CAMBRIA AMD TASK FORCE
PASSIVE TREATMENT SYSTEM EVALUATION

NuMine - AMD Abatement Project

Prepared By:
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Project Background:

Project Name: NuMine (White Lake)
Project Number: AMD 03(0743)101.1/102.1
Problem Area: 0743
Municipality: Cowanshannock Township
County: Armstrong
Topographic Map: Rural Valley
Latitude/Longitude: 40° 47' 26" N, 79° 16' 37" W
Receiving Stream: Cowanshannock Creek

Project Goals:

The goal of these projects were to put in place a successful passive treatment system that would replace an ineffective wetland system built in 1988 by the Soil Conservation Service. The Acid Mine Drainage stems from a coal refuse pile in a deep mine that was abandoned by Rochester & Pittsburgh Coal Company in 1953. This discharge adversely affected both Cowanshannock Creek and White Lake, polluting them with highly acidic water and high amounts of aluminum. The previously built system did not have either the technology or the capacity with which to treat the highly polluted water. Following the Bureau of Abandoned Mine Reclamation initiated site, permanent baffles were put into place in order to increase the retention time in the flushing pond to enhance the treatment process (AMD 03(0743)102.1).

View of the NuMine (White Lake) Passive Treatment System from south to north.

Project Information:

AMD 03(0743)101.1
Project Designer: Mark Kleman
Contractor: Hutchison Excavating
Construction Engineer: Denny Steele
Project Inspector: Dale Yingling/ Dave Eckenrode
Final Inspection: July 25,2003
Engineer's Estimate: $177,110.00
Low Bid: $180, 314.90
Final Construction Cost: $172, 529.82

AMD 03(0743)102.1
Project Designer: Mark Kleman
Contractor: Hutchison Excavating
Construction Engineer: Tom Malesky
Project Inspector: Dale Yingling
Final Inspection: June 3, 2005
Engineer's Estimate: $26,200
Low Bid: $31,960.20
Final Construction Cost: $31,488.00

After years of sampling and monitoring at the original site built by the Soil Conservation Service, it became evident that the wetland system that was in place was not adequate enough to abate the pollution flowing into White Lake and eventually into Cowanshannock Creek. BAMR began designing the improved site in the late 1990s, which would included a limestone bed, through which the drainage would flow before entering White Lake. This limestone bed would allow as much Aluminum as possible to settle out before entering White Lake. Even this improvement, however, did not completely solve the problem. In 2005, permanent baffles consisting of standard concrete barriers and floating curtains were installed in the flushing pond. These baffles were meant to enhance the retention time in pond to allow for even more of the aluminum hydroxides to settle out before the water is released into the lake.

The design for this site began with a complete overhaul of the existing treatment system. The small wetland ponds in place were proven too small and ineffective to properly treat the contaminated discharge. The original site was filled up and destroyed during the initial grading process for the new passive treatment system. The new system first introduces the AMD into a limestone drain to allow some of the high Aluminum content of the flow to settle out before it is put into the vertical flow ponds. Since there is a negligible amount of iron in this water, anoxic conditions were not necessary. Following the limestone drain, the water is put into a polishing wetland and then into a vertical flow limestone bed with a two-tiered flushing system. A sedimentation basin then collects the effluent flow to allow for any additional settling before the water is released into White Lake with net alkalinity content. The permanent baffles that were added to the flushing pond in 2005 assist in allowing longer, more effective settling time, as the discharge is more highly polluted with Aluminum than most other AMD sites.

Project Description:

The AMD that emanates from the refuse pile from the Rochester & Pittsburgh Coal Company's abandoned deep mine has been attracting attention from local watershed and environmental organizations since the early 1980s. After a failed system was put into place in 1988, it became evident that more modern technology was needed to deal with this pollution. BAMR designed a state-of-the-art passive treatment system which was put into place in 2002 and then updated with permanent baffles in 2005. It was the goal of all parties involved to improve the water quality in White Lake and in the Cowanshannock Creek Watershed, which is stocked with trout every fishing season. An improvement of water quality would provide an increase in aquatic life which would therefore enhance recreational activities in the area.

System Monitoring:

Monitoring Site Map: AMD 03(0743)Numine Mon.Pnts.pdf

Water Sampling Schedule:

Samples will be collected at the following five points:

Point #1 (MP1) seep discharge into collection pond

Point #2 (MP2) end of collection pond

Point #3 (MP3) end of wetlands/pipe discharge

Point #4 (MP4) treatment pond discharge into settling pond

Point #5 (MP5) settling pond discharge into White Lake

Flow Measurements*:*

Flow depths should be measured when the water samples are collected at the sediment/flushing pond flow control structure outlet prior to flushing of the system.

Schedule for sampling:

All five sampling points will be sampled monthly until December 2005. From January 2006, until notified in writing from BAMR, samples can be collected once every three months.

Water Quality Results:
WQ monitoring(new).xls

System Flushing Schedule:

The top tier of the limestone treatment pond needs to be flushed once every month and the lower tier needs to be flushed once every six month. BAMR personnel will review the quality of the treated water and may change the frequency of the flushing. The flushed water should not be discharged directly into White Lake. Therefore, it may be necessary to add a stoplog in the sediment/flushing pond outlet flow control structure outlet, which BAMR will provide.

FLUSHING SEQUENCE:

By using the valve ranch, open the two valves for the top tier treatment pipes simultaneously; these valves are located in the embankment along the treatment ponds. As soon as these valves are open, the water will flush out into sediment/flushing pond. Because of the high aluminum content of the discharge, the flush water will look milky white. Once the plume of milky water nears the outlet structure install two stoplogs in the outlet structure. Allow the water to flow until the flush water has cleared. Once the flush water has cleared, close the valves. Use the same procedure for the lower tier pipes when appropriate. Separate gate valves are provided for the bottom tier of the treatment system. These gate valves have been located as shown on the as-built drawings and are marked along the embankment in the field.

Note: It will be necessary to return the water level in the sediment/flushing pond to its original level prior to flushing. After the flushing procedure, wait a few days then remove one or two stoplogs or rearrange them to help lower the water level in this pond.

Property Owner Information:

This property is owned by the Cowanshannock Creek Watershed Association. It is used for recreation as well as for education, due to its adjacent location to the local high school.

System Performance Evaluation and Recommendations:

At this point in time, the passive treatment system at the NuMine site has been successful. This project was meant to accomplish two things, the removal of acidity and Aluminum from the incoming AMD, and both of these goals have been accomplished. The installation of permanent baffles in 2005 increased the efficiency of the system.

The Numine (White Lake) system continues to work very well. The final discharge from White Lake has not been detected below pH 7.0 for more than 2 years. There are no trends showing a decline in performance from the system.

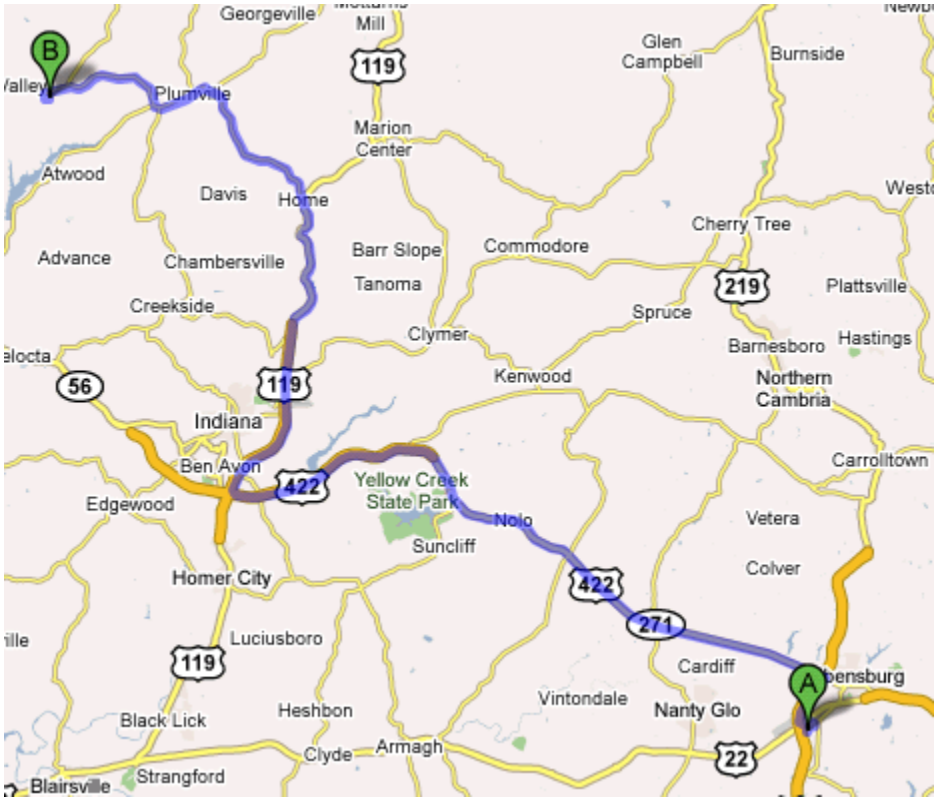
Recommendations:

1. Weirs or flumes should be installed in order to measure the flow of water into and out of each pond/portion of the system. Accurate and regular flow data has not been measured since the inception of this system and a means of gathering this data would assist in any further analysis to be done on the effectiveness of this passive treatment system.

2. The monitoring results for this system should be routinely reviewed and continue to be compiled into a spreadsheet in order to assist in evaluation of overall system performance.

3. The established operation and maintenance plan should be followed by the Cowanshannock Creek Watershed Association and DEP – BAMR. A copy of that Operation and Maintenance Plan is attached to this report.

Final OM&R Plan .pdf



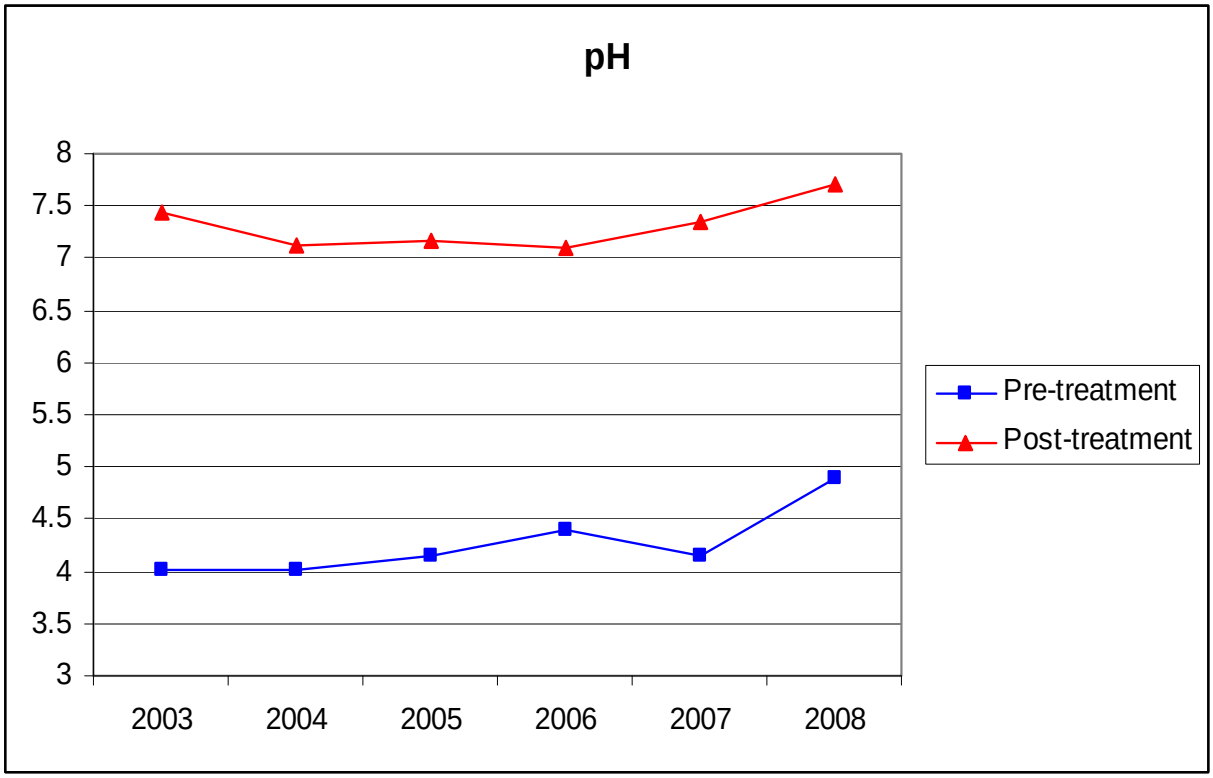
Directions to Site:

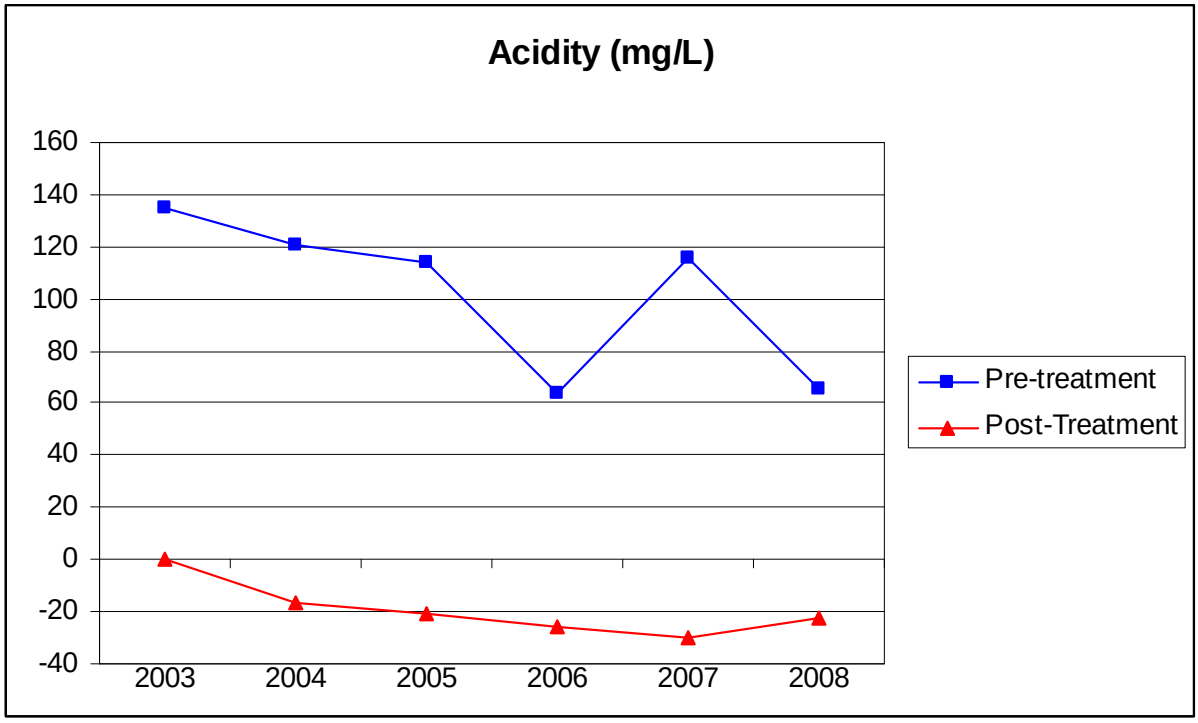
Start – 286 Industrial Park Rd, Ebensburg

- Turn **left** on Mini Mall Road	0.3 mi
- Turn **left** on US-22	0.1 mi
- Take the **ramp** onto Us-219 N	1.8 mi
- Take the US-219 Bus **exit** toward Ebensburg	0.4 mi
- Turn **left** at US-422	24.7 mi
- Take **exit B** to merge onto US-119 N	12.4 mi
- Turn **left** at Route 85	12.7 mi
- Turn **left** at T-746	0.2 mi
- Turn **left** at T-767/Fifth St	0.1 mi

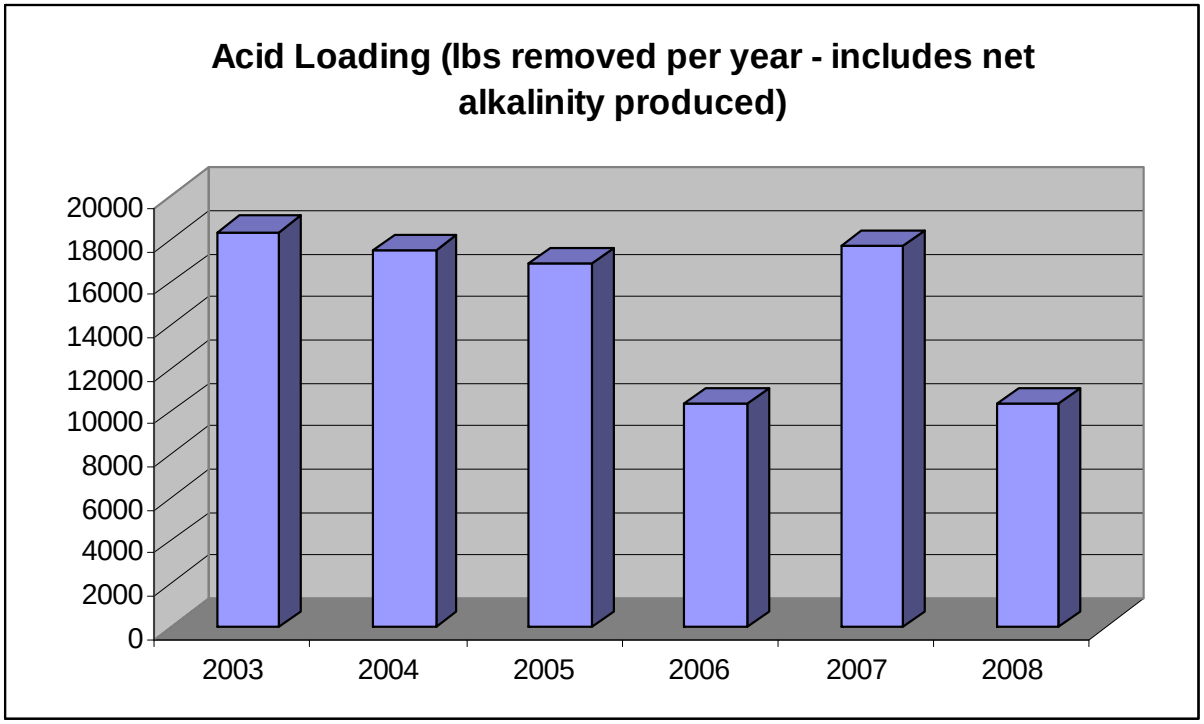
Enter site at construction entrance at the dead end of Fifth St.

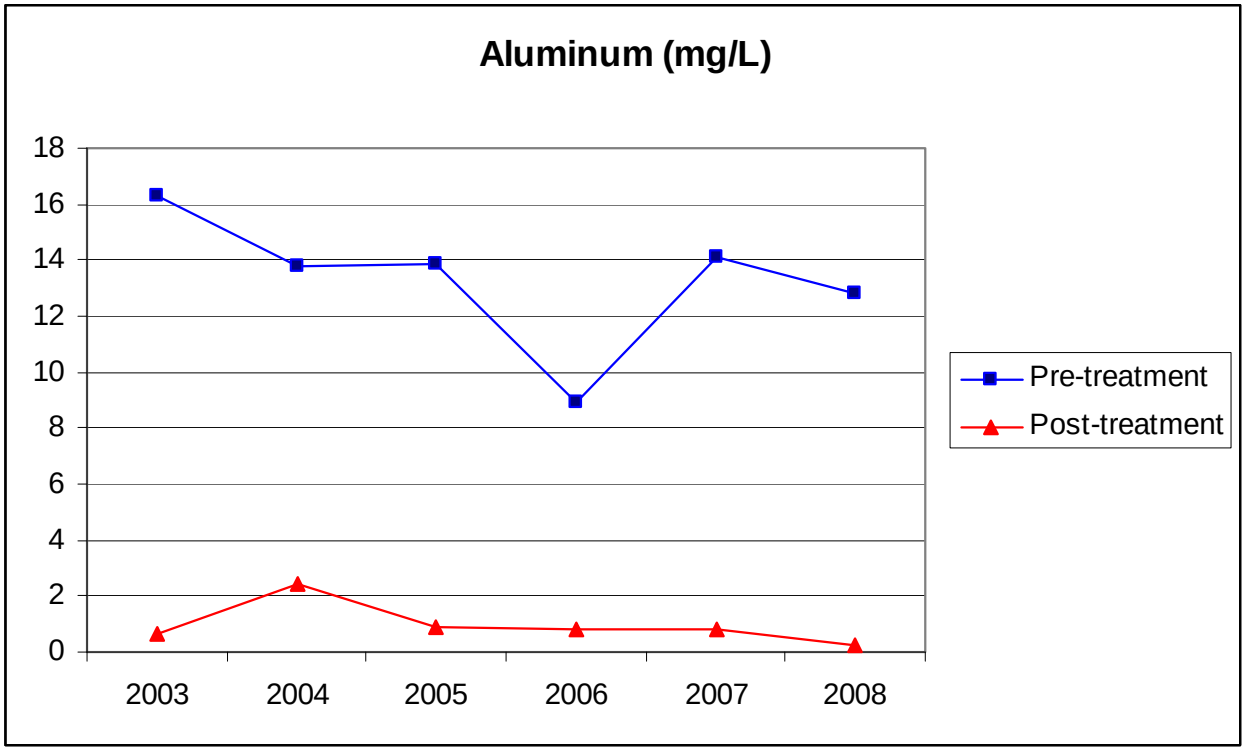
Data: (Pre-treatment flow data is average value read before construction, 31 gpm.)

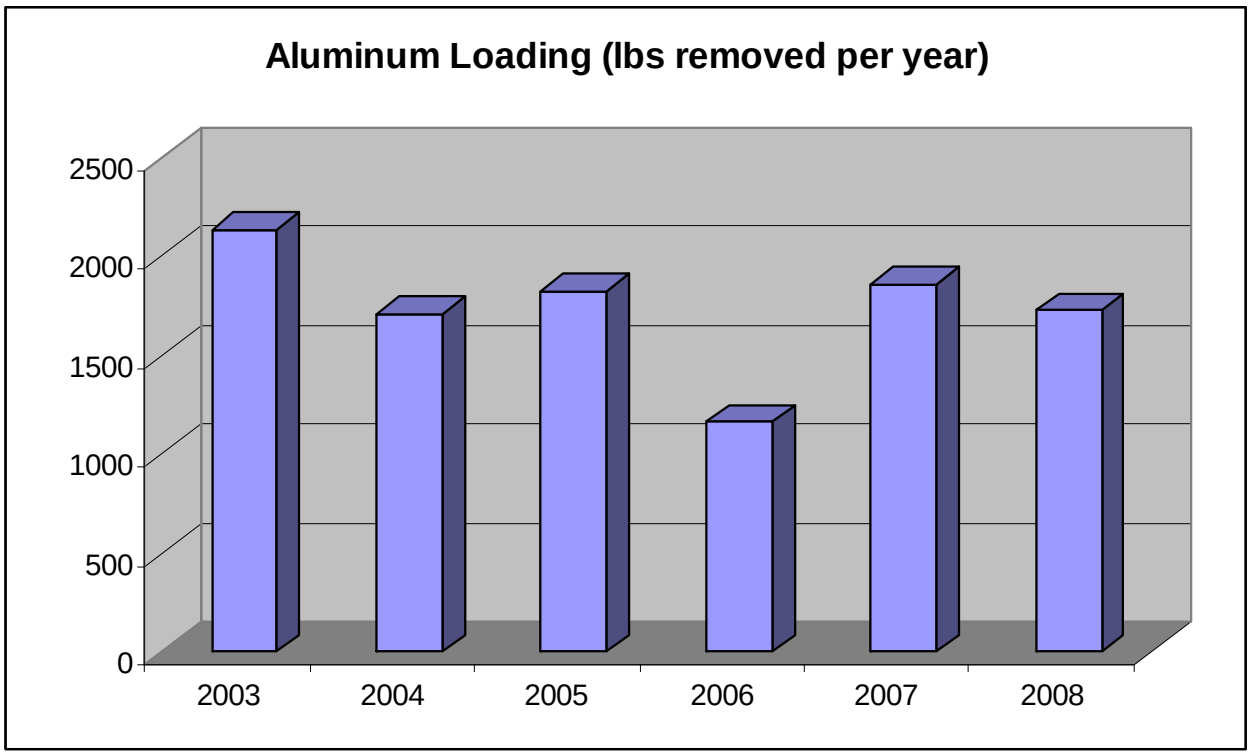


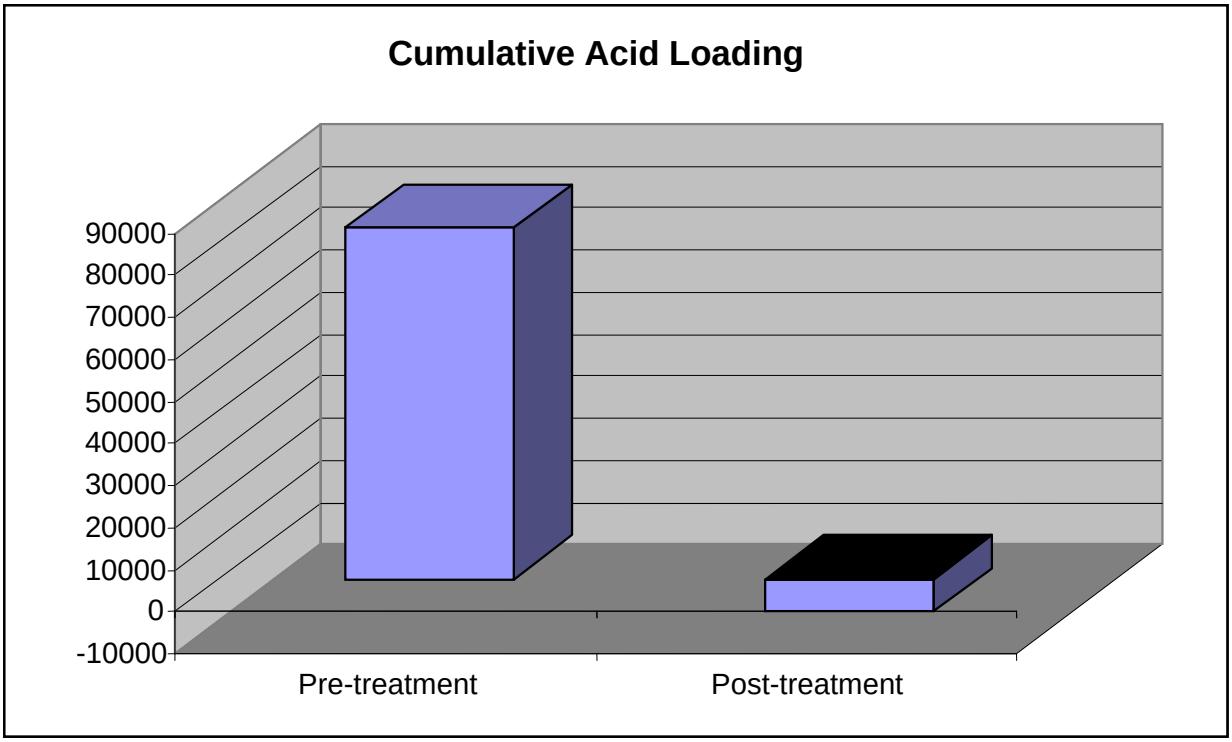


Negative values show that net alkalinity has been added to the final effluent.

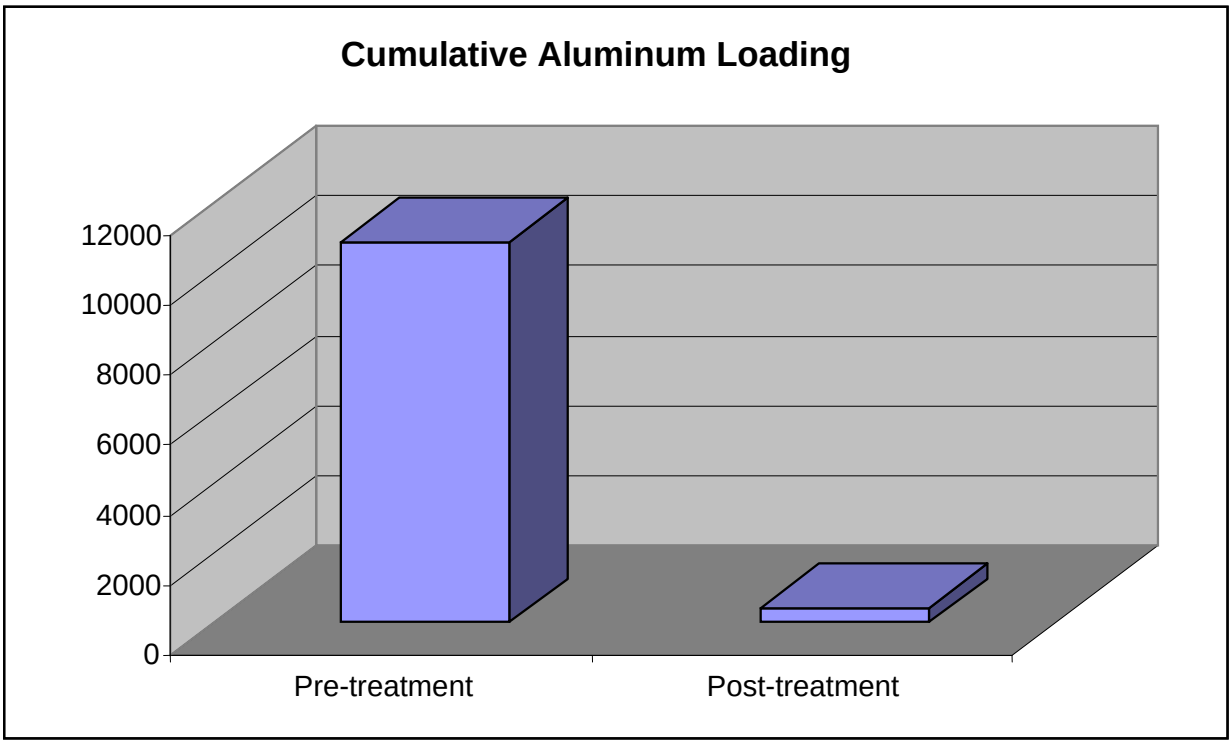



Aluminum (mg/L)
18
16
14
12
10
8
6
4
2
0
2003
2004
2005
2006
2007
2008
Pre-treatment
Post-treatment


Aluminum Loading (lbs removed per year)
2500
2000
1500
1000
500
0
2003
2004
2005
2006
2007
2008



83,470 lbs of acid have been removed and 7,624 lbs of alkalinity have been produced since 2003.



10,424.23 lbs of Aluminum have been removed from this site since 2003.