



Maryland Department of Environment
Water and Science Administration
Compliance Program
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Inspector: Christopher Lepadatu
AI ID: 3076

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

Start Date/Time: November 27, 2023 09:00 AM
End Date /Time: November 27, 2023 10:45 AM
Media Type(s): NPDES Municipal Major Surface Water

Contact(s): Sadikia Caldarazzo, Laboratory Technical Administrator, DPW
Omachile Taupyen, Laboratory Supervisor, DPW
Scott Moffatt, Policy Analyst, Environmental Compliance, Baltimore City

NPDES Municipal Major Surface Water

Permit / Approval Numbers: 15DP0580
NPDES Numbers: MD0021601
Inspection Reason: Initial Yearly
Site Status: Active
Compliance Status: Compliance
Site Condition: Satisfactory/Compliance
Recommended Action: Continue Routine Inspection
Evidence Collected: Photos or Videos Taken, Record Review, Visual Observation
Delivery Method: Email
Weather: Calm, Clear, Good

Inspection Findings:

Introduction:

The Patapsco Wastewater Treatment Plant (WWTP) is permitted to discharge to the Patapsco River which is designated as Use II waters protected for estuarine and marine aquatic life. The Patapsco WWTP features advanced treatment processes to achieve enhanced nutrient removal (ENR), chlorination and de-chlorination. The Patapsco WWTP is rated to treat an average daily flow of up to 73 MGD.

The treatment system includes preliminary treatment (grit removal and fine screening), primary treatment (primary settling tanks (PSTs)), secondary treatment (biological nutrient removal activated sludge process and additional filter nitrification), tertiary treatment (denitrification filters for enhanced nutrient removal) and disinfection (chlorination). Primary sludge (PS) and waste activated sludge (WAS) produced by the primary treatment and secondary treatment process is thickened on-site. The solids thickening process consists of Gravity Sludge Thickeners (GSTs) and dissolved

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air flotation tanks. The thickened sludge is stored in a sludge blend tank and then conveyed to the drying facility on-site which is operated by a third-party, Synagro.

The Patapsco WWTP has a laboratory onsite equipped to process and analyze permit-required effluent parameters. The laboratory also regularly analyzes samples to monitor and, if necessary, adjust the various water treatment processes used at the facility.

The Patapsco WWTP has been unable to use their own in-house laboratory testing in their permit-required effluent reporting due to QA/QC issues observed during laboratory inspections in the past. The Patapsco WWTP reported that they have made changes to their internal processes and QA/QC procedures, and they are capable of using their own laboratory testing results to satisfy the permit-required effluent reporting for BOD and SS (Suspended Solids).

On this day, I inspected the Patapsco WWTP laboratory with the individuals listed above.

Lab Walkthrough:

We began the visit with a general walkthrough of the laboratory. The lab is divided into different areas based on the type of testing to be completed, for example: SS, BOD, COD, TOC, Nutrient, and Microbiology. The areas are dedicated to the specific type of analysis and are not used for any other testing or analysis.



Image 1: Patapsco WWTP Lab, Typical interior and bench set up.



Image 2: Patapsco WWTP Lab, pH analysis area.

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Image 3: Patapsco WWTP Lab, BOD Analysis Room



Image 4: Patapsco WWTP Lab, TOC Analysis Area

While walking through the different areas of the lab, the logs for the different sections and different pieces of equipment were observed to be readily available. I reviewed the logs and found that entries were current and complete. A review of previous entries did not reveal any issues or violations.

Samples requiring refrigeration are stored in sample refrigerators just inside the main entrance to the lab.

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Image 5: Patapsco WWTP Lab, Sample Holding Refrigerators

The refrigerators were observed to be in operation and the temperature reading was observed as indicating a temperature of 4.5°C. The log of regular temperature checks was available for review. No violations were observed.

Equipment calibration logs / records were available for review. Calibration standards were observed to be current. No violations were observed.

The Standard Operating Procedures (SOPs) for the laboratory testing and analysis methods are maintained in the lab and were available for review. The SOPs were found to be current; no violations were observed. Each SOP contains complete Demonstration of Capability (DOC) forms which are completed by laboratory technicians to verify training on the SOPs and check performance regularly.

Records Review:

Following the lab inspection, copies of the Patapsco Lab's BOD and SS test results were forwarded to me along with copies of laboratory analysis results of the same samples from Patapsco's contract laboratory, ALS. Results were provided from February 2023 through July 2023. Copies of the Standard Operating Procedures (SOPs) were also provided for our records.

The purpose of the review of the two sets of laboratory results is to aid in the determination of the Patapsco WWTP's on-site laboratory's ability to use its own lab results to satisfy permit-required reporting for BOD and SS. In my review of the lab data, I will be evaluating it based on whether Patapsco's own lab data satisfies the effluent requirements of the permit, whether Patapsco's data shows any signs of bias in favor of Patapsco when compared to the ALS data, and, finally, evaluate the Relative Percent Difference (RPD) between Patapsco's results and ALS's results to consider the reliability of Patapsco's data.

Permit Compliance

As previously stated in this report, Patapsco WWTP has been using an outside lab, ALS, for analysis and using those results in their permit-required effluent reporting. In my evaluation of the BOD and SS results from Patapsco's own laboratory, their own lab results are in compliance with permit effluent limits. The results for February 2023 are presented below.

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	PAT BOD	ALS BOD		PAT SS	ALS SS	
Monthly Average	17.57	14.66	mg/L	4.78	5.82	mg/L
Max Weekly Ave	24.9	20.7	mg/L	7.2	7.3	mg/L
Mthly Ave Loading	10697.84	8927.91	lb/day	2907.12	3544.20	lb/day
Wkly Ave Loading	15133.53	12602.57	lb/day	4383.50	4435.69	lb/day
Permit Limits	BOD			TSS		
	30 mg/l	Monthly Average		30 mg/l	Monthly Average	
	45 mg/l	Max Weekly Average		45 mg/l	Max Weekly Average	
	18,000 lb/day Mthly Ave Loading			18,000 lb/day Mthly Ave Loading		
	27,000 lb/day Wkly Ave Loading			27,000 lb/day Wkly Ave Loading		

Table 1: Permit Compliance Comparison, BOD and SS, February 2023 Data

The results for the remaining months provided were consistent with the results presented above. In my loading calculations, I used the 73.0 MGD average daily flow rate referenced in the permit.

Potential Bias

In determining a potential for bias in the data provided, I considered the permit effluent requirements discussed in the previous section. The results from each month were fairly consistent with what is presented above for February 2023. Patapsco’s BOD results tended to be marginally greater than those of ALS while Patapsco’s SS results tended to vary slightly being either greater or less than ALS results.

The results from July 2023 are presented below:

	PAT BOD	ALS BOD		PAT SS	ALS SS	
Monthly Average	4.77	4.66	mg/L	3.42	3.60	mg/L
Max Weekly Ave	5.1	5.1	mg/L	3.7	4.3	mg/L
Mthly Ave Loading	2906.62	2837.89	lb/day	2081.77	2191.75	lb/day
Wkly Ave Loading	3120.20	3078.89	lb/day	2261.33	2609.23	lb/day
Permit Limits	BOD			TSS		
	30 mg/l	Monthly Average		30 mg/l	Monthly Average	
	45 mg/l	Max Weekly Average		45 mg/l	Max Weekly Average	
	18,000 lb/day Mthly Ave Loading			18,000 lb/day Mthly Ave Loading		
	27,000 lb/day Wkly Ave Loading			27,000 lb/day Wkly Ave Loading		

Table 2: Permit Compliance Comparison, BOD and SS, July 2023 Data

No apparent bias was observed in the lab results from Patapsco WWTP as compared to the lab results from ALS in terms of the permit effluent reporting requirements.

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Relative Percent Difference (RPD)

The formula for Relative Percent Difference (RPD) is as follows:

$$RPD = \frac{|x_1 - x_2|}{\left(\frac{x_1 + x_2}{2}\right)} \times 100$$

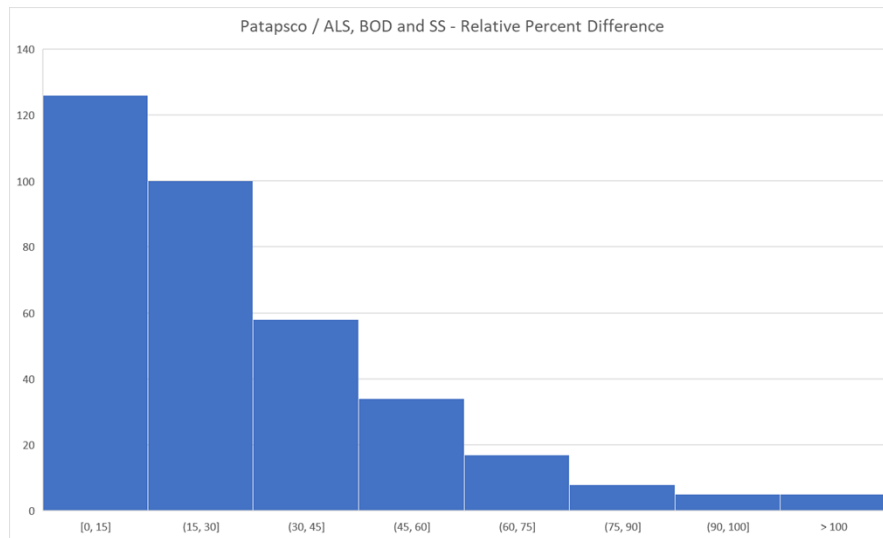
where x_1 is sample 1,
and x_2 is sample 2.

RPD is used in evaluating the reliability of a laboratory’s internal results (comparing results from multiple runs of the same sample in the same lab). Typically, the tolerance of the RPD is less than 10%. It was discussed in evaluating Patapsco’s internal lab compared to their contract lab ALS; however, comparing an onsite lab to another lab in another location using this method has not been done by the Department before. The tolerance of 10% in a typical RPD evaluation cannot account for the variability of one sample being handled by two different labs, tested by different technicians with different techniques, and in different environmental conditions (HVAC, temperature, humidity, etc.).

As a result, the RPD evaluation was undertaken to evaluate the distribution of the results. A laboratory with effective QA/QC processes and Standard Operating Procedures (SOPs) should present an RPD distribution closer to zero.

The RPD results comparing Patapsco and ALS from all six months of data for both BOD and SS were combined in this analysis. Each value represents the RPD between Patapsco’s BOD or SS results on a given day compared to ALS’s BOD or SS results on the same day.

The distribution of the results is presented in the graph below:



Graph 1: Relative Percent Difference, X-axis is range of RPD (0%-15%, 15%-30%, etc.), Y-axis is total # of samples.

Without applying any tolerance to account for the variability in analysis previously mentioned, the results show the following:

- 36% of samples less than 15% RPD.
- 28% of samples between 15% and 30% RPD.
- 16% of samples between 30% and 45% RPD.
- 10% of samples between 45% and 60% RPD.

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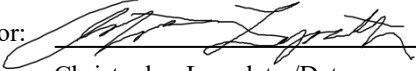
The results of the RPD comparison between Patapsco and ALS are distributed closer to zero. Any additional percent tolerance added would only improve their results. The percent tolerance to give is debatable given the wide variety of variables one might try to capture.

Conclusion

The lab walkthrough did not reveal any issues or concerns related to the Department's typical methods for evaluating the condition and compliance with permit requirements for a wastewater treatment facility's laboratory. The laboratory analysis data provided by Patapsco WWTP compared to ALS was within permit effluent limitations for BOD and SS. The data provided did not indicate any potential bias in Patapsco's results related to permit compliance. The RPD analysis shows that Patapsco's lab results are distributed closer to zero and any allowance or tolerance to account for variability in sampling and testing between the two labs would only improve their results.

Patapsco WWTP's onsite lab appears to be capable of completing their own BOD and SS tests and analysis in compliance with permit requirements.

Regular inspections will continue.

Inspector:  12/19/23 Received by: _____
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Print Name