

Company Name Glacial Minerals, Inc.

Project 16850101-Z1

Site Name Blair



AMDTREAT

AMD TREAT

Costs

AMD TREAT MAIN COST FORM

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond			\$0
Anoxic Limestone Drain			\$0
Anaerobic Wetlands			\$0
Aerobic Wetlands	1	0	\$43,144
Manganese Removal Bed			\$0
Oxic Limestone Channel			\$0
Limestone Bed			\$0
BIO Reactor			\$0
Passive Subtotal:			\$43,144
<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	\$44,367
Roads			\$0
Land Access			\$0
Ditching	1	0	\$5,817
Engineering Cost	1	0	\$18,666
Ancillary Subtotal:			\$68,850
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$111,994
<u>Annual Costs</u>			
Sampling	1	0	\$597
Labor	1	0	\$910
Maintenance	1	0	\$3,266
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal			\$0
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$4,773
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 \$0.907**

Company Name Glacial Minerals, Inc.

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COMMENTS:

Company Name Glacial Minerals, Inc.

Printed on 03/31/2008

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AMD TREAT AEROBIC WETLANDS

AMDTREAT

Aerobic Wetlands Name

**Opening Screen
Water Parameters**

SIZING METHODS Select One

- Aerobic Wetland Based on Metal Removal Rates
 - 1. Iron Removal Rate g/m2/day
 - 2. Mn Removal Rate g/m2/day
- Aerobic Wetland Based on Dimensions
 - 3. Top Length at Freeboard ft
 - 4. Top Width at Freeboard ft
- Aerobic Wetland Based on Iron Oxidation Kinetics
 - 5. Rate Constant moles/sec
 - 6. Effluent Fe Concentration mg/l
 - 7. Dissolved Oxygen mg/l
 - 8. H2O Temperature °C

Influent Water Parameters that Affect Aerobic Wetlands

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

9. Length to Width Ratio Length : Width
10. Slope of Wetland Sides Run of Slope : Rise of Slope
11. Freeboard Depth ft
12. Free Standing Water Depth ft
13. Organic Matter Depth ft
14. Organic Matter Unit Cost \$/yd3
15. Organic Matter Spreading Unit Cost \$/yd3
16. Excavation Unit Cost \$/yd3
17. Wetland Planting Unit Cost \$/acre

Liner Cost

- No Liner
- Clay Liner
 - 18. Clay Liner Unit Cost \$/yd3
 - 19. Thickness of Clay Liner ft
- Synthetic Liner
 - 20. Synthetic Liner Unit Cost \$/yd2

21. Clearing and Grubbing?

- 22. Land Multiplier ratio
- 23. Clear/Grub Acres acres
- 24. Clear and Grub Unit Cost \$/acre

Aerobic Wetland Sizing Summaries

25. Length at Top of Freeboard	<input type="text" value="1,600.00"/>	ft
26. Width at Top of Freeboard	<input type="text" value="30.00"/>	ft
27. Freeboard Volume	<input type="text" value="2,395"/>	yd3
28. Water Surface Area	<input type="text" value="38,256"/>	ft2
29. Water Volume	<input type="text" value="678"/>	yd3
30. Organic Matter Volume	<input type="text" value="1,177"/>	yd3
31. Excavation Volume	<input type="text" value="1,856"/>	yd3
32. Clear and Grub Area	<input type="text" value="0.0"/>	acres
33. Liner Area	<input type="text" value="0"/>	ft2
34. Retention Time	<input type="text" value="228"/>	hrs

Aerobic Cost Summaries

35. Organic Matter Cost	<input type="text" value="28,857"/>	\$
36. Excavation Cost	<input type="text" value="10,210"/>	\$
37. Liner Cost	<input type="text" value="0"/>	\$
38. Clear and Grub Cost	<input type="text" value="0"/>	\$
39. Wetland Planting Cost	<input type="text" value="4,077"/>	\$

40. Total Cost \$

Record Number 1 of 1

Company Name Glacial Minerals, Inc.

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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 340.000 ft

9. Pond Width at Top of Freeboard 180.000 ft

	Run	Rise
10. Slope Ratio of Pond Sides	<input type="text"/> 2.0	: <input type="text"/> 1
11. Freeboard Depth	<input type="text"/> 2.0	ft
12. Water Depth	<input type="text"/> 4.0	ft
13. Excavation Unit Cost	<input type="text"/> 5.50	\$/yd3
14. Total Length of Effluent / Influent Pipe	<input type="text"/> 0.00	ft
15. Unit Cost of Pipe	<input type="text"/> 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. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard 340 ft

26. Width at Top of Freeboard 180 ft

27. Freeboard Volume 12,256 yd3

28. Water Volume 7,875 yd3

29. Estimated Annual Sludge 0 yd3/yr

30. Volume of Sludge per Removal 0 yd3/removal

31. Excavation Volume 4.88 acre ft

32. Excavation Volume 7,875 yd3

33. Clear and Grub Area 2.10 acres

34. Liner Area 0 yd2

35. Calculated Retention Time 2,651 hours

Ponds Sub-Totals per Pond

36. Excavation Cost 43,313 \$

37. Pipe Cost 0 \$

38. Liner Cost 0 \$

39. Clearing and Grubbing Cost 0 \$

40. Revegetation Cost 1,053 \$

41. Baffle Cost 0 \$

42. Estimated Cost 44,367 \$

Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity 0.00 mg/L

Alkalinity 166.00 mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity) -166.00 mg/L

Design Flow 10.00 gpm

Typical Flow 10.00 gpm

Total Iron 37.30 mg/L

Aluminum 0.00 mg/L

Manganese 28.10 mg/L

Record Number
1 of 1

Project 16850101-Z1

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AMDTREAT

**AMD TREAT
DITCHING**

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 \$

Company Name Glacial Minerals, Inc.

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AMD TREAT

**AMD TREAT
ENGINEERING COST**

1. Capital Cost *	<input type="text" value="93,328"/>	\$
2. Per Cent of Capital Cost	<input type="text" value="20.00"/>	%
3. Actual Engineering Cost	<input type="text"/>	\$
4. Total Engineering Cost	<input type="text" value="18,666"/>	\$

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

Company Name Glacial Minerals, Inc.

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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

Company Name Glacial Minerals, Inc.

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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

Company Name Glacial Minerals, Inc.

Project 16850101-Z1

Site Name Blair



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

Company Name Glacial Minerals, Inc.

Project 16850101-Z1

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AMD TREAT RECAPITIALIZATION 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. Wetland	43,144	1	43,144	20	3	47,165
2. Pond	44,367	1	44,367	20	3	48,502
3. Ditching	5,817	1	5,817	20	3	6,359
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 \$

Company Name Glacial Minerals, Inc.
 Project 16850101 SPA1 & SPA2
 Site Name Blair



AMDTREAT

**AMD TREAT
 AMD TREAT MAIN COST FORM**

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
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	\$40,409
Roads	1	0	\$22,429
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$13,045
Ancillary Subtotal:			\$75,883
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$78,270
<u>Annual Costs</u>			
Sampling	1	0	\$1,298
Labor	1	0	\$21,840
Maintenance	1	0	\$2,283
Pumping			\$0
Chemical Cost	1	0	\$2,968
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$622
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$29,011
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 \$2.188**

Company Name Glacial Minerals, Inc.

Project 16850101 SPA1 & SPA2

Site Name Blair

COMMENTS: Sludge removal every 5 years

Company Name Glacial Minerals, Inc.

Project 16850101 SPA1 & SPA2

Site Name Blair



AMDTREAT

AMD TREAT CAUSTIC SODA

**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 \$

\$

Record Number 1 of 1

Company Name Glacial Minerals, Inc.
 Project 16850101 SPA1 & SPA2
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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="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 \$

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 Glacial Minerals, Inc.
 Project 16850101 SPA1 & SPA2
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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	<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 / 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
2 of 2



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

Company Name Glacial Minerals, Inc.
Project 16850101 SPA1 & SPA2
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AMDTREAT

**AMD TREAT
ENGINEERING COST**

1. Capital Cost *	65,225	\$
2. Per Cent of Capital Cost	20.00	%
3. Actual Engineering Cost		\$
4. Total Engineering Cost	13,045	\$

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

Company Name Glacial Minerals, Inc.

Printed on 03/31/2008

Project 16850101 SPA1 & SPA2

Site Name Blair



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

Company Name Glacial Minerals, Inc.
Project 16850101 SPA1 & SPA2
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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 Glacial Minerals, Inc.
Project 16850101 SPA1 & SPA2
Site Name Blair



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

Company Name Glacial Minerals, Inc.
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AMDTREAT

AMD TREAT CHEMICAL COST

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		Annual Amount of Chemicals Consumed
33. Total Hydrated Lime Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
34. Total Pebble Lime Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
35. Total Caustic Soda Cost	<input type="text" value="2,968"/> \$	<input type="text" value="4,945"/> gals
36. Total Anhydrous Ammonia Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
37. Total Soda Ash Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> lbs
38. Total Known Chemical Cost	<input type="text" value="0"/> \$	
39. Total Flocculent Cost	<input type="text" value="0"/> \$	<input type="text" value="0"/> gals

40. Selected Chemical: **CAUSTIC SODA**

Annual Chemical Cost \$

Company Name Glacial Minerals, Inc.
 Project 16850101 SPA1 & SPA2
 Site Name Blair



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

Company Name Glacial Minerals, Inc.
 Project 16850101 SPA1 & SPA2
 Site Name Blair



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. Caustic system	2,387	1	2,387	20	3	2,609
2. Ponds	40,409	1	40,409	20	3	44,175
3. Roads	22,429	1	22,429	20	3	24,519
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 \$