baffles	0	$

Calculated Pond Dimensions per Pond

26. Length at Top of Freeboard	75	ft
27. Width at Top of Freeboard	40	ft
28. Freeboard Volume	444	yd3
29. Water Volume	255	yd3
30. Estimated Annual Sludge	2	yd3/yr
31. Volume of Sludge per Removal	2	yd3/ removal
32. Excavation Volume	0.15	acre ft
33. Excavation Volume	255	yd3
34. Clear and Grub Area	0.10	acres
35. Liner Area	439	yd2
36. Calculated Retention Time	28	hours

Ponds Sub-Totals per Pond

37. Excavation Cost	1,825	$
38. Pipe Cost	55	$
39. Liner Cost	879	$
40. Clearing and Grubbing Cost	0	$
41. Revegetation Cost	103	$
42. Baffle Cost	0	$

☑ 43. Estimated Cost: 2,864 $

☑ 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 $

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

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AMD TREAT

SAMPLING

AMDTREAT

Sampling Name: quarterly sample - upstream, downstream

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	0.25	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.33	samples/mo
5. Lab Cost Per Sample	25.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost		$

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	198	$
9. Yearly Travel Cost	139	$
10. Yearly Collection Cost	69	$
11. Sampling Cost	406	$

Record Number 1 of 2

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

Printed on 12/05/2007

AMD TREAT

SAMPLING

AMDTREAT

Sampling Name: 4 samples/yr of raw and final

Estimate Sampling Cost

1. Unit Labor Cost	35.00	$/hr
2. Collection Time per Sample	0.25	hours/sample
3. Travel Time	1.00	hr
4. Sample Frequency	0.33	samples/mo
5. Lab Cost Per Sample	25.00	$/sample
6. Number of Sample Points	2	points

Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost		$

Sampling Sub-Totals

8. Yearly Sample Analysis Cost	198	$
9. Yearly Travel Cost	139	$
10. Yearly Collection Cost	69	$
11. Sampling Cost	406	$

Record Number 2 of 2

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

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AMDTREAT

AMD TREAT

LABOR

Labor Name: once a week for 3 months

Estimate Labor Cost

1. Site Visits per Week	0.23	
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	837	$

Record Number 1 of 1

Printed on 12/05/2007

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

AMD TREAT

MAINTANENCE

◉ **Estimate Maintenance Cost**

1. Percent of Active Cost	3.50	%
2. Percent of Passive Cost	1.00	%
3. Percent of Ancillary Cost *	0.01	%
4. Percent of Other Capital Cost	0.01	%

○ **Enter Established Annual Maintenance Cost**

5. Annual Maintenance Cost		$

Maintenance Sub-Totals

6 Total Maintenance Active Cost	119	$
7. Total Maintenance Passive Cost	0	$
8. Total Maintenance Ancillary Cost	0	$
9. Total Maintenance Other Capital Cost	0	$
10. Total Maintenance Cost	119	$

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

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

Printed on 12/05/2007

AMD TREAT
CHEMICAL COST

AMDTREAT

Chemical Cost Name:

☐ **Opening Screen Water Parameters**

Influent Water Parameters that Affect Chemical Cost

Calculated Acidity: 35.00 mg/L

Alkalinity: 12.00 mg/L

◉ Calculate Net Acidity (Acid-Alkalinity)

○ Enter Net Acidity manually

Net Acidity (Hot Acidity): 23.00 mg/L

Design Flow: 30.00 gpm

Typical Flow: 3.00 gpm

Total Iron: 1.00 mg/L

Aluminum: 2.50 mg/L

Manganese: 6.00 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 ofcaustic / gal H2O

14. Caustic Purity: 99.00 — purity of 20% caustic solution

15. Mixing Efficiency of Caustic: 90.00 %

○ Non-Bulk Delivery

16. Caustic Non-Bulk Unit Cost — $/gal

◉ Bulk Delivery

17. Caustic Bulk Unit Cost: 0.80 $/gal

○ D. Limestone ?

18. Limestone Purity — %

19. Limestone Efficiency — %

20 Limestone Unit Cost — $/ton

○ E. Anhydrous Ammonia ?

☐ 21. Titration?

22. AmmoniaTitration 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			Annual Amount of Chemicals Consumed	
33. Total Hydrated Lime Cost	0	$	0	lbs
34. Total Pebble Lime Cost	0	$	0	lbs
35. Total Caustic Soda Cost	108	$	135	gals
36. Total Limestone Cost	0	$	0	tons
37. Total Anhydrous Ammonia Cost	0	$	0	lbs
38. Total Soda Ash Cost	0	$	0	lbs
39. Total Known Chemical Cost	0	$		

40. Selected Chemical: **CAUSTIC SODA**

Annual Chemical Cost: 108 $

Company Name C&O Coal Co

Project MD1

Site Name Burkholder

Printed on 12/05/2007

AMD TREAT

SLUDGE REMOVAL

AMDTREAT

☑ **Opening Screen Water Parameters**

Influent Water Parameters that Affect Sludge Removal

Calculated Acidity: 35.00 mg/L

Alkalinity: 12.00 mg/L

○ Calculate Net Acidity (Acid-Alkalinity)

◉ Enter Net Acidity manually

Net Acidity (Hot Acidity): 50.00 mg/L

Design Flow: 30.00 gpm

Typical Flow: 3.00 gpm

Total Iron: 1 mg/L

Aluminum: 3 mg/L

Manganese: 6 mg/L

Sludge Removal Name

1. Select One — Selection for Method of Removing Sludge

◉ Sludge Removal by $ per Gallon

2. Sludge Removal Unit Cost: 0.05 $/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: 0.00 $

Record Number 1 of 1

14. Iron Concentration: 1.00 mg/L

15. Manganese Concentration: 6.00 mg/L

16. Aluminum Concentration: 2.50 mg/L

17. Total Miscellaneous Concentration: 0 mg/L

18. Percent Solids: 5.00 %

19. Sludge Density: 8.33 lbs/gal

☐ 20 Titration?

21. Gal. of Sludge per Gal of Water Treated: gal

22. Estimated Sludge Volume: 1 yd3/yr

Cost for Sludge Removal Types

23. Removal by $ per Gallon: 15 $

24. Removal by Vacuum Truck: 0 $

25. Removal by Mechanical Excavation: 0 $

26. Removal by Lagoon Cleaner: 0 $

27. Actual Sludge Removal Cost: 0 $

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost: 16 $

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Company Name C&O Coal Co

Project MD1

Site Name Burkholder

AMD TREAT
RECAPITIZALITION COST

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

Recapitizalition Name trust recap

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. rebuild/replace entire system	8,387	1	8,387	20	3	4,585
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 8,387 $ PV Grand Total 4,585 $

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Company Name C&O Coal Co

Project MD1

Site Name Burkholder

AMD TREAT
RECAPITIZALITION COST

AMDTREAT

Calculation Period 75 yrs Inflation Rate 3.10 % Net Return Rate 6.00 %

Recapitizalition Name bond recap

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. rebuild/replace entire system	8,387	1	8,387	20	3	9,169
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 8,387 $ PV Grand Total 9,169 $