

Company Name Western Hickory

Project 10803018

Site Name Campbell 35-36-37



AMD TREAT

AMD TREAT MAIN COST FORM

AMDTREAT

Costs

| <u>Passive Treatment</u> | <u>A</u> | <u>S</u> | |
|---------------------------|----------|----------|-----------------|
| Vertical Flow Pond | 1 | 0 | \$25,243 |
| 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: | | | \$25,243 |
| <u>Active Treatment</u> | | | |
| Caustic Soda | | | \$0 |
| Hydrated Lime | | | \$0 |
| Pebble Quick Lime | | | \$0 |
| Ammonia | | | \$0 |
| Oxidants | | | \$0 |
| Soda Ash | | | \$0 |
| Active Subtotal: | | | \$0 |
| <u>Ancillary Cost</u> | | | |
| Ponds | 1 | 0 | \$3,189 |
| Roads | | | \$0 |
| Land Access | | | \$0 |
| Ditching | 1 | 0 | \$2,125 |
| Engineering Cost | | | \$0 |
| Ancillary Subtotal: | | | \$5,314 |
| Other Cost (Capital Cost) | | | \$49,864 |
| Total Capital Cost: | | | \$80,421 |
| <u>Annual Costs</u> | | | |
| Sampling | 1 | 0 | \$1,298 |
| Labor | 1 | 0 | \$10,920 |
| Maintenance | 1 | 0 | \$1,490 |
| Pumping | | | \$0 |
| Chemical Cost | 1 | 0 | \$2,410 |
| Oxidant Chem Cost | | | \$0 |
| Sludge Removal | 1 | 0 | \$368 |
| Other Cost (Annual Cost) | | | \$0 |
| Land Access (Annual Cost) | | | \$0 |
| Total Annual Cost: | | | \$16,486 |
| Other Cost | 1 | 0 | |

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 \$1.791**

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COMMENTS:



AMD TREAT

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VERTICAL FLOW POND (VFP)

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VFP Name _____

Opening Screen
 Water Parameters

Influent Water Parameters that Affect VFP

Calculated Acidity mg/L
Alkalinity mg/L

Calculate Net Acidity (Acid-Alkalinity) mg/L

Enter Net Acidity manually mg/L

Net Acidity (Hot Acidity) mg/L

Design Flow gpm
Typical Flow gpm

Total Iron mg/L
Aluminum mg/L
Manganese mg/L

SIZING METHODS Select One

VFP Based on Acidity Neutralization
 VFP Based on Retention Time
 VFP Based on Alkalinity Generation Rate
 VFP Based on Tons Limestone Entered
 VFP Based on Dimensions

1. Tons of Limestone Needed
2. Tons of Limestone Needed
3. Tons of Limestone Needed
4. Tons of Limestone Needed
5. Tons of Limestone Needed

11. % Void Space of LS. Bed %
12. System Life years
13. Limestone Purity %
14. Limestone Efficiency %
15. Density of Loose Limestone lbs/ft³
16. Limestone Unit Cost \$/ton
17. LS Placement Unit Cost \$/yd³

Run of Slope : Rise of Slope
18. Slope of Pond Sides :
19. Freeboard Depth ft
20. Free Standing Water Depth ft
21. Organic Matter Depth ft
22. Organic Matter Unit Cost \$/yd³
23. Organic Matter Spreading Unit Cost \$/yd³
24. Limestone Depth ft
25. Excavation Unit Cost \$/yd³

Liner Cost

No Liner
 Clay Liner
11. Clay Liner Unit Cost \$/yd³
12. Thickness of Clay Liner ft
 Synthetic Liner
13. Synthetic Liner Unit Cost \$/yd²

29. Cleaning and Grubbing?

30a. Land Multiplier ratio
 30b. Clear/Grub Acres acres
31. Clear and Grub Unit Cost \$/acre

32. Nbr. of Valves nbr
33. Unit Cost of Valves \$ ea.

AMDTreat Piping Costs

34. Total Length of Effluent / Inlet Pipe ft
35. Pipe Install Rate ft/hr
36. Labor Rate \$/hr
37. Segment Len. of Trunk Pipe ft/pipe seg.
38. Trunk Pipe Cost \$/ft
39. Trunk Coupler Cost \$/coupler
40. Spur Cost \$/ft
41. Spur Coupler Cost \$/spur
42. "T" Connector Cost \$/T coupler
43. Segment Len. of Spur Pipe ft/pipe seg.
44. Spur Pipe Spacing ft

Custom Piping Costs

Length ft Diameter in Unit Cost \$
45. Pipe #1 ft in \$
46. Pipe #2 ft in \$
47. Pipe #3 ft in \$

VFP Sizing Summaries

48. Length at Top of Freeboard ft
49. Width at Top of Freeboard ft
50. Freeboard Volume yd³
51. Water Surface Area ft²
52. Total Water Volume yd³
53. Organic Matter Volume yd³
54. Limestone Surface Area ft²
55. Limestone Volume yd³
56. Excavation Volume yd³
57. Clear and Grub Area ac.
58. Liner Area ft²
59. Theoretical Retention Time hrs

VFP Cost Summaries

60. Organic Matter Cost \$
61. Limestone Cost \$
62. Limestone and Organic Matter Placement Cost \$
63. Excavation Cost \$
64. Liner Cost \$
65. Clear and Grub Cost \$
66. Valve Cost \$
67. Pipe Cost \$
68. Total Cost \$

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Printed on 07/15/2008



AMD TREAT PONDS

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Pond Name Secondary Pond

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 | <input type="text" value="2.0"/> | : | <input type="text" value="1"/> |
| 11. Freeboard Depth | <input type="text" value="2.0"/> ft | | |
| 12. Water Depth | <input type="text" value="4.0"/> ft | | |
| 13. Excavation Unit Cost | <input type="text" value="4.50"/> \$/yd3 | | |
| 14. Total Length of Effluent / Inlet Pipe | <input type="text" value="0.00"/> ft | | |
| 15. Unit Cost of Pipe | <input type="text" value="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 \$/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 1

Company Name Western Hickory

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Site Name Campbell 35-36-37

AMD TREAT DITCHING



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Ditching Name

1. Ditch Length Rock ft
2. Ditch Length Grass ft
3. Bottom Width of Ditch ft
4. Ditch Depth ft
5. Geo Textile Unit Cost \$/yd2
6. Length of Geo Textile ft
7. Slope Ratio of Ditch Sides

| | |
|-----------------------------------|-----------------------------------|
| Run | Rise |
| <input type="text" value="2.00"/> | <input type="text" value="1.00"/> |
8. Surveying?
9. Survey Rate acres/day
10. Survey Unit Cost \$/day
11. Clearing and Grubbing?
12. Clear and Grub Cost \$/acre

13. Ditch Depth of Rock ft
14. Cost of Ditch Surface Rock \$/yd3
15. Cost to Place Rock \$/yd3
16. Excavation Unit Cost \$/yd3
17. Length of Silt Fence ft
18. Unit Cost of Silt Fence \$/ft
19. Revegetation Unit Cost \$/acre

Ditching Sub-Totals

20. Excavation Cost \$
21. Survey Cost \$
22. Clear and Grub Cost \$
23. Aggregate Cost \$
24. Filter Fabric Cost \$
25. Silt Fence Cost \$
26. Revegetation Cost \$

Record Number 1 of 1

27. Total 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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AMD TREAT

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

Company Name Western Hickory

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MAINTENANCE

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 not include Cost for Land Access and Engineering Cost

Company Name Western Hickory
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AMD TREAT CHEMICAL COST

AMD TREAT

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%
 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

40. Selected Chemical: _____ Annual Chemical Cost \$

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AMD TREAT SLUDGE REMOVAL

AMD TREAT

Opening Screen Water Parameters

Sludge Removal Name

| | |
|---|-------------|
| Influent Water Parameters that Affect Sludge Removal | |
| Calculated Acidity | 0.00 mg/L |
| Alkalinity | 0.00 mg/L |
| Calculate Net Acidity (Acid-Alkalinity) | |
| Enter Net Acidity manually | 734.74 mg/L |
| Design Flow | 23.20 gpm |
| Typical Flow | 17.50 gpm |
| Total Iron | 36 mg/L |
| Aluminum | 84 mg/L |
| Manganese | 117 mg/L |

1. Select One Selection for Method of Removing Sludge

Sludge Removal by \$ per Gallon \$/gal

Sludge Removal by Vacuum Truck \$/hr

4. Mobilization Cost \$

5. Hours to be Used hr

Sludge Removal by Mechanical Excavation \$/hr

6. Mechanical Excavation Unit Rate \$

7. Mobilization Cost hr

8. Hours to be Used hr

Sludge Removal by Lagoon Cleaner \$/hr

9. Lagoon Cleaning Unit Rate \$

10. Mobilization Cost hr

11. Hours to be Used hr

Actual Sludge Removal Cost \$ 368

12. Actual Sludge Removal Cost \$

13. Off Site Disposal Cost \$ 0.00

Record Number 1 of 1

Concentrations from Main Water Quality Screen

14. Iron Concentration mg/L 36.05

15. Manganese Concentration mg/L 117.14

16. Aluminum Concentration mg/L 84.42

17. Total Miscellaneous Concentration mg/L

18. Percent Solids %

19. Sludge Density lbs/gal

20. Titration? gal

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

22. Estimated Sludge Volume yd3/yr 218

Cost for Sludge Removal Types

23. Removal by \$ per Gallon \$ 2,211

24. Removal by Vacuum Truck \$ 0

25. Removal by Mechanical Excavation \$ 0

26. Removal by Lagoon Cleaner \$ 0

27. Actual Sludge Removal Cost \$ 368

Sludge Removal Sub-Totals

28. Currently Selected Removal Cost Plus Off Site Disposal Cost \$ 368

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**AMD TREAT
OTHER COST**

Other Cost Name

| A. Description of Item | B. Unit Cost Per Item | C. Quantity | D. Total Item Cost | E. Capital Cost Annual Cost |
|----------------------------------|-----------------------------|----------------|--------------------------|--|
| 1. VFP Cell 2 793 Tons Limestone | 25,633.00 | 1 | 25,633 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 2. VFP Cell 5 633 Tons Limestone | 21,042.00 | 1 | 21,042 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 3. Cell 7 | 3,189.00 | 1 | 3,189 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 4. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 5. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 6. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 7. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 8. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 9. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 10. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 11. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 12. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 13. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 14. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |
| 15. | 0.00 | 0 | 0 | <input checked="" type="radio"/> Capital Cost <input type="radio"/> Annual Cost |

Record Number
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Current Capital Cost \$
Current Annual Cost \$

Total Capital Cost \$
Total Annual Cost \$

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AMD TREAT RECAPITIALIZATION COST

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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. VFP Cell 1 778 Tons Limestone | 25,243 | 1 | 25,243 | 20 | 3 | 13,799 |
| 2. VFP Cell 2 793 Tons Limestone | 25,633 | 1 | 25,633 | 20 | 3 | 14,012 |
| 3. Cell 3 120 ft X 60 ft | 3,189 | 1 | 3,189 | 20 | 3 | 1,743 |
| 4. VFP Cell 5 633 Tons Limestone | 21,042 | 1 | 21,042 | 20 | 3 | 11,503 |
| 5. Cell 6 Ditching 440 ft | 2,125 | 1 | 2,125 | 20 | 3 | 1,162 |
| 6. Cell 7 120 ft X 60 ft | 3,189 | 1 | 3,189 | 20 | 3 | 1,743 |
| 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 \$