

TECHNICAL REPORT

**FINAL GROWING GREENER
TECHNICAL REPORT
GROWING GREENER INNOVATIVE TECHNOLOGY
PROJECT: ME No. 351036
WICONISCO TOWNSHIP
DAUPHIN COUNTY, PENNSYLVANIA**

Prepared For

WICONISCO TOWNSHIP
Dauphin County, Pennsylvania
3035 Walnut Street
Wiconisco, Pennsylvania 17097

Prepared By

BRINJAC ENGINEERING, INC.
114 North Second Street
P.O. Box 1290
Harrisburg, Pennsylvania 17108

APRIL 2003

BRINJAC No. 01084

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CONTACT INFORMATION

OWNER INFORMATION

Mr. John Coles
Chairman
Wiconisco Township
PO Box 370
305 Walnut Street
Wiconisco, PA 17097-0370
(717) 453-7571

Mr. Douglas H. Klinger
Plant Superintendent
Operator Number: (717) 453-7743
Wiconisco Township
PO Box 370
305 Walnut Street
Wiconisco, PA 17097-0370
(717) 453-7571

Emergency Contact:
Mr. Doug Klinger
Plant Superintendent
Township cell phone: (717) 649-7225

ENGINEER CONTACT INFORMATION

BRINJAC ENGINEERING, Inc.
114 North Second Street
Harrisburg, PA 17101-1401

Mr. William Gralski, P.E.
Work Phone Number: (717) 233-4502
Home Phone Number: (717) 561-0508
Cell Phone Number: (717) 503-8332
Fax Number: (717) 233-0833

INTRODUCTION

BRINJAC ENGINEERING, Inc. (BRINJAC) working with the Wiconisco Township Wastewater Treatment Plant (WWTP) staff received a Growing Greener Innovative Grants Technology Award for a project examining alternative biological product applications in WWTPs. The primary objective of the Growing Greener Innovative Technology Project: ME No. 351036 was to control algae within the existing lagoons with the use of two (2) bioaugmentation products. Typically, the facility has difficulty meeting the NPDES discharge limits for total suspended solids (TSS) during the summer because of dense algal blooms in the lagoons. The secondary objective of this project was to examine control of the sludge build-up within the lagoons. Both products were tested for their ability to function in a symbiotic mode since one product was a year-round product and the other was seasonal only.

To meet the project objectives, two (2) products were tested at the treatment plant under this program: Quellz is an enzyme product capable of accelerating metabolic rates for bacteria, which will help reduce sludge build-up and help increase water clarity; and BioSys B600, a commercial dried bacterial product specifically designed to reduce algae problems in lagoons and reduce sludge build-up.

The Quellz can be applied year-round because it will accelerate in-situ bacterial metabolic rates no matter what the temperature and conditions. The BioSys B600 is most effective during more moderate temperatures of the late spring, summer and early fall time frames.

Initial experimentation was to apply each product in series to the lagoons to evaluate each product individually. However, a decision was made to introduce the BioSys and the Quellz enzyme simultaneously since there is a complimentary nature to the two (2) products. This was based on product information and conversations with the manufacturers. The enzymes will work all year round while bacteria can only be added seasonally since the cold temperature reduces their capabilities. The two (2) products work synergistically since the enzymes will enhance the activity of the bacteria being added.

The primary objective of the study was to confirm control of the algae so that the treatment plant would be able to meet effluent permit limits.

DESCRIPTION OF THE WASTEWATER SYSTEM

Wiconisco Township serves Wiconisco Village and the surrounding vicinity located in Dauphin County, Pennsylvania. The bulk of the flow for the POTW comes from Wiconisco Village, which is seeing only limited growth at this time.

Wiconisco Township owns and operates a 0.125 million gallons per day (MGD) secondary treatment plant, permitted under the Bureau of Water Quality Management (BWQM), NPDES permit No. PA 0084697, May 1, 2002, and discharges into Bear Creek, a tributary of Wiconisco Creek under the BWQM Part II Permit No. 2291406, dated October 30, 1991.

There are two (2) pump stations that feed the WWTP. All sewage is conveyed through the No. 1 pump station to the WWTP. The design capacity for pump station No. 1 is 425 gallons per minute (GPM) with one (1) pump running and 510 GPM with two (2) pumps running. Pump station No. 1 uses Gorman Rupp suction lift pumps. The design capacity for pump station No. 2 is 54 GPM with one (1) pump running and 67 GPM with two (2) pumps running. Pump station No.2 is a Hydromatic submersible pump station. Neither station is equipped with metering equipment at this time.

The WWTP treatment system consists of a comminutor pretreatment system and a bypass manual bar screen. An influent flow meter measures the flow into the treatment plant. The operator can select feeding of the influent to one (1) or two (2) lagoons through the selection of valves for the gravity influent feed lines.

The lagoons are aerated facultative lagoons, which can be operated in series or in parallel. Four (4) Framco Oxygun surface aspirating aerators service each lagoon. Three (3) 5-horsepower units service the aerated lagoon sections and a single 7-horsepower unit services each facultative section. The aerated section of the lagoons must remain aerated to provide sufficient mixing and biological reduction. The facultative section of the lagoons is the sludge storage area of the lagoons.

The lagoons then discharge to a small contact tank where chlorine is used for disinfection. Two (2) small submersible pumps provide the water used for the chlorine solution. Gas chlorine (150-lb cylinders) is used for disinfection.

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The application of the two (2) products has produced a successful testing of an algae control mechanism for the treatment plant. A comparison of the effluent water quality for the year 2001 and 2002 is below:

COMPARISON OF EFFLUENT WATER QUALITY RESULTS

| Month | 2001 Effluent CBOD | 2002 Effluent CBOD | 2001 Effluent TSS | 2002 Effluent TSS |
|-----------|-----------------------|-----------------------|----------------------|----------------------|
| January | 12 | 19 | 32 | 16 |
| February | 14 | 12 | 35 | 19 |
| March | 18 | 11 | 35 | 34 |
| April | 12 | 13 | 42 | 54 |
| May | 16 | 9 | 56 | 32 |
| June | 15 | 9 | 35 | 29 |
| July | 8 | 7 | 24 | 21 |
| August | 10 | 6 | 17 | 14 |
| September | 5 | 13 | 16 | 22 |
| October | 11 | 10 | 21 | 21 |
| November | 9 | 15 | 28 | 32 |
| December | 12 | 14 | 22 | 36 |
| Total | 5 | 7 | 4 | 7 |
| Averages | 11.0 | 11.0 | 30 | 28 |

The information depicted above indicates that the treatment plant in the summer months performed quite well. In each case, the use of the products resulted in a total of 7 out of 12 months of better effluent water quality for the treatment facility. This means that for more than 60 percent of the year, the facility produced a better effluent water quality when using the products. This is significant. Overall, the average TSS dropped by 2 mg/L, which seems at the outset trivial but shows a solid general trend in a direction of better effluent water quality.

Indications show that the Bacteria product is performing quite well at controlling algae blooms when mixed with the Quellz enzyme. There appears to be a very strong correlation between the two and their ability to work jointly and show quick results. Without the use of the products, the operator of the WWTP has indicated that his discharge would most likely be violating his NPDES discharge permit for TSS and he would not have been able to utilize a single lagoon all year to process his flows. This has saved money as the lagoon aerators in the other lagoon have not had to be turned on and when finally turned on could be on timers and not in constant use.

Sludge blanket depths will continue to be monitored to determine the impact of the products on the sludge depths and the reduction of the sludge blanket buildup. As of the final report written for the client, there was no indication of any appreciable reduction in the sludge blanket. The products will continue to be used and the impact on the sludge blanket depths monitored.