pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

Wastewater Treatment System Operational Review

Of

Rayne Township Elementary School
Wastewater Treatment Facility
PA0204498

Rayne Township, Indiana County, Pennsylvania

Initial Review Date
January 16, 2013

Present During Review:
Robert DiGilarmo – DEP CO
Kristin Gearhart- Water Quality Specialist
Ron States –Operator
John Stile- Operator

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Introduction

The Rayne Township Elementary School wastewater treatment plant is a 0.00676 MGD activated sludge, extended aeration system with an average daily flow of approximately 0.0016 MGD. The wastewater plant serves only the elementary school and, as such, the flows are highest during the day with minimal to no flow through the evening, overnight, and holidays or other times the school is closed. The plant is currently operated with the same process scheme year round in an attempt to maximize treatment.

This review was requested by regional staff due to the facility struggling to achieve compliance with its ammonia nitrogen, fecal coliform and total suspended solids.

The treatment plant consists of a comminutor, aeration tank, clarifier, chlorine contact tank and sludge holding tank. Sludge solids are removed in liquid form via waste hauler.

Findings

1. This facility maintains extremely thorough process control and operating records. The thoroughness of the records allowed this preliminary review to occur during just one visit. The operators should be commended for their efforts.

2. The facility has high Dissolved Oxygen (DO) levels in the aeration tank, often above 6.0 mg/l. Generally, a DO level between 2.0 and 4.0 mg/l is sufficient for nitrification to occur. Any DO over 4.0 mg/l usually does not accomplish additional treatment. In some cases over aeration can negatively impact settling. The blowers are currently controlled

by timers which are set at 9 minutes on and 11 minutes off. The goal is to reduce DO to between 2.0 and 4.0 mg/l and to reduce electrical costs.

a. Recommendation - Time setting should be adjusted initially to 2/3 air on 1/3 air off, operator monitoring can fine tune the settings from there. Operators may be able to reduce blower run times over the evening hours when there is no influent flow. If this is desirable, the current timer will need replaced with a 24hr model.
b. Recommendation - Close off the ball vales at the aeration basin and remove some weight plates from the blower lines as necessary. The long term solution would be to install adjustable sheaves on the blowers to better control the blower speed.

3. Current alkalinity levels are approximately 0-20 mg/l. These are insufficient for nitrification to occur and are likely a leading cause to low pH levels and elevated ammonia levels. While monitoring the effluent, the alkalinity levels shouldn't drop below 80mg/l. If they do, there will be problems with incomplete nitrification occurring shortly thereafter. The facility currently adds soda ash for supplemental alkalinity. Goal to consistently keep alkalinity at 80 mg/l or more in the effluent.

a. Recommendation – Replace soda ash supplement with Magnesium Hydroxide; Mag Hydroxide has a lower pH, and is not as toxic when added in larger quantities.
b. Recommendation - Purchase alkalinity test strips to quickly and accurately monitor the treatment process. Monitoring should occur at least four times per week until the operational issues are resolved.

4. The facility maintains excellent process control records. The operators appear to be maintaining appropriate ½ hour settleability test results and effective sludge blanket depths (1-3 ft target depth) to maximize effective treatment.

5. The return sludge flow may be higher than necessary. Generally the RAS would be 75-100% of forward flow based upon design. This facility is operating at approximately 33% or less of its hydraulic loading capacity and both RAS pumps are in operation as expected. Goal to reduce costs and improve biological process.

a. Recommendation - The RAS flow may be able to be reduced; the operator can perform bucket test calculations to measure the actual RAS flow. If reductions in flow continue to lead to clogged RAS lines, as the operator indicates, then a change of RAS pumps may be necessary. Geiser pumps often work well at lower flows with reduced clogging issues.

6. During summer months, the facility adds dog food to supplement the organic loading to the plant. While this can help, it generally adds a lot of grease, which the operator confirmed. Also, the facility adds amino acids, Doslofat, to supplement treatment. Unfortunately this has not prevented the facility from experiencing ammonia violations with the likely cause the drastically lower organic and hydraulic loadings during these months. Goal to bring the system into compliance, and to solve the summer time organic and hydraulic under loading issues.

a. Partial solution- the facility should stop adding dog food and contact a chemical supplier to purchase dried bacteria cultures that can be added to supplement the loadings. These materials are specifically created for these particular situations without the grease issues.
b. Solution - the facility should pump out part of the aeration basin and use it to collect the wastewater, while continuing aeration. The partially treated collected wastewater then can be hauled off site by a waste hauler to an approved treatment facility. This will prevent a discharge from the plant eliminating compliance issues.