Printed on 08/21/2007

Company Name Bulldog Excavating
Project Bulldog Excavating
Site Name Andrews MD1

# 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 | 1 | 0 | $893 |
| Oxic Limestone Channel | | | $0 |
| Limestone Bed | | | $0 |
| BIO Reactor | | | $0 |
| Passive Subtotal: | | | **$893** |
| **Active Treatment** | | | |
| Caustic Soda | | | $0 |
| Hydrated Lime | | | $0 |
| Pebble Quick Lime | | | $0 |
| Ammonia | | | $0 |
| Oxidants | | | $0 |
| Soda Ash | 1 | 0 | $500 |
| Active Subtotal: | | | **$0** |
| **Ancillary Cost** | | | |
| Ponds | 1 | 0 | $5,000 |
| Roads | 1 | 0 | $577 |
| Land Access | | | $0 |
| Ditching | 1 | 0 | $3,870 |
| Engineering Cost | 1 | 0 | $1,084 |
| Ancillary Subtotal: | | | **$10,531** |
| Other Cost (Capital Cost) | | | $0 |
| Total Capital Cost: | | | **$11,924** |
| **Annual Costs** | | | |
| Sampling | 1 | 0 | $2,174 |
| Labor | 1 | 0 | $21,840 |
| Maintenance | 1 | 0 | $307 |
| Pumping | | | $0 |
| Chemical Cost | | | $0 |
| Oxidant Chem Cost | | | $0 |
| Sludge Removal | 1 | 0 | $33 |
| Other Cost (Annual Cost) | | | $0 |
| Land Access (Annual Cost) | | | $0 |
| **Total Annual Cost:** | | | **$24,354** |
| Other Cost | | | |

### Water Quality

| | | |
|---|---|---|
| Calculated Acidity | 165.00 | mg/L |
| Alkalinity | 0.00 | mg/L |

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

| | | |
|---|---|---|
| Net Acidity (Hot Acidity) | 165.00 | mg/L |
| Design Flow | 2.00 | gpm |
| Typical Flow | 1.00 | gpm |
| Total Iron | 14.00 | mg/L |
| Aluminum | 0.69 | mg/L |
| Manganese | 48.00 | mg/L |
| pH | 3.30 | su |
| Ferric Iron | 0.00 | mg/L |
| Ferrous Iron | 1.33 | mg/L |
| Sulfate | 1200.00 | 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** **$46.303**

Printed on 08/21/2007

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

# AMD TREAT
## MANGANESE REMOVAL BED

AMDTREAT

MN Removal Bed Name

| SIZING METHODS | Select One | | | |
|---|---|---|---|---|
| Tons of Limestone Needed | 59.14 | (•) Based on Retention Time | 1. Retention Time | 1.00 days |
| Tons of Limestone Needed | 200.00 | ( ) Based on Tons of Limestone | 2. Limestone Needed | tons |
| Tons of Limestone Needed | 919.45 | ( ) Based on Dimensions | 3. Length at Top of Freeboard | ft |
| Tons of Limestone Needed | 0.00 | ( ) Based on Kinetics | 4. Width at Top of Freeboard | ft |
| | | | 5. Rate Constant (k) | hr/ft |

☐ **Opening Screen Water Parameters**

**Influent Water Parameters that Affect MN Removal Bed**

Calculated Acidity 165.00 mg/L

Alkalinity 0.00 mg/L

(•) Calculate Net Acidity (Acid-Alkalinity)

( ) Enter Net Acidity manually

Net Acidity (Hot Acidity) 165.00 mg/L

Design Flow 2.00 gpm

Typical Flow 1.00 gpm

Total Iron 14.00 mg/L

Aluminum 0.69 mg/L

Manganese 48.00 mg/L

| | | |
|---|---|---|
| 6. Stone Diameter | 1.00 | inches |
| 7. Effleunt Mn Concentration | 5.00 | mg/l |
| 8. % Void Space of Limestone Bed | 35.00 | % |
| 9 Density of Loose Limestone | 107.53 | lbs/ft3 |
| 10. Limestone Unit Cost | 12.00 | $/ton |
| 11. Limestone Placement Unit Cost | 0.00 | $/yd3 |
| 12. Freeboard Depth | 2.00 | ft |
| 13. Limestone Depth | 1.00 | ft |
| 14. Excavation Unit Cost | 4.50 | $/yd3 |

| | Run | Rise |
|---|---|---|
| 15. Slope of Pond Sides | 2.0 : | 1 |

**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 |

**Manganese Removal Bed Sizing Summaries**

| | | |
|---|---|---|
| 23. Top Length at Freeboard | 57.88 | ft |
| 23. Top Width at Freeboard | 32.94 | ft |
| 25. Freeboard Volume | 115 | yd3 |
| 26. Limestone Surface Area | 1,244.3 | ft2 |
| 27. Limestone Volume | 40.7 | yd3 |
| 28. Tons of Limestone | 59 | tons |
| 29. Excavation Volume | 40 | yd3 |
| 30. Clear and Grub Area | 0.0 | acres |
| 31. Liner Area | 0 | ft2 |
| 32. Theoretical Retention Time | 1.00 | days |

**Manganese Removal Bed Sub-Totals**

| | | |
|---|---|---|
| 33. Limestone Cost | 710 | $ |
| 34. Limestone Placement Cost | 0 | $ |
| 35. Excavation Cost | 183 | $ |
| 36. Liner Cost | 0 | $ |
| 37. Clear and Grub Cost | 0 | $ |
| 38. Total Cost | 893 | $ |

**Record Number 1 of 1**

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

Printed on 08/21/2007


# AMD TREAT

## SODA ASH

1. Soda Ash Dispenser Cost [500] $

Company Name Bulldog Excavating
Project Bulldog Excavating
Site Name Andrews MD1

Printed on 08/21/2007

# AMD TREAT

## PONDS

AMDTREAT

Pond Name: Settling Pond

☐ **Opening Screen Water Parameters**

**Influent Water Parameters that Affect Ponds**

Calculated Acidity: 165.00 mg/L
Alkalinity: 0.00 mg/L

◉ Calculate Net Acidity (Acid-Alkalinity)
○ Enter Net Acidity manually
Net Acidity (Hot Acidity): 165.00 mg/L

Design Flow: 8.00 gpm
Typical Flow: 4.00 gpm
Total Iron: 0.30 mg/L
Aluminum: 10.50 mg/L
Manganese: 9.76 mg/L

**Record Number 1 of 1**

**Pond Design Based On:**

◉ Retention Time
1. Desired Retention Time: 24.0 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 | 2.0 | 1 |

11. Freeboard Depth: 2.0 ft
12. Water Depth: 4.0 ft
13. Excavation Unit Cost: 4.50 $/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

23. Revegetation Cost: 1500.00 $/acre
24. Number of Ponds for this Design: 1 number
25. Cost of Baffles: 0 $

**Calculated Pond Dimensions per Pond**

| | | |
|---|---|---|
| 26. Length at Top of Freeboard | 47 | ft |
| 27. Width at Top of Freeboard | 27 | ft |
| 28. Freeboard Volume | 133 | yd3 |
| 29. Water Volume | 57 | yd3 |
| 30. Estimated Annual Sludge | 0 | yd3/yr |
| 31. Volume of Sludge per Removal | 0 | yd3/ removal |
| 32. Excavation Volume | 0.03 | acre ft |
| 33. Excavation Volume | 57 | yd3 |
| 34. Clear and Grub Area | 0.04 | acres |
| 35. Liner Area | 0 | yd2 |
| 36. Calculated Retention Time | 24 | hours |

**Ponds Sub-Totals per Pond**

| | | |
|---|---|---|
| 37. Excavation Cost | 256 | $ |
| 38. Pipe Cost | 0 | $ |
| 39. Liner Cost | 0 | $ |
| 40. Clearing and Grubbing Cost | 0 | $ |
| 41. Revegetation Cost | 22 | $ |
| 42. Baffle Cost | 0 | $ |

☑ 43. Estimated Cost: 279 $

☑ 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 Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

Printed on 08/21/2007

# AMD TREAT

## ROADS

AMDTREAT

Road Name

| | | |
|---|---|---|
| 1. Road Length | 200 | ft |
| 2. Road Width | 15 | ft |
| 3. Road Depth | 0.50 | ft |
| 4. Aggregate Unit Cost | 10.00 | $/yd3 |
| 5. GeoTextile Length | 0 | ft |
| 6. GeoTextile Unit Cost | 0.50 | $/yd2 |
| 7. Length of Silt Fence | 0 | ft |
| 8. Unit Cost of Silt Fence | 1.00 | $/ft |
| ☐ 9. Surveying? | | |
| 10. Survey Rate | | acres/day |
| 11. Survey Unit Cost | | $/day |
| ☐ 12. Clearing and Grubbing? | | |
| 13. Clear and Grub Cost | | $/acre |

**Record Number 1 of 1**

| | | |
|---|---|---|
| 14. Reveg Unit Cost | 1500.00 | $/acre |
| 15. Culvert Unit Cost | 30.00 | $/ft |
| 16. Culvert Length | 0 | ft |

**Roads Sub-Totals**

| | | |
|---|---|---|
| 17. Road Surface Cost | 556 | $ |
| 18. GeoTextile Cost | 0 | $ |
| 19. Silt Fence Cost | 0 | $ |
| 20. Culvert Cost | 0 | $ |
| 21. Revegetation Cost | 21 | $ |
| 22. Survey Cost | 0 | $ |
| 23. Clear and Grub Cost | 0 | $ |
| 24. Total Cost | 577 | $ |

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

Printed on 08/21/2007

# AMD TREAT

## DITCHING

AMDTREAT

Ditching Name

| | | |
|---|---|---|
| 1. Ditch Length Rock | 200 | ft |
| 2. Ditch Length Grass | 100 | ft |
| 3. Bottom Width of Ditch | 1.0 | ft |
| 4. Ditch Depth | 2.00 | ft |
| 5. Geo Textile Unit Cost | 0.00 | $/yd2 |
| 6. Length of Geo Textile | 100 | ft |

7. Slope Ratio of Ditch Sides — Run 2.00 : Rise 1.00

☐ 8. Surveying?

| | | |
|---|---|---|
| 9. Survey Rate | | acres/day |
| 10. Survey Unit Cost | | $/day |

☐ 11. Clearing and Grubbing?

| | | |
|---|---|---|
| 12. Clear and Grub Cost | | $/acre |

**Record Number 1 of 1**

| | | |
|---|---|---|
| 13. Ditch Depth of Rock | 1.50 | ft |
| 14. Cost of Ditch Surface Rock | 18.00 | $/yd3 |
| 15. Cost to Place Rock | 12.00 | $/yd3 |
| 16. Excavation Unit Cost | 4.50 | $/yd3 |
| 17. Length of Silt Fence | 0.00 | ft |
| 18. Unit Cost of Silt Fence | 1.00 | $/ft |
| 19. Revegetation Unit Cost | 1500.00 | $/acre |

**Ditching Sub-Totals**

| | | |
|---|---|---|
| 20. Excavation Cost | 500 | $ |
| 21. Survey Cost | 0 | $ |
| 22. Clear and Grub Cost | 0 | $ |
| 23. Aggregate Cost | 3,315 | $ |
| 24. Filter Fabric Cost | 0 | $ |
| 25. Silt Fence Cost | 0 | $ |
| 26. Revegetation Cost | 55 | $ |
| 27. Total Cost | 3,870 | $ |

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

Printed on 08/21/2007


# AMD TREAT

## ENGINEERING COST

| | | |
|---|---|---|
| 1. Capital Cost * | 10,840 | $ |
| (•) 2. Per Cent of Capital Cost | 10.00 | % |
| ( ) 3. Actual Engineering Cost | | $ |
| 4. Total Engineering Cost | 1,084 | $ |

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

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

Printed on 08/21/2007

# AMD TREAT

## SAMPLING

AMDTREAT

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 | 1.00 | samples/mo |
| 5. Lab Cost Per Sample | 25.00 | $/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 | 1,200 | $ |
| 9. Yearly Travel Cost | 420 | $ |
| 10. Yearly Collection Cost | 554 | $ |

| | | |
|---|---|---|
| 11. Sampling Cost | 2,174 | $ |

**Record Number 1 of 1**

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

Printed on 08/21/2007


# AMD TREAT

## LABOR

Labor Name

**Estimate Labor Cost**

| | | |
|---|---|---|
| 1. Site Visits per Week | 3.00 | |
| 2. Site Labor Time per Visit | 2.00 | hours |
| 3. Travel Time per Visit | 2.00 | hours |
| 4. Unit Labor Cost | 35.00 | $/hour |

**Enter Established Annual Labor Cost**

| | | |
|---|---|---|
| 5. Actual Annual Labor Cost | | $ |

| | | |
|---|---|---|
| 6. Total Cost | 21,840 | $ |

**Record Number 1 of 1**

Printed on 08/21/2007

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1


# AMD TREAT

## MAINTANENCE

**Estimate Maintenance Cost**

| | | |
|---|---|---|
| 1. Percent of Active Cost | 3.00 | % |
| 2. Percent of Passive Cost | 1.00 | % |
| 3. Percent of Ancillary Cost * | 3.00 | % |
| 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 | 15 | $ |
| 7. Total Maintenance Passive Cost | 9 | $ |
| 8. Total Maintenance Ancillary Cost | 283 | $ |
| 9. Total Maintenance Other Capital Cost | 0 | $ |
| 10. Total Maintenance Cost | 307 | $ |

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

Printed on 08/21/2007

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

# AMD TREAT

## SLUDGE REMOVAL

AMDTREAT

☐ **Opening Screen Water Parameters**

**Influent Water Parameters that Affect Sludge Removal**

Calculated Acidity: 165.00 mg/L

Alkalinity: 0.00 mg/L

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

Net Acidity (Hot Acidity): 165.00 mg/L

Design Flow: 2.00 gpm

Typical Flow: 1.00 gpm

Total Iron: 14 mg/L

Aluminum: 1 mg/L

Manganese: 48 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 | 14.00 | mg/L |
| 15. Manganese Concentration | 48.00 | mg/L |
| 16. Aluminum Concentration | 0.69 | 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 | 3 | yd3/yr |

**Cost for Sludge Removal Types**

| | | |
|---|---|---|
| 23. Removal by $ per Gallon | 33 | $ |
| 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: 33 $

Printed on 08/21/2007

Company Name Bulldog Excavating

Project Bulldog Excavating

Site Name Andrews MD1

# AMD TREAT
## RECAPITIZALITION COST

AMDTREAT

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

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. soda ash dispenser | 500 | 1 | 500 | 10 | 7 | 1,340 |
| 2. settling pond | 5,000 | 1 | 5,000 | 10 | 7 | 13,397 |
| 3. ditching | 3,870 | 1 | 3,870 | 10 | 7 | 10,369 |
| 4. roads | 577 | 1 | 577 | 10 | 7 | 1,546 |
| 5. Mn removal pond | 893 | 1 | 893 | 10 | 7 | 2,393 |
| 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 10,840 $ PV Grand Total 29,044 $