

Company Name Power Opr

Project Dugan 2 PTD

Site Name Dugan 2



**AMDTREAT**

**AMD TREAT**

**AMD TREAT MAIN COST FORM**

**Costs**

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond	1	0	\$86,950
Anoxic Limestone Drain	1	0	\$4,103
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>\$91,053</b>
<u>Active Treatment</u>			
Caustic Soda			\$0
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	\$6,020
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$39,848
<b>Ancillary Subtotal:</b>			<b>\$45,868</b>
<b>Other Cost (Capital Cost)</b>			<b>\$0</b>
<b>Total Capital Cost:</b>			<b>\$136,921</b>
<u>Annual Costs</u>			
Sampling	1	0	\$1,808
Labor	1	0	\$1,820
Maintenance	1	0	\$3,398
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal			\$0
<b>Other Cost (Annual Cost)</b>			<b>\$0</b>
<b>Land Access (Annual Cost)</b>			<b>\$0</b>
<b>Total Annual Cost:</b>			<b>\$7,026</b>
<b>Other Cost</b>			

**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 \$0.333**

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COMMENTS:



**AMDTREAT**

**AMD TREAT  
VERTICAL FLOW POND (VFP)**

VFP Name

Opening Screen Water Parameters

**SIZING METHODS Select One**

1. Tons of Limestone Needed	514
2. Tons of Limestone Needed	1,407
3. Tons of Limestone Needed	1,991
4. Tons of Limestone Needed	1,922
5. Tons of Limestone Needed	1,684

- 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
- 6. Retention Time  hours
- 7. Alkalinity Generation Rate  g/m2/day
- 8. Limestone Needed  tons
- 9. Length at Top of Freeboard  ft
- 10. Width at Top of Freeboard  ft

**Influent Water Parameters that Affect VFP**

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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- 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
- 18. Slope of Pond Sides  :  (Run of Slope : Rise of Slope)
- 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. Clearing 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 / Influent Pipe  ft
- 35. Pipe Install Rate  ft/hr
- 36. Labor Rate  \$/hr
- 37. Segment Len. of Trunk Pipe  ft/pipeline 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/pipeline seg.
- 44. Spur Pipe Spacing  ft

Custom Piping Costs

	Length	Diameter	Unit Cost
45. Pipe #1	<input type="text"/> ft	<input type="text"/> in	<input type="text"/> \$
46. Pipe #2	<input type="text"/> ft	<input type="text"/> in	<input type="text"/> \$
47. Pipe #3	<input type="text"/> ft	<input type="text"/> in	<input type="text"/> \$

**VFP Sizing Summaries**

48. Length at Top of Freeboard	174.00	ft
49. Width at Top of Freeboard	99.00	ft
50. Freeboard Volume	1,737	yd3
51. Water Surface Area	14,094	ft2
52. Total Water Volume	971	yd3
53. Organic Matter Volume	433	yd3
54. Limestone Surface Area	11,250	ft2
55. Limestone Volume	1,105.37	yd3
56. Excavation Volume	2,510.7	yd3
57. Clear and Grub Area	0.5	acr.
58. Liner Area	2,785.9	ft2
59. Theoretical Retention Time	16.00	hrs

**VFP Cost Summaries**

60. Organic Matter Cost	8,671	\$
61. Limestone Cost	30,958	\$
62. Limestone and Organic Matter Placement Cost	1,950	\$
63. Excavation Cost	13,809	\$
64. Liner Cost	15,322	\$
65. Clear and Grub Cost	771	\$
66. Valve Cost	0	\$
67. Pipe Cost	15,468	\$
68. Total Cost	86,950	\$

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## AMD TREAT ANOXIC LIMESTONE DRAIN (ALD)

**AMDTREAT**

ALD Name

**SIZING METHODS** Select One

- |                             |                                    |  |  |
|-----------------------------|------------------------------------|--|--|
| 1. Tons of Limestone Needed | <input type="text" value="116"/>   | <input checked="" type="radio"/> ALD Based on Acidity Neutralization |  |
| 2. Tons of Limestone Needed | <input type="text" value="131"/>   | <input type="radio"/> ALD Based on Retention Time                    | 5. Retention Time <input type="text" value=""/> hours  |
| 3. Tons of Limestone Needed | <input type="text" value="0"/>     | <input type="radio"/> ALD Based on Tons Limestone Entered            | 6. Limestone Needed <input type="text" value=""/> tons |
| 4. Tons of Limestone Needed | <input type="text" value="3,772"/> | <input type="radio"/> ALD Based on Dimensions Entered                | 7. Top Length ALD <input type="text" value=""/> ft     |
|                             |                                    |  | 8. Top Width ALD <input type="text" value=""/> ft      |

**Opening Screen Water Parameters**

**Influent Water Parameters that Affect ALD**

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

9. System Life  years
10. Limestone Purity  %
11. Limestone Efficiency  %
12. % Void Space of Limestone Bed  %
13. Limestone Depth  ft
14. Density of Loose Limestone  lbs/ft3
15. Limestone Unit Cost  \$/ton
16. Limestone Placement Unit Cost  \$/yd3
17. Soil Cover Depth  ft
18. Length to Width Ratio  Length :  Width
19. Excavation Unit Cost  \$/yd3
20. Soil Replacement Unit Cost  \$/yd3
21. Liner Unit Cost  \$/yd2
22. Total Length of Effluent / Influent Pipe  ft
23. Unit Cost of Pipe  \$/ft
24. Clearing and Grubbing?
- 25a. Land Multiplier  ratio
- 25b. Clear/Grub Acres  acres
26. Clear and Grub Unit Cost  \$/acre

**ALD Sizing Summaries**

27. Top Width  ft
28. Top Length  ft
29. Limestone Surface Area  ft2
30. Limestone Volume  yd3
31. Excavation Volume  yd3
32. Clear & Grub Area  acres
33. Liner Area  ft2
34. Theoretical Retention Time  hrs

**ALD Cost Summaries**

35. Limestone Cost  \$
36. Excavation Cost  \$
37. Limestone Placement Cost  \$
38. Pipe Cost  \$
39. Liner Cost  \$
40. Clear and Grub Cost  \$
41. Soil Replacement Cost  \$

42. Total Cost  \$

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## AMD TREAT PONDS

**AMDTREAT**

Pond Name

**Pond Design Based On:**

Retention Time

1. Desired Retention Time  hours

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="5.50"/> \$/yd3	
14. Total Length of Effluent / Influent Pipe	<input type="text" value="0.00"/> ft	
15. Unit Cost of Pipe	<input type="text" value="10.00"/> \$/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  \$

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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## AMD TREAT ENGINEERING COST

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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AMDTREAT

## 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 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. VFP Organic Matter	8,671	1	8,671	15	5	14,705
2. VFP Ls Cost	30,958	1	30,958	15	5	52,501
3. VFP Placement	1,950	1	1,950	15 <sup>0</sup>	5 <sup>0</sup>	3307 <sup>0</sup>
4. VFP Liner Cost	15,322	1	15,322	30	2	9,567
5. ALD Ls	2,567	1	2,567	10	7	6,876
6. ALD Excavation	756	1	756	10	7	2,026
7. Liner Cost	544	1	544	10	7	1,458
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  \$

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