

Company Name REM Coal Co., Inc.

Project 16820107-RT12

Site Name Truittsburg



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:			\$0
<u>Active Treatment</u>			
Caustic Soda	1	0	\$2,387
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			\$0
<u>Ancillary Cost</u>			
Ponds	2	0	\$10,000
Roads	1	0	\$16,822
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$5,842
Ancillary Subtotal:			\$32,664
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$35,051
<u>Annual Costs</u>			
Sampling	1	0	\$1,152
Labor	1	0	\$21,840
Maintenance	1	0	\$1,022
Pumping			\$0
Chemical Cost	1	0	\$1,375
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$357
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$25,746
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 \$2.447**

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COMMENTS: Sludge removal every 5 years

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AMD TREAT CAUSTIC SODA

AMDTREAT

**Opening Screen
Water Parameters**

Caustic Soda Name

**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

Company Name REM Coal Co., Inc.

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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 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 2

Company Name REM Coal Co., Inc.

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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 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
/ Inflow 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

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Project 16820107-RT12

Site Name Truittsburg

AMD TREAT ROADS



AMDTREAT

Road Name

- 1. Road Length ft
- 2. Road Width ft
- 3. Road Depth ft
- 4. Aggregate Unit Cost \$/yd3
- 5. GeoTextile Length ft
- 6. GeoTextile Unit Cost \$/yd2
- 7. Length of Silt Fence ft
- 8. Unit Cost of Silt Fence \$/ft
- 9. Surveying?
- 10. Survey Rate acres/day
- 11. Survey Unit Cost \$/day
- 12. Clearing and Grubbing?
- 13. Clear and Grub Cost \$/acre

- 14. Reveg Unit Cost \$/acre
- 15. Culvert Unit Cost \$/ft
- 16. Culvert Length ft

Roads Sub-Totals

- 17. Road Surface Cost \$
- 18. GeoTextile Cost \$
- 19. Silt Fence Cost \$
- 20. Culvert Cost \$
- 21. Revegetation Cost \$
- 22. Survey Cost \$
- 23. Clear and Grub Cost \$

24. Total Cost \$

Record Number 1 of 1

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AMDTREAT

**AMD TREAT
ENGINEERING COST**

1. Capital Cost *	<input type="text" value="29,209"/>	\$
2. Per Cent of Capital Cost	<input type="text" value="20.00"/>	%
3. Actual Engineering Cost	<input type="text"/>	\$

4. Total Engineering Cost \$

*** Total Capital Cost minus Engineering and
Land Access Capital Cost**

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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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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

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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

18. Flocculents?

19. Flocculent Consumption gal/hr

20. Flocculent Unit Cost \$/gal

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 Anhydrous Ammonia Cost \$

37. Total Soda Ash Cost \$

38. Total Known Chemical Cost \$

39. Total Flocculent Cost \$

**Annual Amount of
Chemicals Consumed**

lbs

lbs

gals

lbs

lbs

gals

40. Selected Chemical: **CAUSTIC SODA**

Annual Chemical Cost \$

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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 \$

Concentrations from Main Water Quality Screen

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 gal

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

Record Number 1 of 1

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AMD TREAT RECAPITALIZATION 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. Caustic System	2,387	1	2,387	20	3	2,609
2. Ponds	10,000	1	10,000	20	3	10,932
3. Road	16,822	1	16,822	20	3	18,390
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 \$