



Maryland Department of Environment
Water and Science Administration
Compliance Program
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WInspector: Ronald Wicks
AI ID: 3076

Site Name: Patapsco WWTP
Facility Address: 3501 Asiatic Ave, Curtis Bay, MD 21226
County: Baltimore City County

Start Date/Time: June 29, 2022 09:00 AM
End Date /Time: July 08, 2022 04:21 PM

Complaint Number:
Media Type(s): NPDES Municipal Major Surface Water

Contact(s):

Neal Jackson Plant Manager
Eric Johnson Operations Supervisor
Wendy Huang Environmental Compliance Specialist MDE
Emily Grace, Associate, Hazen and Sawyer
Aaron Thomas Senior Associate, Hazen and Sawyer
NPDES Municipal Major Surface Water

Permit / Approval Numbers: 15dp0580
NPDES Numbers: MD0021601
Inspection Reason: Follow-up (Non-Compliance)
Site Status: Active
Compliance Status: Noncompliance
Site Condition: Noncompliance
Recommended Action: Additional Investigation Required
Evidence Collected: Photos or Videos Taken, Record Review, Samples Taken, Visual Observation
Delivery Method: Email
Weather: Dry Average

Inspection Findings:

The Patapsco Wastewater Treatment Plant (WWTP) is a 73 million gallon per day (MGD) capacity activated sludge WWTP with ferric chloride for removal of phosphorus. The treatment system has grit removal, mechanical fine screens, primary clarifiers, oxygen activated sludge reactors, secondary clarifiers, biological aerated filters for nitrification, denitrification filters, flow distribution chamber, chlorine contact chamber, and cascade post aeration chamber. Prior to the final discharge into the Patapsco River, any designated Use II waters protected for estuarine and marine aquatic life is processed through chlorination, dichlorination, and post aeration. The average flow is approximately 55-57 MGD; however, during heavy rainfall flows can double due to infiltration from the sewer lines. Patapsco WWTP's biosolids are processed by Synagro, Inc., a

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private company, located on-site that draws the undigested biosolids from the gravity sludge thickeners (GST), dewater them, and transports off-site.

On June 29, 2022, and July 7, 2022, I performed follow up evaluations to a National Pollution Discharge Elimination System (NPDES) inspection conducted on May 18, 2022, at the Patapsco WWTP, NPDES Discharge Permit number MD0021601 and State number 15-DP-0580.

For the June 29, 2022, inspection, I was joined by Wendy Huang, Environmental Compliance Specialist, with the Maryland Department of the Environment (MDE or the Department), WSA Compliance Program. At the site, Huang and I met Neal Jackson, Plant Manager, Eric Johnson, Wastewater Operations Supervisor II, and Emily Grace, Associate, Hazen and Sawyer. Hazen and Sawyer, an engineering consultant firm, was contracted by Baltimore City Department of Public Works (DPW) to assist with getting the Patapsco WWTP into compliance with the NPDES permit.

For the July 7, 2022, inspection, I met Neal Jackson, Plant Manager, and Aaron Thomas, Senior Associate, Hazen and Sawyer, who both accompanied me during the site review.

The permit effective date is Oct. 1, 2017, expiration date is Sept. 30, 2022 with a reapplication date of March 31, 2021. The renewal application was received by MDE. The facility's activity code or standard industrial classification is 4952 and the North American Industry Classification System is 22132.

For the June 29, 2022 inspection, Huang and I conducted a preliminary meeting with Jackson and Johnson. I discussed the numerous effluent violations reported for April and May and questioned how the Patapsco WWTP is addressing these violations. I also inquired about the condition of the grit handling equipment.

There have been a continual series of permit effluent violations reported for the following constituents due to operational and process problems:

- Biochemical oxygen demand (BOD₅)
- Total suspended solids (TSS)
- Total phosphorus (TP)
- Total Nitrogen (TN)
- Total Ammonia as N
- Enterococcus

During a data review of the Discharge Monitoring Reports and Monthly Operating Reports for April and May 2022, the following reported violations were observed as shown in Table 1 below. Select data for June is also included. The annual cumulative load for total nitrogen and total phosphorus and seasonal total nitrogen loading violations continue in June.

Date	Parameter	Result Reported	Permit Violation	Permit Limitation
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April 2022	TSS	Monthly Average Concentration- 61 mg/L	Exceeded Monthly Average Concentration	30 mg/L
April 2022	TSS	Monthly Average Loading – 29,231 Lbs.	Exceeded Monthly Average Loading	18,000 Lbs.
April 1–7, 2022	TSS	Weekly Average Concentration - 155 mg/L	Exceeded Weekly Average Concentration	45 mg/L
April 4/1 – 4/7 2022	TSS	Weekly Average Loading - 74,486 Lbs.	Exceeded Weekly Average Loading	27,000 Lbs.
April 4/1 – 4/7 2022	Total Phosphorus	Weekly Average Concentration – 4.6 mg/L	Exceeded Weekly Average Concentration	3.0 mg/L
April 4/1 – 4/7 2022	Total Phosphorus	Weekly Average Loading – 2,513 Lbs.	Exceeded Weekly Average Loading	1,830 Lbs.
April 2022	Total Phosphorus	Monthly Average Concentration – 2.56 mg/L	Exceeded Monthly Average Concentration	2.0 mg/L
April 2022	Total Phosphorus	Annual cumulative loading - 128,800 lbs.	Exceeded the 2022 total cumulative annual loading for 2022 in March 2022 and will continue to exceed the limit until 12/31/2022	66,700 Lbs./year
April 2022	Total Nitrogen	Annual cumulative loading 1,111,800.0 lbs.	Exceeded the total annual cumulative loading for 2022. Will continue to exceed the limit until 12/31/2021	889,300 Lbs./yr.
April 2022	Enterococcus	Monthly Geomean concentration 54 MPN/100 ML	Exceeded Monthly Geomean Concentration	35 MPN/ 100 ml
April 4/1 – 4/7 2022	Biochemical Oxygen Demand	Reported Weekly Average Concentration - 60 mg/L	Exceeded Weekly Average Concentration	45 mg/L
April 4/1 – 4/7 2022	Biochemical Oxygen Demand	Weekly Average Loading – 30,136 Lbs.	Exceeded Weekly Average Loading	27,000 Lbs.
April 22	Biochemical Oxygen Demand	Monthly Average Concentration- 38 mg/L	Exceeded Monthly Average Concentration	30 mg/L

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April 22	Biochemical Oxygen Demand	Monthly Average Loading – 18,778 Lbs.	Exceeded Monthly Average Loading	18,000 Lbs.
May 2022	Enterococcus	Monthly Geomean concentration 38.2 MPN/100 ML	Exceeded Monthly Geomean Concentration	35 MPN/ 100 ml
May 2022	Ammonia as N	Monthly Average Concentration- 14.2 mg/L	Exceeded Seasonal Monthly Average Concentration (5/1-10/31)	6.3 mg/L
May 2022	Ammonia as N	Monthly Average Loading – 7,100 Lbs.	Exceeded Seasonal Monthly Average Loading (5/1-10/31)	3,836 Lbs.
May 2022	Total Nitrogen	1,456,300.0 Lbs.	Exceeded the total annual cumulative loading for 2022. Will continue to exceed the limit until 12/31/2021	889,300 Lbs./yr.
May 2022	Total Nitrogen, Seasonal Cumulative Total 5/1-10/31	344,600 Lbs.	Exceeded Seasonal cumulative total	333,330 Lbs.
June 2022	Ammonia as N	Monthly Average Concentration- 13.5 mg/L	Exceeded Seasonal Monthly Average Concentration (5/1-10/31)	6.3 mg/L
June 2022	Ammonia as N	Monthly Average Loading – 5,938 Lbs.	Exceeded Seasonal Monthly Average Loading (5/1-10/31)	3,836 Lbs.
June 2022	Total Phosphorus Seasonal Cumulative Total 5/1-10/31	Seasonal Cumulative Loading 35,500 Lbs.	Exceeded Seasonal Cumulative Loading (5/1-10/31)	33,330 Lbs.
June 2022				

Similar violations have been observed during previous compliance evaluations. Today, July 7, 2022, Jackson reiterated that these violations were the result of "...the continued poor performance of the Patapsco's solids handling contractor, Synagro Water Technology, Inc." According to

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Jackson, Synagro has not been processing the biosolids consistently. In the Department's May 18, 2022, compliance evaluation report, Patapsco WWTP was directed to negotiate and implement a **permanent solution** for the management of biosolids and submit the details of the resolution to the Department on how Patapsco WWTP plans to achieve this goal. A description of the plan of action for addressing the biosolids processing problems was submitted to the Department on June 1, 2022. However, during this inspection, **I found that some of the actions and initiation dates in the submitted plan of action have either changed or the action is not being done.**

According to Jackson, the Patapsco WWTP is working with Synagro to improve biosolids processing and removal from the site. Originally the solids were pulled from the sludge blending tanks (SBT). This operation was controlled by Synagro, however analytical data show that the sludge in the SBT has petroleum hydrocarbon concentrations at levels that Synagro determined were too high to process in the dryer.

Biosolids are now being taken from the GST instead of from the SBT where the hydrocarbon concentrations are very high. Synagro will be able to control the GST pumps bypassing the SBT and pumping directly from the GSTs. Synagro has obtained the necessary permits and has arranged to send the centrifuged sludge out by railcar. The removal of the sludge by rail began on June 23, 2022. According to Jackson, Synagro will only deliver sludge to customers that signed contracts to purchase the sludge.

Currently, the two SBTs are filled with sludge. According to Jackson and Johnson, a separate belt press is scheduled to be installed at the SBT to process the sludge. At this time, this installation is in the planning stages and Jackson and Johnson could not provide any dates. I spoke with representatives from Synagro, Matthew Tabisz, Business Development Manager, and Alan Wuebker, Senior Plant Manager who confirmed that the centrifuged biosolids are being transported offsite to Pennsylvania by railcar. Due to the high concentration of petroleum hydrocarbons detected in the sludge, I asked Tabisz and Wuebker if the sludge was characterized by Toxicity Characteristic Leaching Procedure (TCLP) and checked for ignitability to determine if there was any environmental risk with the disposal of the sludge. Tabisz informed me that the sludge had been characterized using TCLP and tested for ignitability. The report indicated that the sludge for Patapsco WWTP collected on Dec. 21, 2021 was tested and passed the ignitability, reactive, and corrosivity tests, indicating that the sludge was not classified as hazardous waste by U.S. Environmental Protection Agency (EPA) standards.

After the preliminary meeting on June 29, 2022, we continued the inspection with a site review beginning at the GSTs. I was accompanied by Huang, Grace, Johnson and Jackson. Gravity thickening is the process by which biosolids are condensed to produce a concentrated solids product and a relatively solids-free supernatant. The facility has three GSTs (#1, #2, and #4) and during this inspection, I observed that two were online. The #4 GST is not functional. The scrapers, drive, and pumps require replacement. According to Jackson, the funding to repair the scrapper arm that was causing a shaft drive problem was approved and the repairs are expected to begin next week. During an inspection of #1 GST and #2 GST, I observed a few problems.

The sludge blankets were above an acceptable level causing the effluent (supernatant) from the GST to have a higher-than-normal solids concentration. The solids are also accumulating on the

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effluent weirs blocking the flow of the supernatant. As mentioned in the Department's previous inspection report, the #2 GST skimmer arm was not in complete alignment with the surface of the water and required reinforcement. The high sludge blanket is also causing the top layer of supernatant to be charcoal in color. These problems are increasing the amount of solids going through the system into the biological reactors and continues to cause high solids concentrations, leading to monthly effluent violations for BOD, ammonia as N, and cumulative total nitrogen.

During an evaluation of the area, I observed that the #1 GST scum pump was on the deck. According to Jackson, they are cleaning and performing routine maintenance on the pump and pumping out the scum pits with a Vac truck.



6/29/22 GST #1 note floating solids

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6/29/22 Effluent from GST #1 the weirs are blocked and covered with the sludge

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6/29/22 GST #1 scum pump removed for cleaning and routine maintenance

The next area of evaluation was the Tailings Transfer Station. Patapsco WWTP has been using the Tailings Transfer Station as a temporary sludge storage area to store unprocessed sludge. This area is now being cleared of sludge. According to Jackson, now that Synagro is using the railcars to transport the centrifuged sludge off-site, there is no need to store the sludge at the Tailings Transfer Station. The railcars offer a greater capacity than trucks and this change has significantly reduced Patapsco WWTP's biosolids inventory. Tailings Transfer Station will go back to being used as a storage area for the tailings from the fine screening area as designed. The area is in much better condition than before. See picture taken on June 29, 2022, and another picture taken on April 6, 2022. Note the improvement.

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6/29/22 Tailings Transfer Station is being cleaned of sludge.

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4/6/22 This is the condition of Tailings Transfer Station in April when the area was used for the storage of sludge. Picture above shows sludge inventory has diminished.

The domestic waste enters the plant at the grit building where there are six grit chambers. Hazen and Sawyer, Inc, is still repairing and cleaning the grit building process equipment. Initially, Hazen and Sawyer determined that all six grit chambers were not functioning as designed because of the grit and rags in the chambers. All of the grit chambers have been cleaned and put into service. Hazen and Sawyer Inc. has also repaired and put into service one of the clamshell cranes. Due to problems with odor control and ventilation at the grit building, confined space entry requirements are in place. Respirators are required for entry to the grit building so we were not able to inspect the grit handling system. I asked Hazen and Sawyer to send me pictures of the interior of the Grit Building showing the grit tanks and traveling crane. These pictures are shown below.

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7/5/22 Grit tank and traveling crane with clamshell in Grit Building. Picture taken at my request by Hazen and Sawyer

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7/5/22 Grit Chamber. Picture taken at my request by Hazen and Sawyer

During the next segment of the June 29, 2022 site review, I evaluated the fine screening system, which is the next phase of treatment after the grit building. There are two influent lines coming into

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the plant, domestic, which is 90-95% of the flow and industrial, which makes up the remaining 5-10% of the flow. The sewage travels from the grit chambers to the fine screening units.

The sewage is pumped to the influent tank at the fine screen building and travels to the fine screening building. The facility has eight screening units, and according to Johnson, three units are always online for the fine screening of the wastewater. During this inspection, six units were online. Five of the eight screens have been recently refurbished. Baltimore City has appropriated the funds to upgrade the bar screens by replacing all the internal parts and installing a more effective wash system. The six fine screens online were functioning satisfactorily. During the past four inspections conducted May 5, 2021, Oct. 6, 2021, and April 6, 2022, I observed that the fine screening system was overwhelmed with trash and other debris, and were falling off of the conveyor belts causing the belts to stop working. During the May 18, 2022 inspection and also today, I found that the conveyor belts were functioning. However, during the May, 18, 2022 inspection and today, I still observed trash and debris falling off of the conveyor belts that will compromise proper functioning of the system. The housekeeping practices still require more attention and improvements are necessary to prevent and minimize potential problems with clogging and other maintenance issues downstream due to trash and debris.



6/29/22 pile of trash from screening unit located in a position to get back into the system. The area should be checked and cleaned as appropriate.

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6/29/22 trash clogging conveyor belt. This area should be routinely cleaned of trash and maintained in a manner that promotes effective functioning of the system. The permittee must improve operating practices in this area.

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6/29/22 Unsatisfactory housekeeping practices in the fine screening building. Wet trash is a slip and trip hazard as well.

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6/29/22 Unsatisfactory housekeeping practices as well as a safety issue.

The wastewater travels from the fine screening to the primary settling tanks (PST) for initial settling of the solids. The plant has six primary settling tanks with three passes. The bottom sludge from the PSTs is gathered by screw collectors at the bottom of the tanks and collected in hoppers and then sent to the GSTs.

During the June, 29, 2022 inspection, five of the six PSTs were online. PST #3 was taken offline for cleaning and according to Jackson PST #3 would be back online by July 1, 2022. I observed floating scum along with fats, oils, and grease (FOG) floating on the surface of PSTs #1 and #2. However, the remaining three PSTs did not have the floating FOG and were in satisfactory condition. According to Jackson, the scum troughs are rotated twice a day to remove the scum and manual skimming with a net is being conducted as well to try to manage the floating scum and FOGs. There was no manual skimming or rotations being done during my time inspecting the PSTs. I inspected the final effluent from the PSTs and observed no floating scum going over the weir at this time. The facility shall ensure the operational integrity of the primary treatment system and shall take a proactive approach by removing the accumulation of FOGs that have accumulated in some of the PSTs.

I observed a heavy layer of scum and FOG in PSTs #1 and #2, and a fine layer in PSTs #4, #5, and #6 during the July 7, 2022 inspection, which occurred the day after rainfall. The scum troughs were filled with FOG as well. PST #3 is still offline, and I observed that it had not been cleaned. The two pumps for the scum pit have been neglected and failed. They were removed and sent out for

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repairs. According to Thomas, they would be returned and installed during the third week of July. Until then, the permittee must perform manual skimming.



6/29/22 PST showing floating FOG

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6/29/22 PST with floating FOG.

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6/29/22 PST #3 was drained and now scheduled to be cleaned and put back into service on July 1.

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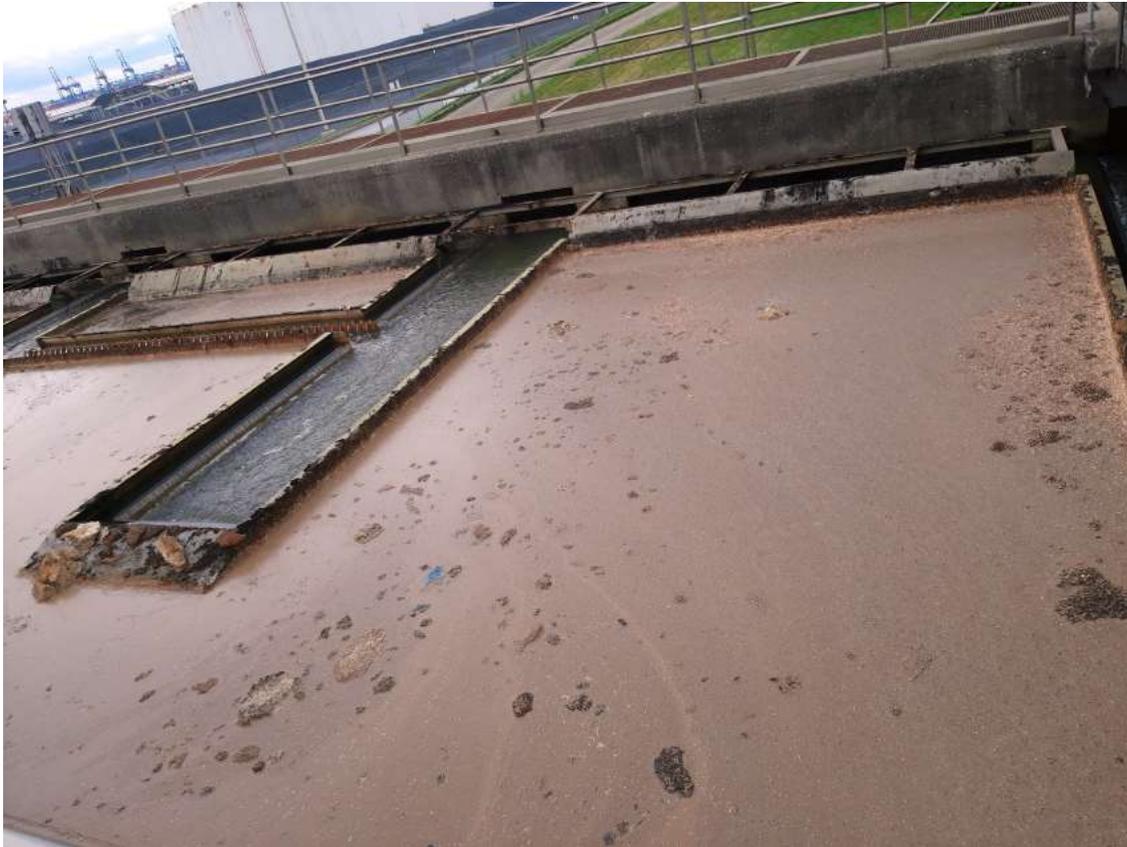
6/29/22 PST overflow to biological reactor. Gray color due to solids.

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7/7/22 Scum trough for PST #4

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7/7/22 Thick layer of scum on PST #2 after rain event the day before

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7/7/22 Thick layer of scum on PST #1 after rain event the day before

The wastewater travels from the PSTs to the high-pressure pure oxygen reactors, which are below ground. Each of the six PSTs has an associated reactor. The first stage receives no oxygen and oxygen is added to the second stage to maintain a dissolved oxygen (DO) concentration of 6.0 to 12.0 mg/l. The second stage DO is monitored by the operators and adjusted as necessary. The waste streams from reactors #1 through #4 are split between four secondary clarifiers and the wastewater from reactors # 5 and #6 split between four smaller separate secondary clarifiers.

The liquid oxygen required for the reactors is produced in the liquid oxygen (LOX) plant. Originally, the Lox Plant had two compressors for the production of oxygen. Currently, only one of these compressors is functioning, but not to the level required for satisfactory oxygen production for the biological reactors. During the Department's April ,6, 2022 inspection, I was told that one of the compressors was repaired, back online, and the repairs to the second compressor have been made and was being shipped back to the plant. The Department received a letter dated June 10, 2022, stating that the compressor that was out for repairs was received on June 8, 2022, and would be installed on June 17, 2022. The compressors are critical to satisfactory nitrification and ammonia removal. Fully functional, as designed, compressors are necessary in order to meet the effluent limits of the permit.

The April BOD concentrations are elevated due to solids in the system, which in turn has hindered nitrification in the biological reactors. In addition to high BOD, the nitrification process at the high purity oxygen aeration reactors is further compromised due to the problems at the LOX Plant.

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According to Jackson, the poor nitrification process at the biological reactors mentioned above disrupted the Enhance Nutrient Removal (ENR) nitrification stage at the biological aerated filters (BAF), which in turn has affected the denitrification performance at the ENR denitrification filters causing the seasonal nitrogen and ammonia as N violations shown in Table 1.

During this June 29, inspection, I learned that the compressor had not been installed. I was informed by Johnson and Jackson that the compressor will be installed by Southern Designs on July 6, 2022. When I returned to the Patapsco WWTP on July 7, 2022, to confirm installation, I discovered that the compressor had arrived, but it had not been installed. According to Mike Young, Area Supervisor, the contractor is working on the install, but stepped away. Young indicated that the new LOX compressor would be installed by July 9, 2022. According to Young, the old compressor was leaking oil and overheating. The refurbished compressor can produce and deliver twice the amount of Dissolved Oxygen (DO) as the old compressor. This improvement in oxygen delivery should improve nitrification in the biological reactors and prevent the disruption of nitrification in the BAF.



7/7/22 Old LOX compressor that was overheating. This compressor will be refurbished in 2-3 months by Southern Designs.

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7/7/22 Refurbished compressor for the LOX plant.

On July 11, Thomas informed me by email that there was a setback in the installation of the refurbished compressor shown above and the scheduled installation date of July 9, 2022, is no longer achievable. The refurbished compressor did not line up with the discharge piping on train #1. The refurbished compressor was moved to train #2 and the installers were able to install the compressor to train #2. However, train #2 has electrical and mechanical issues that need to be corrected before the LOX plant can be put back online. According to Thomas, the LOX plant will be back online when the second compressor that is scheduled to be refurbished is back from the factory and installed on train #1 or the mechanical and electrical issues on train #2 are corrected whichever comes first. According to Michael Hallmen, Division Chief, Wastewater Facilities Division, they are purchasing oxygen from an outside contractor for the high-pressure pure oxygen reactors until the LOX plant is back in service.

During the June 29, and July 7, 2022 inspections, I found that four of the six reactors were in service. Reactor 1C was not in service because of a problem with the capacitors and #2 reactor was down because of three failed aerators. According to Jackson, the target mix-liquor suspended solids concentration (MLSS) in the reactors is 2,500–3,500 mg/L. Current concentrations are:

- Reactor #1 – 5,000–8,000
- Reactors #2, 3 – 3,000–5,000
- Reactors #4, 5 and 6 – 2,000–4,000

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Since the MLSS concentration is above the target concentration in some of the reactors, there will be a loss of aeration efficiency in those aeration tanks. The permittee must consistently keep solids concentration down to the level to meet the target MLSS of 2,500–3,500.

Next, I conducted an evaluation of the secondary clarifiers. The reactors are split between eight secondary clarifiers. Clarifier #6A has been out of service for over 1 year because the return activated sludge (RAS) pump was not functioning. According to a June 9, 2022, letter to the Department, the DPW stated that the parts to repair the pump on clarifier #6A are scheduled to be shipped on June 21, 2022. Johnson explained to me during the June 29, 2022 inspection that the parts have arrived, but no date to complete the repairs have been made. I explained that this correction must be addressed immediately. When I returned on July 7, 2022, I observed that the RAS pump was repaired and installed, and secondary clarifier 6A was back in service.



7/7/22 Secondary clarifier 6A RAS pump is functioning and the 6A clarifier is back in service

Secondary clarifier #3 is being used to collect the backwash from the BAF and the Denitrification Filter System (DNF). This appears to be isolating the BAF media that is being lost during backwash. The effluent from this clarifier goes back to the influent line of the PSTs. Currently, seven of the eight clarifiers are active and being used for wastewater treatment to settle solids. The water in the secondary clarifiers was gray due to the TSS concentration. There were also media pellets from the BAF system observed floating in the water of a few of the secondary clarifiers but not to the extent observed during previous inspections. The skimmer arm on clarifier #5A is slightly bent and the scum scraper is missing, therefore, there is no effective skimming being

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performed at this clarifier. I also observed bubbling of the water due to the release of methane gas in the secondary clarifiers along with floating balls of black solids. This condition is caused by anoxic conditions in the water due to over-aged sludge. This is a concern because it can lead to denitrification in the secondary clarifiers and the floating solids can cause solids to carry over to the next stage of treatment (BAF) causing further problems with solids. This was most evident at clarifier #4. The Patapsco WWTP should evaluate the following to prevent denitrification in the secondary clarifiers:

- Evaluate the sludge blanket, optimal is between -3 feet. According to Grace, the sludge blanket in clarifier #4 was approximately 3.5 feet.
- Evaluate hydraulic retention time in the clarifier. Optimal time is between 2-4 hours.
- Use a water spray to degas the floating solids. This will cause the bubbles to breakout and the sludge to sink



6/29/22 Secondary clarifier #3 is being used to collect the filter backwash discharge

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6/29/22 Secondary clarifier #4 methane gas bubbling from the surface and black balls of sludge floating on the surface

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6/29/22 skimmer arm on clarifier #5A is slightly bent and the scum scraper is missing.

Next, I conducted an evaluation of the BAF system. Twenty-one of the 22 filters were online during this evaluation. I observed foaming in the filter cells caused by the high BOD due to the high concentration of solids. Solids were also observed floating in the foam. The solids load, now going into the BAF system, is above the capacity of the system. The effluent was moderately turbid due to solids. According to Grace, the ammonia as N concentration of the influent going to the BAF is 20 mg/L and the ammonia concentration of the effluent leaving the BAF is 14 mg/L, which is a 30% ammonia removal rate. The BAF should be capable of removing 75–90 % of Ammonia as N from the wastewater. Therefore, complete ammonia oxidation is not being performed by the BAF due to solid concentrations that are elevating the BOD and hindering nitrification. This data indicates that the BAF is not functioning to ENR standards as required by the permit. The facility shall make equipment and process corrections to achieve ENR standards for this treatment process.

In the BAF process, wastewater flows upwards through the cells that contain tightly packed media that provides a surface for the microorganisms to attach to and grow. Air is added to the bottom of the cell to provide oxygen for the microorganisms to thrive. This media is being lost and discharged during the backwash process and according to the Patapsco WWTP it has been isolated to Cell #5. The ENR filters used are Veolia Water technologies (VWT) BAF. The Patapsco WWTP has been working with VWT to resolve the problem, but to date there has been no resolution to the problem and the media is still being discharged. During an inspection of the BAF mud well, where the backwash is discharged before going into clarifier #3, I observed the entire surface of the water in the mud well is covered with a heavy layer of media with the potential to return to the beginning

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of the treatment system. The Patapsco WWTP shall work with VWT to resolve this process problem to prevent the media loss.



6/29/22 Effluent from BAF

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7/7/22 BAF filter cell – Note heavy foaming with solids

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7/7/22 BAF mud well containing a heavy layer of media.

DNF was the next stop during the site review. The facility has 34 denitrification filters for denitrification and today 32 were online. During the Department's inspection on May 18, 2022, I observed that the DNF was not functioning. The cells were submerged and incapable of filtration and there was floating sludge in the filters indicating clogging of the system. On June 29, 2022, the DNF system was functioning. However, there were solids, algae, FOG, and scum observed in the water of the cells. The DNF system cannot operate and effectively denitrify under the current condition of the filter system. According to the operator on site, two filters are backwashed per hour. He also stated that the Patapsco WWTP will begin starting today, taking some of the filters offline and draining them and then letting them dry in an effort to remove the algae. Currently, the system is still not being operated as specified in Special Condition A2 footnote 5 of the permit and General Condition B5:

The permittee shall operate the ENR facility in a manner that optimizes the nutrient removal capability of the facility as stipulated in the Grant Agreement for ENR upgrade. The first exceedance of the permit limit shall be counted and reported as daily exceedances beginning from the first exceedance, determined to the nearest day, through December 31. In addition, after any such exceedance, the permittee shall demonstrate to the Department's satisfaction that the facility is optimizing its nutrient removal capability, and neither the arrival of the next calendar year nor the issuance of a permit renewal during a period of noncompliance shall obviate continuance of any noncompliance status related to treatment optimization requirements.

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When I returned on July 2, 2022, 17 of the 34 DNFs were offline, and the exposed areas were being dried in order to remove the algae and scum on the filter walls.



6/29/22 DNF filter cell – turbid water with floating scum

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6/29/22 DNF – turbid water with floating solids

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6/29/22 DNF – turbid water with floating solids

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6/29/22 DNF – Algae, solids and scum

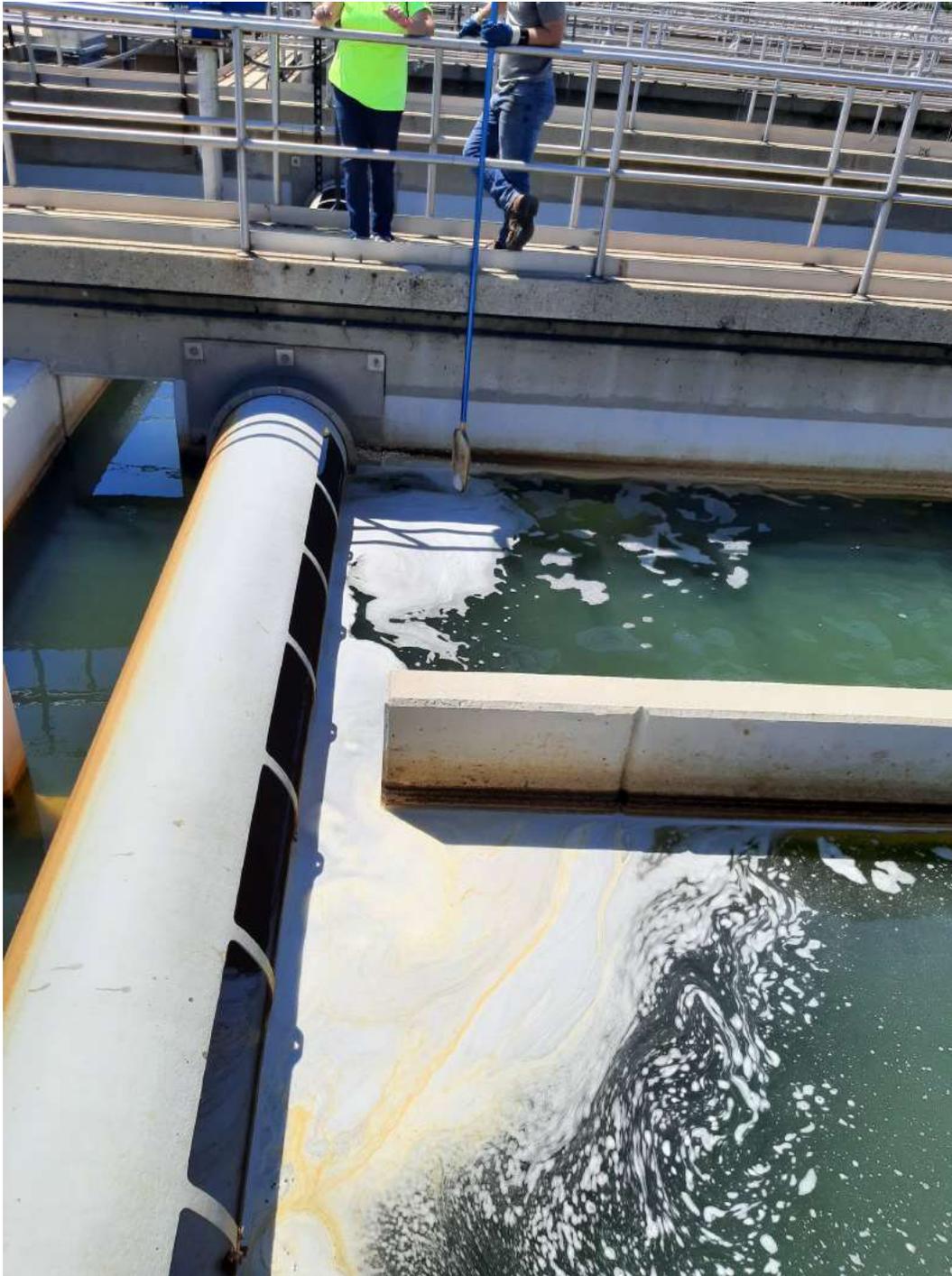
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7/7/22 DNF taken offline and allowed to dry in an attempt to remove the algae on the overflow weirs

Next, I inspected the chlorine contact basins prior to the final discharge. There are four contact chambers and three are currently online. Each contact chamber has three scum logs or troughs to remove floating scum. Contact chamber #3 is offline, and the #2 scum trough is down and requires repairs. According to Johnson, a service contractor inspected the unit on June 27, 2022, and they are expecting a quote to be submitted today. However, Johnson was not able to give me a date for the completion of the repairs to the scum log. I observed floating scum and FOG at the chlorine contact chambers. Currently, there was staff skimming at the chlorine contact basins.

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6/29/22 Heavy scum layer noted.

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6/29/22 Another view of chlorine contact chamber

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7/7/22 Same area as the picture above the day after the rain event. On this date there was no skimming being done.

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6/29/22 Final effluent

The facility is collecting 24-hour, flow-proportioned composite samples at Outfall 001 in accordance with the requirements of the permit. The primary refrigerated, automatic composite sampler was inspected, and I found that the temperature of the compartment was satisfactory, and the sampling container was also clean. The temperature of the refrigerated compartment was 5 degrees C, which meets 40 CFR Part 136 requirements. I inspected the final effluent in the sampling container and observed that the composite sample was a medium amber color with visible particulates (see picture).

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6/29/22 final effluent medium amber color with some turbidity.

The field measurements for Outfall 001 are listed below in Table 2 show that these results are in compliance with the permit.

Table 2

Date	pH	Dissolved Oxygen	Temperature	Total Residual Chlorine
6/29/22	7.11 SU	8.8 mg/L	69.8° F	<0.01 mg/L

Operation and Maintenance

The management of biosolids at Patapsco WWTP has been increasingly problematic because the solids processing facility, Synagro Inc., has not been able to successfully keep up with the processing of the solids that are being generated by the treatment system on a daily basis. The

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recent analysis of the sludge revealed diesel range organics, gasoline range organics, as well as other organic compounds. Synagro has concerns that if the sludge is processed through their dryer there is a fire hazard and the potential for an explosion because of the high concentration of hydrocarbons detected in the sludge. Therefore, the air dryer normally used to efficiently process sludge is not being used. Synagro is no longer pelletizing the sludge, but is processing solids to cake at a much slower rate and this slower rate is not adequate to keep up with the amount of solids being produced by the system. During this inspection, I learned that centrifuged sludge is now being transported off-site

The above issues are to an extent currently being resolved, especially since Synagro is now transporting centrifuged biosolids off-site by railcar and the sludge inventory has been diminished. At this point, the Patapsco WWTP must control and eliminate solids buildup within the treatment system. Moreover, there are a number of out of service and malfunctioning process equipment that require replacement or repairs as detailed in this and previous compliance evaluation reports. The majority of these process equipment issues have been outstanding for months and many for over one year. The Patapsco WWTP must improve operating practices by utilizing preventive maintenance procedures that are devised to reduce incidents of process equipment failures and inefficiency due to poorly functioning equipment. The Patapsco WWTP is operating in a corrective maintenance mode and correcting problems after an incident or after failing equipment no longer functions instead of operating in a preventative maintenance (PM) mode.

PM helps to cut facility operating costs by eliminating unforeseen equipment failures and the need for corrective maintenance. PM improves the facility's reliability of treatment processes by minimizing the time equipment is out of service. PM can increase the useful life of equipment and thereby avoiding costly premature replacement of equipment. PM also prevents possible compliance violations.

The Patapsco WWTP shall develop and initiate a PM program, including but not limited to the following:

1. A written PM program covering all major equipment items;
2. Types of repair and other PM tasks necessary for each piece of equipment including interval or frequency of service;
3. PM tasks should be scheduled in accordance with the manufacturer's recommendations;
4. All PM tasks should be recorded, filed, and reviewed so future maintenance problems can be assessed properly; and
5. A central inventory of spare parts, equipment, and supplies should be maintained and controlled.

There should also be well-trained, competent plant staff to perform the routine PM tasks. An ongoing training program should be developed and implemented to ensure that staff have the skills necessary to operate and maintain the process equipment.

After the site review, we returned to the Administration building to review specific records and reports for 2022 that include:

1. Laboratory analytical reports- (select routine analytical reports including QA/QC and laboratory validation procedures).
2. Overflow report for 2022.
3. PST and chlorine contact chamber skimming records.

Total Annual Cumulative Load for 2020, 2021 and 2022

The annual nitrogen load for 2020 was 1,029,200 lbs. and the annual phosphorus load for 2020 was 114,500 lbs. The facility did not meet the annual loading limitations for these parameters for 2020. The cumulative totals for 2021 were also not met and increased by approximately 50% from 2020, which indicates no discernable progress in improving treatment. See Table 3 below. In addition, as reported in Table 1 above, the annual cumulative totals specified by the permit were exceeded for total phosphorus in March 2022 and April 2022 for total nitrogen. The first 5 months of 2022 indicate that if current nutrient concentrations continue, the annual cumulative total for nitrogen and phosphorus will exceed the 2021 loading rates.

Table 3

Parameter	Cumulative Total for 2020	Cumulative Total for 2021	Cumulative Total for 2022 as of May 31, 2022	Limit	Compliance
Total Suspended Solids	1,690,800 lbs./yr.	3,192,300 lbs./yr.	2,480,700 lbs./yr.	6,669,776 lbs./yr.	Y
Total Nitrogen	1,029,200 lbs./yr.	1,993,300 lbs./yr.	1,456,300.0 Lbs./year	889,300 lbs./yr.	N
Total Phosphorus	114,500 lbs./yr.	252,300 lbs./yr.	153,100 lbs.	66,700 lbs./yr.	N
Annual Flow	18,098.2 MG/yr.	18,340.6 MG/yr.	NA	NA	NA

FOG Mitigation Plan

To assess compliance with the permittee’s FOG Mitigation Plan, I discussed the implementation of the plan with Jackson, Johnson, and Grace. Section 3.2.1 of the FOG mitigation plan specifies specific operational procedures that will be performed by operating staff, which includes inspecting the Chlorine Contact Chambers every 2 hours and manually skimming and records are updated daily and maintained in the Administration Building. I reviewed these records and observed that many of the daily records are missing days and shifts (or times) for the evaluations and skimming. On April 28, 2022, the Department submitted a letter to Director Jason Mitchell requesting revisions to the FOG Mitigation Plan with a list of corrections. The letter was received on April 29, 2022. The revised plan was required to be submitted to the Department by May 31, 2022. The revised plan was not submitted; however on July 5, 2022, the Department received a FOG Source Tracking Plan, which the Department believes to be a critical part of the plan. However, the

complete revised FOG Mitigation Plan revised as requested by the Department is overdue and must be submitted within 10 days of the receipt of this report.

Field instrument calibration records

There are no quality assurance records for the measurement of Dissolved Oxygen, SM 4500 O G. The Patapsco WWTP has failed to comply with the Standard Methods 4020I quality assurance requirements below:

1. Duplicate analysis must be performed at a rate of 10% to assess precision.
2. A zero-oxygen sample must be run at a rate of 20%.
3. Documentation for membrane changes for the DO probe.

The colorimeter used for the measurement of TRC is checked for accuracy before use with secondary standards. To comply with EPA requirements, the colorimeter shall also be checked at least quarterly with a series of primary standards in the range of 0.05 to 2 mg/L. This has not been done. However, according to Johnson and Grace, the reagents have been ordered and the above QA/QC procedures will begin once the reagents have been received. Hazen and Sawyer Inc. is working on SOPs for these procedures.

Laboratory Reports

During the evening of July 6, 2022, I received a spreadsheet with the analytical results of the requested analytes. My request was for the laboratory reports. This was a misunderstanding on the part of the permittee. Therefore, the permittee shall within 10 days of the receipt of this report submit the complete analytical report from the contract laboratory for the following analytes:

- Biochemical Oxygen Demand
- TSS
- Total Kjeldahl Nitrogen
- Ammonia as N
- Enterococcus
- Nitrate – Nitrite
- Total Phosphorus
- Ortho phosphate

The monthly average concentration of the primary parameters for the period June 1–26, 2022 are shown in Table 4 below:

Table 4.

6/1 – 6/26	TSS	BOD	NH3	NO2+NO3	TP	TKN	OP	ENTEROCOCCUS
AVERAGE	20 mg/L	17 mg/L	14.13 mg/L	5.53 mg/L	0.96 mg/L	16.1 mg/L	0.16 mg/L	11.3 MPN/100 mL monthly GEOMEAN

With respect to the above MDE authorization the following violations of Environmental Article 9 by the Patapsco WWTP were observed on this date:

- A. The management of biosolids at Patapsco WWTP has been increasingly problematic, but now the biosolids are being transported off-site eliminating on-site sludge inventory. However, the high number of solids within the treatment system has overburdened the system and along with equipment failures and inefficient treatment processes, the quality of the final effluent has declined annually since 2020. See Table 1.
- B. The Patapsco WWTP is operating in a corrective maintenance mode and only addressing maintenance and repairs after the process equipment begins to fail or stop working.
- C. The fine screening system is not being maintained to the level necessary to keep the current equipment functioning satisfactorily. During previous inspections in 2021 and 2022, the belt conveyors were not operable due to the accumulation of debris such as rags, paper and plastic items. During this inspection, the belts were functioning; however, there was an accumulation of debris on and around the belts. The belts are old with missing and damaged skirting which allows the debris to fall from the belt and clog the mechanical parts. Due to this issue, the system requires constant maintenance to prevent blockage of the belt mechanisms.
- D. The GSTs are not processing the sludge as designed because they are overloaded with sludge. During gravity thickening, the biosolids are condensed to produce a concentrated solids material and a relatively solids-free supernatant. However, with the two units in operation this is not being done. The supernatant from the GSTs has an excessive amount of solids that are keeping the solids concentration too high in the bioreactors. This is causing nitrification issues.
- E. The PSTs had an accumulation of floating scum and FOG, which may impede and impact downstream treatment processes.
- F. Media is escaping from the BAF cells that has been identified as originating from the #5 filter cell.
- G. The scum log on chlorine contact chamber #2 is not functioning and requires maintenance.
- H. PST skimming records performed by the Patapsco WWTP staff were not available during the June 29, 2022 evaluation.
- I. The complete analytical report including chain of custody from the contract laboratory were not submitted for the requested analytes.
- J. There have been 16 effluent violations at the Patapsco WWTP for the period of my review (4/1/22- 5/31/22) and the partial data for June 2022 show water quality issues for Ammonia as N and total nitrogen.

K. Because of maintenance problems and equipment failures described in this report, the LOX plant is not delivering oxygen to the high-pressure pure oxygen reactors.

To bring this site into compliance with Environment Article Title 9, the Patapsco WWTP shall make the following corrections:

- 1. With respect to item A above, the Patapsco WWTP shall take immediate action to begin making all necessary repairs to failing and nonfunctional equipment and effectively address the overload of solids throughout the treatment processes. Within 15 days of the receipt of this report, the Patapsco WWTP shall begin submitting progress reports on corrective measures being taken to lower the solids load to the treatment system that will not be addressed by wasting.**
- 2. With respect to item B above, the Patapsco WWTP shall begin operating in a PM mode and within 30 days of the receipt of this report the Patapsco WWTP shall develop and initiate a PM program as described above in this report. The PM program shall include but not limited to the following:**
 - **A written PM program covering all major equipment items;**
 - **Types of repair and other PM tasks necessary for each piece of equipment including interval or frequency of service;**
 - **PM tasks should be scheduled in accordance with the manufacturer's recommendations;**
 - **All PM tasks should be recorded, filed, and reviewed so future maintenance problems can be assessed properly; and**
 - **A central inventory of spare parts, equipment, and supplies should be maintained and controlled.**
- 3. With respect to item C above, the Patapsco WWTP shall immediately initiate better maintenance and housekeeping practices at the fine screen building to prevent and minimize potential problems and maintenance issues downstream. Within 30 days of the receipt of this report, the Patapsco WWTP shall develop, implement and submit to the Department for review a corrective actions plan designed to keep rags, paper, plastics, and other debris from clogging the transport belt. The plan shall include procedures for regular manual cleaning of the belt transport system. This was reported as a deficiency on the May 182022 inspection report.**
- 4. With respect to item D above, the Patapsco WWTP shall operate and process sludge in the GSTs in a manner that maintains a solids-free supernatant. Since the two operating GSTs are overburdened with solids, the #4 GST should be repaired so that the active GSTs can be taken offline one at a time and cleaned. This action will greatly improve the quality of supernatants from the GSTs. Within 30 days of the receipt of this report, the Patapsco WWTP shall submit to the Department a status report on the**

progress of the repairs to the #4 GST with an updated report every 30 days until the #4 GST is back in service.

- 5. With respect to item E above, the Patapsco WWTP shall immediately ensure the operational integrity of the PST and must take a proactive approach by removing the accumulation of FOG that has accumulated in some of the PSTs after the rain event. A root cause analysis should be performed to evaluate operations and maintenance including collection systems, inflow and infiltration problems, capacity issues during rainfall. The facility should also evaluate the effectiveness of the current contingency plan that is implemented during heavy rainfall and the success of implementation during these events.**
- 6. With respect to item F above, within 15 days of the receipt of this report the Patapsco WWTP shall provide a written plan or SOP on how the BAF media will be removed from the mud well and steps that will be taken to prevent further media loss.**
- 7. With respect to item G above, within 15 days of the receipt of this report the Patapsco WWTP shall provide a status report on the progress of the repairs to the scum log for CCC #2 with updates every 30 days until the repairs are completed and the scum log is back online. The Patapsco WWTP shall determine if additional manual skimming is required and implement as necessary.**
- 8. With respect to item H above, the PST skimming activities shall be documented and maintained, and all skimming shall be conducted as specified by the FOG plan.**
- 9. With respect to item I above, the Patapsco WWTP shall within 10 days of the receipt of this report submit complete analytical report from the contract laboratory for April, May, and June 2022 for the parameters listed below:**
 - TSS**
 - Total Kjeldahl Nitrogen**
 - Ammonia as N**
 - Enterococcus**
 - Nitrate – Nitrite**
 - Total Phosphorus**
 - Ortho phosphate**
 - Biochemical Oxygen Demand**
- 10. With respect to item J above, the Patapsco WWTP shall immediately meet the effluent limitations of the permit.**
- 11. With respect to item K above, within 15 days of the receipt of this report the Patapsco WWTP shall provide a status report on the progress of the repairs to the LOX plant with updates every 30 days until the repairs are completed and the LOX plant is producing oxygen for the biological reactors.**

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State law provides for penalties for violations of Maryland Environment Article Title 9 for each day the violation continues. The Maryland Department of the Environment may seek penalties for the aforementioned violations of Title 9 on this site for each day the violation continues.

NPDES Municipal Major Surface Water - Inspection Checklist

Inspection Item	Status	Comments
Does the facility have a discharge permit?	No Violations Observed	
Is the discharge permit current?	No Violations Observed	
If the permit is not current, has the facility applied for renewal?	No Violations Observed	
Does the facility operate as authorized by their current permit?	No Violations Observed	
Has the Permittee exceeded the permitted capacity of the WWTP?	No Violations Observed	
Is the number and location of discharge points as described in the discharge permit?	No Violations Observed	
Has permittee submitted the correct name and address of receiving waters?	No Violations Observed	
Is the permittee meeting the compliance schedule per permit requirements?	2 - Not Applicable	
Has the operator or superintendent been certified by the Board in the appropriate classification for the facility?	No Violations Observed	
Are adequate records being maintained for the sampling date, time, and exact location; analysis dates and times; individual performing analysis; and analytical results?	4 - Not Evaluated	
Are adequate records being maintained for the analytical methods/techniques used?	4 - Not Evaluated	
Does the permittee retain a minimum of 3 years worth of monitoring records including raw data and original strip chart recordings; calibration and maintenance records; and reports?	No Violations Observed	
Do lab records reflect that lab and monitoring equipment are being properly calibrated and maintained?	No Violations Observed	Only field measurements evaluated Contract Laboratory was not evaluated
Does the permittee/laboratory use suitable QA/QC procedures and operate a formal quality assurance (QA) program using appropriate controls?	No Violations Observed	Only field measurements evaluated Contract Laboratory was not evaluated
Has the permittee submitted the monitoring results on the proper Discharge Monitoring Report form?	No Violations Observed	
Do the Discharge Monitoring Reports reflect permit conditions?	No Violations Observed	
Has the permittee submitted these results within the allotted time electronically?	No Violations Observed	
Is the facility being properly operated and maintained including:(a) stand-by power or equivalent provisions available, (b) adequate alarm system for power or equipment failure available, (c) all treatment units are in service, .	Out of Compliance	
Is sewage sludge managed correctly per permit requirements?	No Violations Observed	
If a by-pass occurred since last inspection, has the permittee submitted notice of the by-pass within the allotted time?	No Violations Observed	

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NPDES Municipal Major Surface Water - Inspection Checklist

Inspection Item	Status	Comments
If a non-complying discharge occurred since the last inspection, was the regulatory agency notified within the allotted time?	No Violations Observed	
If applicable, has the permittee complied with all special conditions of their permit?	Out of Compliance	Effluent violations and compliance with ENR standards requirements
Have overflows occurred since the last inspection?	4 - Not Evaluated	Records received on 7/7/22 but not yet reviewed
Have records of overflows been maintained at the facility for at least five years?	4 - Not Evaluated	Records received on 7/7/22 but not yet reviewed
Are flow measuring devices properly installed and operated, calibration frequency of flow meter adequate, flow measurement equipment adequate to handle expected ranges of flow?	No Violations Observed	
Are discharge monitoring points adequate for representative sampling?	No Violations Observed	
Do parameters and sampling frequency meet the minimum requirements?	No Violations Observed	
Does the permittee use the method of sample collection required by the permit?	No Violations Observed	
Are analytical testing procedures approved by EPA?	4 - Not Evaluated	
If alternate analytical procedures are being used, has proper approval been obtained?	4 - Not Evaluated	
Has the permittee notified the Department of the name and address of the commercial laboratory?	No Violations Observed	
Were discharges observed at the authorized outfalls?	No Violations Observed	
If discharges were observed, do the discharges or receiving waters have any visible pollutants observed?	Corrective Actions Required	Foaming with some particulates
Were discharge samples collected?	No Violations Observed	
Does this facility have coverage under a NPDES stormwater discharge permit?	No Violations Observed	Yes
If the permittee has coverage under a NPDES storm water permit, has a stormwater pollution prevention plan been developed and implemented as required?	Out of Compliance	Not implemented as required
Are the permit conditions being met?	Out of Compliance	See narrative

Inspector: **Ronald Wicks 7/8/22**
 Ron Wicks /Date
 ron.wicks@maryland.gov
 410-537-3510

Received by: Neal Jackson 7/18/2022
 Signature/Date
Neal Jackson
 Print Name