

Company Name Acme Drilling

Project BS15

Site Name Broom



### AMD TREAT

### AMD TREAT MAIN COST FORM

AMDTREAT

**Costs**

| <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             |
| <b>Passive Subtotal:</b>   |          |          | <b>\$0</b>      |
| <u>Active Treatment</u>    |          |          |                 |
| Caustic Soda               | 1        | 0        | \$6,387         |
| Hydrated Lime              |          |          | \$0             |
| Pebble Quick Lime          |          |          | \$0             |
| Ammonia                    |          |          | \$0             |
| Oxidants                   |          |          | \$0             |
| Soda Ash                   |          |          | \$0             |
| <b>Active Subtotal:</b>    |          |          | <b>\$0</b>      |
| <u>Ancillary Cost</u>      |          |          |                 |
| Ponds                      | 1        | 0        | \$5,000         |
| Roads                      |          |          | \$0             |
| Land Access                |          |          | \$0             |
| Ditching                   |          |          | \$0             |
| Engineering Cost           | 1        | 0        | \$2,277         |
| <b>Ancillary Subtotal:</b> |          |          | <b>\$7,277</b>  |
| Other Cost (Capital Cost)  |          |          | \$0             |
| <b>Total Capital Cost:</b> |          |          | <b>\$13,664</b> |
| <u>Annual Costs</u>        |          |          |                 |
| Sampling                   | 2        | 0        | \$1,226         |
| Labor                      | 1        | 0        | \$10,920        |
| Maintenance                | 1        | 0        | \$192           |
| Pumping                    |          |          | \$0             |
| Chemical Cost              | 1        | 0        | \$17,033        |
| Oxidant Chem Cost          |          |          | \$0             |
| Sludge Removal             | 1        | 0        | \$495           |
| Other Cost (Annual Cost)   |          |          | \$0             |
| Land Access (Annual Cost)  |          |          | \$0             |
| <b>Total Annual Cost:</b>  |          |          | <b>\$29,866</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 \$5.678**

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# AMD TREAT CAUSTIC SODA

AMDTREAT

**Opening Screen  
Water Parameters**

Caustic Soda Name proposed caustic system

**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**



# 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                | <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="6.0"/> ft      |      |                                |
| 13. Excavation Unit Cost                     | <input type="text" value="2.50"/> \$/yd3 |      |                                |
| 14. Total Length of Effluent / Influent Pipe | <input type="text" value="20.00"/> ft    |      |                                |
| 15. Unit Cost of Pipe                        | <input type="text" value="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  \$/acre

24. Number of Ponds for this Design  number

25. Cost of Baffles  \$

**Calculated Pond Dimensions per Pond**

26. Length at Top of Freeboard  ft

27. Width at Top of Freeboard  ft

28. Freeboard Volume  yd3

29. Water Volume  yd3

30. Estimated Annual Sludge  yd3/yr

31. Volume of Sludge per Removal  yd3/removal

32. Excavation Volume  acre ft

33. Excavation Volume  yd3

34. Clear and Grub Area  acres

35. Liner Area  yd2

36. Calculated Retention Time  hours

**Ponds Sub-Totals per Pond**

37. Excavation Cost  \$

38. Pipe Cost  \$

39. Liner Cost  \$

40. Clearing and Grubbing Cost  \$

41. Revegetation Cost  \$

42. Baffle Cost  \$

43. Estimated Cost  \$

44. Accept Minimum Pond Cost?

The Recommended Minimum Construction Cost of Building a Pond is \$ 5,000

45. Recommended Minimum Cost  \$

46. 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

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**AMD TREAT  
ENGINEERING COST**



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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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## AMD TREAT SAMPLING



AMDTREAT

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

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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 2 of 2

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## 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 Acme Drilling

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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

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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  \$

**Annual Amount of Chemicals Consumed**

|                                     |      |
|-------------------------------------|------|
| <input type="text" value="0"/>      | lbs  |
| <input type="text" value="0"/>      | lbs  |
| <input type="text" value="13,626"/> | gals |
| <input type="text" value="0"/>      | tons |
| <input type="text" value="0"/>      | lbs  |
| <input type="text" value="0"/>      | lbs  |

40. Selected Chemical: **CAUSTIC SODA**  
 Annual Chemical Cost  \$

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## 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  gal

22. Estimated Sludge Volume  yd<sup>3</sup>/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 all caustic components | 11,387             | 1        | 11,387          | 25         | 3                 | 9,958    |
| 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  \$