

Wastewater Treatment Evaluation
for
Hustontown Joint Sewer Authority Fulton County
Taylor Township, Fulton County
PA0248029

Prepared by:

Marc Neville & Erick Ammon, Water Program Specialists
Bureau of Clean Water, Wastewater Operations Section

From mid-November 2025 through late-January 2026, Marc Neville and Erick Ammon, Water Program Specialists, conducted an instrument-based data collection and analysis of operations at Hustontown Wastewater Treatment Facility.

Introduction:

The primary role of a licensed sewage treatment plant operator (operator) is to maintain compliance with the NPDES permit. Often, the focus of operators is to manage solids entering the treatment process as organic waste and grit from the collection system and, importantly, solids that comprise the collective bacterial mass known as Activated Sludge consuming organic and ammonia waste to reproduce more bacteria and other biota that feed on bacteria that consume the waste. Every day, some of these solids must be wasted from the treatment system to maintain steady-state dynamics measured in constant Food-to-Mass Ratio (F/M) or Mean Cell Residence Time (MCRT). It is the control and management of these solids that produces a quality effluent that meets NPDES permit effluent requirements.

Hustontown Joint Sewer Authority wastewater treatment facility consists of an influent wet well, two-Aqua Aerobics Sequence Batch Reactors (SBR), chlorine contact tank, aerobic sludge stabilization tank, and 6 underground sludge holding tanks. The facility is designed to treat 0.028 MGD, while average daily flow is approximately 0.018 MGD.

The facility has a history of non-compliance. In 2007, its fixed nozzle trickling filter treatment system was replaced with an Aqua Aerobics SBR largely due to effluent non-compliance. Addition of the SBRs did not considerably alter the facility compliance, and DEP's evaluation staff took an expanded view of facility operation and maintenance to determine root causes of the ongoing malfunction. DEP arrived with a collection of continuous-monitoring probes and placed them in the SBRs and the disinfection contact

tank, connecting them to data collectors so they could graph the data and study it for trends that indicate improving or deteriorating treatment conditions.

Aqua Aerobics SBR

On or about April 2, 2025, representatives of Aqua Aerobics had visited the Hustontown plant and made recommendations on repairs needed to the decant mechanism (report attached). The report suggested that Hustontown, “replace the decant weir float and seal assemblies as the plant is 17 or 18 years old, and the seal material has likely fallen out. The effluent quality during initial decant will continue to be an issue until this has been repaired.” It was also noted by Aqua Aerobics that SBR#2 is unable to waste sludge and that the unit should be drained and inspected. They also suggested that the plant be operated on a constant F/M ratio instead of simply a periodic 30-minute settleability test.

Operational Issues

It had been alleged that influent sulfides might be poisoning the activated sludge biomass and hindering effective wastewater treatment; however, the evaluation did not focus on sulfides, as the facility operations immediately appeared to be impacted by limited availability of operator oversight. One of the key tasks of the licensed Sewage Plant Operator is to manage solids in a functional facility. The evaluators found that this solids management is of paramount importance to improving effluent quality and permit compliance.

Consider the two SBRs. Both are controlled by an operator regulating an automated control panel to adjust treatment phases during each batch of wastewater being treated. The duration of treatment phases is based on recommended time settings. The control system also relies on dissolved oxygen residuals to lengthen or reduce the amount of aeration time needed for treating organic waste and for nitrification of aqueous ammonia, a toxic form of nitrogen that is rendered harmless by biological oxidation. A further treatment phase uses influent organic wastes in the absence of dissolved oxygen to further convert the oxidized ammonia, now called nitrate, to nitrogen gas that leaves the water to return to the air.

- SBR1 was operating using timed-treatment cycles that include a short period of sludge wasting at the end of each batch. It appeared that the time setting for this sludge wasting did not vary in accordance with seasonal and operational needs of the facility. Rather, the pump time and rate were held constant to the point of over-wasting SBR1 during cold weather conditions so that it had insufficient active biomass to adequately treat the wastewater comprising each batch. That meant immature bacterial growth conditions prevailed, and the discharged effluent had high ammonia and organic content after being only partially treated by this inadequate mass of bacteria.
- SBR2, contained a broken wasting pump and had little to no solids control through sludge wasting. Operators occasionally used a small sludge transfer pump to transfer solids from this SBR to the aerated sludge holding tank between the two treatment units, but the schedule appeared inconsistent, the pump may be



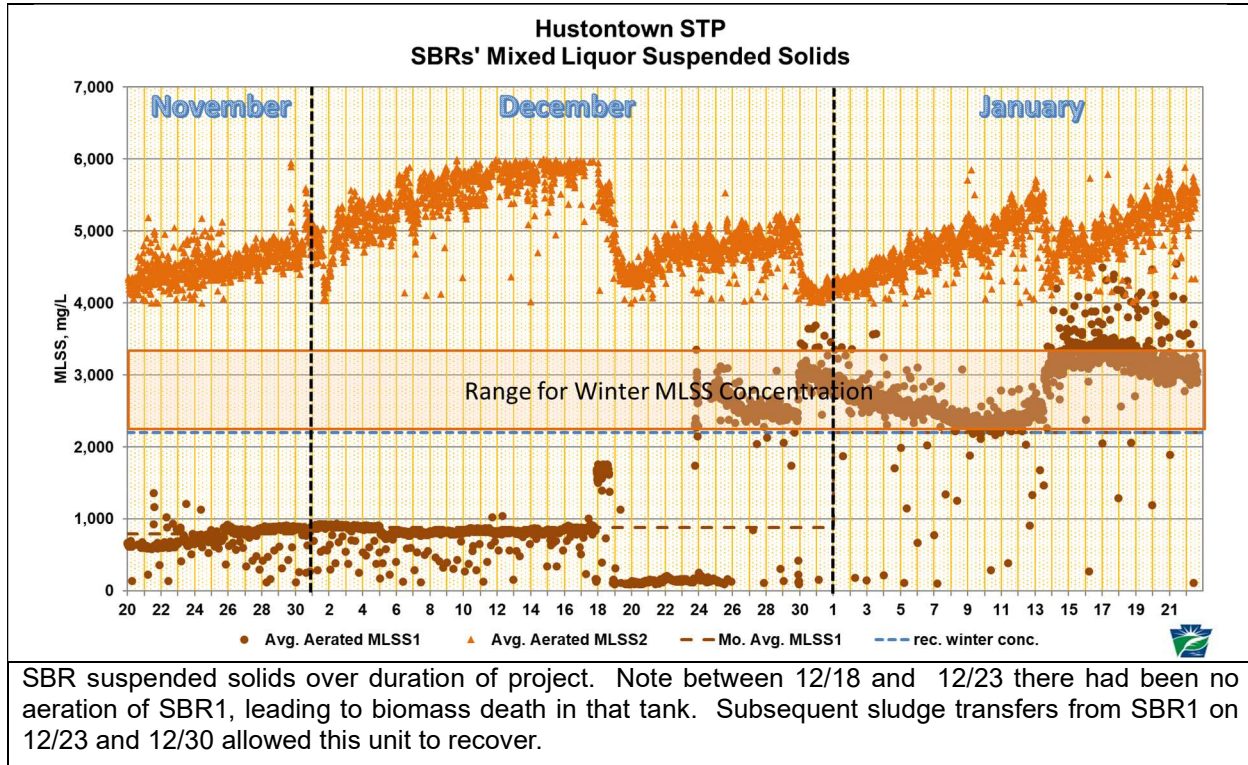
inadequate, and there were no ongoing process monitoring tests to confirm that biomass solids were being managed to achieve an appropriate seasonal concentration. Rather, the solids accumulation in SBR2 exceeded 6,000 mg/L and automatically self-wasted excess solids to the effluent because of ashing, resulting in biosolids carry-over into the effluent disinfection tank and the final outfall, reducing both the effectiveness of disinfection and the clarity of the receiving waters. Solids accumulation in the downstream processes continually rose throughout the study. Optimally, the disinfection tanks should be free of settled and suspended solids and look like a chlorinated pool.

While attending the site one or two days per week, the evaluators conducted several standard process monitoring tests on the activated sludge biomass and nutrient levels in the raw wastewater and in the treated effluent. They also cleaned their probes and assured that they were working correctly. If some of the test results are used to verify the calibration of the continuously-monitoring equipment, all the process monitoring provided a view of the treatment process and would normally be used by the plant operators to make process control decisions and adjustments that favor maintaining constant F/M or MCRT while assuring that effluent quality remains acceptable under NPDES Permit requirements. The evaluators noted that the staff on hand during the early evenings (it was late Fall and early Winter, with early nightfall descending), performed the permit-required effluent water quality testing for pH, temperature, dissolved oxygen, and total chlorine residual, and they checked pH, D.O., and other qualities of the biomass on a less frequent schedule. There was a Settleometer that appeared to be used perhaps weekly. However, the evaluators also noted a Raven Environmental Products solids testing centrifuge located in the back room was not being used to regularly measure biomass concentrations in the two SBRs. Once again, solids management is critical. It appeared that the operations staff did not really know what biomass concentrations to maintain in the SBRs, nor were they aware of the facility's Operations and Maintenance Manual's recommendations for biomass concentration at this plant.

One of the unlicensed operator/laborers, working under the operators' standard operating procedures, complained that there were no working lights above the elevated SBRs. He said he could not adequately conduct a visual inspection of the treatment units when he was working in the dark.

DEP's evaluators recommended an option for one of the laborers to set up the portable pump used for wasting sludge from SBR2 for use transferring biomass over to SBR1 to equalize solids concentrations between 3,000 and 4,000 mg/L in both tanks. This could improve sewage treatment in SBR1 while perhaps reducing the ashing of solids from SBR2 to the downstream tanks. Following initial resistance from one of the licensed operators, who maintained that the solids would recover naturally in SBR1 if left alone, treatment facility staff set up a pump and the evaluator remained on site to unplug it after an appropriate sludge transfer had occurred. Initially, solids in SBR1 increased from about 1,000 mg/L to 3,000 mg/L, but over the next few days the automated controller for SBR1 failed. It remained down for five days until DEP's evaluators discovered the problem when they returned the following week to maintain their probes, collect data, and

conduct process monitoring tests. At that point, the biomass solids in SBR1 were mostly dead and septic-smelling. The evaluators telephoned the operators' company and informed them of the malfunction and its consequences to the plant.



A company representative and the Authority secretary came to the site and saw to it that the controller was repaired and the air blower made operational. It then fell to the evening operator/laborer, as the DEP evaluator recommended, to transfer more biomass from SBR2 to SBR1. The SBRs treatment recovered over the following week.

Since the facility had a history of non-compliance with the trickling filters and the SBRs, they are considering reconfiguring the facility as an extended aeration plant. Keller Engineering has been working on such a proposal for the board.

It was also suggested that influent sulfides might poison the biomass and interfere with treatment. No test results were shown to the evaluators to identify the presence of sulfides, and were influent sulfides a problem, another conversion of treatment technology would not fix such a problem. The bacteria used in extended aeration are the same microbes used in an SBR and all other suspended growth, activated sludge systems. Switching the system from an SBR to extended aeration is likely to be costly as a secondary clarifier would be built. It was suggested that the following be considered:

- Before money be spent on this project, necessary repairs be made to the SBRs and a proper process control program first be implemented based on operating at steady-state F/M. The evaluators were confident that the existing facility would work properly



if the operators were authorized necessary time to conduct process monitoring and control and if the Authority would repair its worn and neglected equipment and controls.

- If, after repairs are made and proper process control is implemented and the plant is still having compliance issues, the presence of toxic or pass-through chemicals in the raw wastewater could then be evaluated. However, it appears likely that it will take a combination of owner and licensed operator effort to repair and operate the existing facility as it was designed and delivered.

Recommendations:

Hustontown is of special concern to the DEP regional office because it has regularly been unable to meet the requirements of its NPDES permit. Following is a list of recommendations:

1. The operator needs to establish a program of regular Process Monitoring and Control to maintain steady-state conditions employing F/M Ratio, Mean Cell Residence Time, Sludge Volume Index, along with microscope observations to calculate the proper sludge wasting rate in both SBRs. Testing once per week or twice per month may be adequate when the plant is operating in steady-state condition, producing quality effluent. However, whenever plant upsets occur, and they may, or filamentous organisms become dominant in the biomass, and they might, the operators should plan to spend more time at the plant, running tests, making process adjustments, and using supplemental organics and chemicals to work through the upset.
2. Acquire the necessary in-house testing equipment for effective solids management. This could include a centrifuge, used in combination with Settleometers and Core-samplers (sludge judge).
3. Test influent and effluent regularly for phosphorus, ammonia, nitrogen, and for alkalinity. Track treatment efficiency and map data to observe trends that may indicate trouble coming or trouble resolving.
4. Sludge should regularly be removed from the facility. During the project, the onsite sludge holding tanks were still full, apart from the aerated sludge holding facility which is regularly decanted but tends to become septic for lack of continuous aeration. The operator has continued dosing lime so that the biosolids may be used for agricultural fertilizer, yet if land is not available due to season or available farms, then sludge must be hauled to a facility that can accept and process it.
5. The SBR#2 wasting pump/mechanism should be repaired or replaced as soon as possible. Without proper sludge wasting, this unit continues ashing excess solids to downstream treatment units and to the final effluent. Next, adjust wasting rates to bring solids concentrations in line with the acceptable values presented in the facility's Operations and Maintenance Manual or site-specific seasonal values that result in a discharge compliant with the facility's NPDES permit.

6. Repair the SBR decanter and mixer systems as recommended by Aqua Aerobics in their proposal dated April 2, 2025. (See earlier report summarizing an August 12, 2025, site visit by DEP's Operator Outreach program.)
7. Consider having the SBR control panel evaluated for effectiveness and repair or replace defective or obsolete components. This includes remote sensors like the dissolved oxygen residual (DO) probes installed at each SBR and used by the control panel programming to adjust treatment conditions. The DO probes should be cleaned every week due to their operating in rough service conditions. Overhauling and updating the control panel might prove a better investment than building a secondary clarifier would be.
8. Replace broken pipes and city-water farm taps; and replace worn or damaged Polyflo chemical lines and secure discharge ends appropriately. Assure that chemical pumps are serviced and cleaned regularly according to their manufacturers' recommendations.
9. Arrange to drain each of three tanks (two SBR and the digester) for cleaning and inspection at the earliest convenience. Remove accumulated grit, rags, and detritus. Given some low-flow conditions, it may be possible to operate only one SBR while inspecting and cleaning the other.
10. The facility engineer should consider the merits of installing fine-screen trash removal in the plant headworks to remove detritus and rags that end up downstream in pumps, valves, mixers, and other operating equipment. Given the observation of black grit in the disinfection tank, also, it may be necessary to provide grit removal at the headworks. The existing trash screen inside the raw wastewater wet well is inadequate for capturing plastics and trash that is found in modern collection systems.
11. Repair or replace inoperable yard lighting. The light standards atop the SBR deck should be used by plant staff should they be working during seasonal darkness and for general safety considerations. If night-time lighting bothers people in neighboring properties, the lighting could be regulated by timers and motion detectors.
12. Additional safety concerns include eliminating hazards of improperly stowed hoses and tools and miscellaneous trash littering SBR decks and repairing any broken or damaged pulleys, pump jacks, electric receptacles. During the evaluation, there was ice accumulation on the concrete deck, rendering it treacherous. This ice was created by partially melted and refrozen snow walked upon to create wholly uneven ground. Prompt clearing of snowfall or use of calcium chloride deicer would have mitigated this.
13. Establish a cradle-to-grave solids management program. Effectively managed biosolids are second only to producing a quality treated effluent. Continue to find additional farmland for biosolids application, and shop around for good pricing for biosolids hauling.



14. In the aerated sludge holding tank between the SBRs, septic sludge should be removed, and the sludge holding tank ought to be restarted from empty and clean. The aeration should be run almost continuously to maintain good dissolved-oxygen residuals to remove volatile content. Turning off the aerators should only occur when settling and decanting the tank but should not exceed being off for more than a day's time as this can also reduce potential malodors. Settling and decanting can be improved by adding polymer flocculants.
15. Schedule regular cleaning of the disinfection treatment and contact tanks downstream of the SBRs, removing accumulated solids from the tank floor and walls to the digester, and determining the correct metered dosage rate for disinfection and sulfonation chemicals used there.
16. When the plant settles down and is running well, (Reading the facility O&M Manual is a must...) consider tackling other administrative tasks such as establishing a written preventative maintenance program for all equipment used on site. The key is to replace reactive, ad hoc maintenance with regular, preventative maintenance. Doing so will prolong the life of equipment at the facility.
17. Consider setting up an asset management program as an extension of the maintenance program. This would include listing all the assets comprising the facility, their original and replacement costs, physical condition, and be used to determine whether to repair, leave untended, or replace equipment and other assets as they wear out. A plan could also incorporate scheduled planning and building of financial assets toward those eventual replacement costs.
18. Lastly, all employees working in a wastewater treatment facility should be trained. Whether licensed operators or laborers, all staff should regularly attend training on the type of system they work in. There are many professional and trade organizations that offer training. It is a stewardship responsibility of a facility owner to assure that staff operate the facility in a safe, proactive, and knowledgeable manner.

Conclusion:

After the facility has been restored to good working order, the evaluators believe it will operate in compliance with its permits. At such a time, the owners and operators may wish to avail themselves of ongoing outreach and technical assistance opportunities that are hosted by a variety of organizations, including those in the regulatory community. Financial planning assistance, training for municipal authority board members, and more are offered through RCAP, PennVest, PRWA, PWEA, USDA, EPA, and others.