

Maryland Department of Environment

Water and Science Administration Compliance Program 1800 Washington Blvd, Suite 420 Baltimore, MD 21230-1719 410- 537-3510, 1-800-633-6101

Inspector: AI ID:	Christopher Lepadatu 8449				
Site Name:	Back River WWTP				
Facility Address:	8201 Eastern Ave, Baltimore, MD 21224				
County:	Baltimore County				
Start Date/Time:	August 14, 2024 09:30 AM				
End Date /Time:	August 14, 2024 11:30 AM				
Media Type(s):	NPDES Municipal Major Surface Water				
Contact(s):	Sadikia Caldarazzo – Laboratory Technical Administrator, Baltimore City DPW				
	Deborah Pitts – Lab Administrator, Baltimore City DPW				
	Amanda Oendine – Water Quality Analyst, Baltimore City DPW				
	Mandu AkPan – Laboratory Technical Supervisor, Back River WWTP				
	Linda Hooks – Chemist III, Back River WWTP				
	John Cunningham – Chemist III, Back River WWTP				
	Iqbal Maqsood – Chemist III, Back River WWTP				
	Gene Barns – Chemist III, Back River WWTP				
	Scott Moffat – Policy Analyst, Baltimore City DPW				
	Mack Cohen – Intern, Baltimore City DPW				
	DeSean Hunter – RCE 1, MDE				

NPDES Municipal Major Surface Water

Permit / Approval Numbers: 15DP0851 NPDES Numbers: MD0021555 Inspection Reason: Follow-up 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:

Back River Wastewater Treatment Plant (WWTP) is operated by Baltimore City DPW. Some areas/systems of the WWTP are operated by subcontractors including the Headworks, Denitrification Building, and Centrifuges (Solids

Inspection Date:	August 14, 2024
Site Name:	Back River WWTP
Facility Address:	8201 Eastern Ave, Baltimore, MD 21224

Handling). The facility is authorized to discharge treated effluent through Outfalls 001 and 002. Outfall 001 discharges to Back River, a designated Use II waterway. Use II waterways support estuarine and aquatic life and shellfish harvesting. Outfall 002 discharges to Tradepoint Atlantic who then discharge via three (3) outfalls under their industrial discharge permit to Bear Creek and the Patapsco River which is also designated as a Use II waterway. Final effluent discharge at Back River WWTP is split at a junction box and a large portion of the flow (up to 130.0 MGD) goes to Outfall 001 via a step cascading aeration system and the remaining portion (up to 50.0 MGD) goes to Outfall 002. The current permit has been administratively extended since it expired on April 30, 2023. A revised permit renewal application (#22DP0581) was received by MDE on May 26, 2023.

Back River WWTP is an activated sludge process sewage treatment plant with biological nutrient removal by Modified Ludzack-Ettinger process, ferric chloride for phosphorous removal, denitrification filters for enhanced nutrient removal (ENR), polishing sand filters, chlorination, and dichlorination. The facility 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.

Back River 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. Back River 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, SS (Suspended Solids), Orthophosphate, Total Phosphorous, Nitrite and Nitrate, and Total Kjeldahl Nitrogen (TKN). Back River's lab received a new distiller last week and will request a review for Ammonia testing at a later date.

On this day, I met with the individuals listed above to inspect Back River's onsite lab for BOD, SS, and nutrient testing/reporting (Orthophosphate, Total Phosphorous, Nitrite and Nitrate, and Total Kjeldahl Nitrogen (TKN). Back River provided three months of data comparing their own results to a third-party lab, Martel, for nutrient testing, and results compared to the lab at Patapsco for BOD and SS. My review of the laboratory will be completed following the guidelines outlined in the NPDES Compliance Inspection Manual, Chapter 7, Revision Version, January 2017.

Lab Walkthrough

I was introduced to Mandu AkPan the Laboratory Technical Supervisor. 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.

Samples and Analysis Procedures:

I was provided a copy of the Standard Operating Procedure (SOP) for Sampling Receipt & Handling at Back River. All lab staff have permission to receive samples and sign off on the chain of custody that the samples have been received. However, one member of the laboratory's technical staff is assigned daily to verify receipt of samples. The SOP for Sampling Receipt and Handling at Back River was last revised on May 3, 2024. In my review of the sample receiving area and the SOP, I found no issues and consider the SOP to be satisfactory.

August 14, 2024 Back River WWTP 8201 Eastern Ave, Baltimore, MD 21224



Image 01: Fresh sample cart, with internal process samples for analysis.

Next, I met with Linda Hooks, Chemist II, who walked me through the Suspended Solids (SS) analysis process. Then I met with John Cunningham, Chemist III, who walked me through the BOD analysis process. Finally, I met with Iqbal Maqsood, Chemist III, who walked me through the SEAL AQ400 equipment and analysis process for the related nutrient testing. A summary of the sample types observed, and the method of testing is as follows:

- Total Suspended Solids, Standard Method 2540D 2540 E, EPA 821 R-01-015 Method 1684.
- Biochemical Oxygen Demand Standard, Standard Method 5210A-5210B.
- Nitrite, EPA Method 353.2
- Nitrate and Nitrite, EPA Method 353.2, Rev. 2.0
- Dissolved Orthophosphate, EPA Method 365.1, Rev. 2.0
- Total Kjeldahl Nitrogen (TKN), EPA Method 351.2
- Total Phosphorous, EPA Method 365.4

No deviations were observed from what is given in Back River's SOPs for each type of analysis. The analysis methods referenced in the SOPs and illustrated during the inspection are methods in 40 CFR Part 136 and approved by the EPA.

Equipment:



Image 02: Scale used in SS analysis.

Inspection Date: Site Name: Facility Address: August 14, 2024 Back River WWTP 8201 Eastern Ave, Baltimore, MD 21224



Image 03: Scale service tag indicating last service 5-9-24.

In general, the equipment in the laboratory appeared to be in good working condition. Service records indicate the equipment is routinely and regularly serviced according to manufacturer's specifications. Logs for daily checks of refrigerator and oven temps were reviewed with no issues observed. There are two SEAL AQ400 units in the nutrients lab, identified as System 1 and System 2.



Image 05: SEAL AQ400 unit, service tag.

Inspection Date:	August 14, 2024
Site Name:	Back River WWTP
Facility Address:	8201 Eastern Ave, Baltimore, MD 21224

It was reported that System 2 was down in need of maintenance / replacement. A new Ammonia distillation unit was installed on August 1, 2024. Ammonia testing is not part of this current lab evaluation as a result of the new replacement distillation unit. After the new unit is tested, a follow-up inspection will be completed to evaluate Back River's lab for Ammonia testing.

Records of these checks/maintenance items associated with the Seal AQ400 units are maintained in a binder and were available for review. As previously stated, System 2 was down and only those records for System 1 were reviewed. No issues or violations were observed in my review of the maintenance records for the SEAL AQ400 unit, System 1.

Records Review:

As previously states, I was provided copies of the SOPs for the observed analysis methods. No violations were observed in my review of the SOPs associated with the observed analysis methods. The Quality Assurance (QA) Manual provided was dated June 5, 2024. No issues or violations were observed in my review of the QA Manual. Training records provided were copies of Initial and Ongoing Demonstration of Capability. The copies provided were current and relevant to the individuals who demonstrated the analysis areas, equipment, and methods. No issues or violations were observed in my review of the provided training records.

Results and Precision:

For permit reporting, Back River WWTP is using a 3rd party lab, Martel Laboratories, for nutrient reporting, and Patapsco WWTP's lab for BOD and SS reporting. Three (3) months of results were provided for my review and comparison to Back River's own results.

The purpose of the review and comparison of the laboratory results is to aid in the determination of Back River WWTP's on-site laboratory's ability to use its own lab results to satisfy permit reporting requirements. In my review of the lab data, I evaluated the results based on whether Back River's own lab data satisfies the effluent requirements of the permit, whether Back River's data shows any signs of bias in Back River's benefit, and, finally, the Relative Percent Difference (RPD) between Back River's results, Martel's, and Patapsco's, to consider the reliability of Back River's data. It should be noted that Back River currently uses its onsite laboratory to monitor, evaluate, and adjust individual treatment processes at the facility.

Summaries of the results from the data comparison are provided below.

BOD-Outfall 001 (OFB)

Permit Limits: 15 mg/L, Max Wkly Avg. Concentration 10 mg/L, Max Mthly Avg. Concentration		16,000 lb/d, Max Wkly Avg. Loading 11,000 lb/d, Max Mthly Avg. Loading				
Results:	March 2024.		April 2024.		May 2024.	
	Back River	Patapsco	Back River	Patapsco	Back River	Pataspco
Max Wkly Avg. Conc.	3.34 mg/L	4.0 mg/L	3.98 mg/L	3.33 mg/L	2.54 mg/L	2.28 mg/L
MthlyAvg. Conc.	2.77 mg/L	2.84 mg/L	3.14 mg/L	2.76 mg/L	2.36 mg/L	2.22 mg/L
MaxWklyAvg. Loading	3,621 lb/d	4,337 lb/d	4,3151b/d	3,610 lb/d	2,754 lb/d	2,472 lb/d
Mthly Ava Loading	3.003.lb/d	3.079 lb/d	3 404 lb/d	2 992 lb/d	2 559 lb/d	2 407 lb/d

BOD-Outfall 002 (96SC)

Permit Limits:	45 mg/L, Max Wkly Avg. Concentration
(11/1-4/30)	30 mg/L, Max Mthly Avg. Concentration

Permit Limits: 30 mg/L, Max Wkly Avg. Concentration (5/1-10/31) 20 mg/L, Max Mthly Avg. Concentration

18,770 lb/d, Max Wkly Avg. Loading 12,520 lb/d, Max Mthly Avg. Loading

12,520 lb/d, Max Wkly Avg. Loading 8,430 lb/d, Max Mthly Avg. Loading

Results:	March 2024.		April 2024.		May2024.	
	Back River	Patapsco	Back River	Patapsco	Back River	Pataspco
MaxWklyAvg.Conc.	2.58 mg/L	2.0 mg/L	2.77 mg/L	2.2 mg/L	2.24 mg/L	4.0 mg/L
MthlyAvg. Conc.	2.39 mg/L	1.69 mg/L	2.5 mg/L	1.8 mg/L	2.17 mg/L	3.0 mg/L
MaxWklyAvg. Loading	1,076 lb/d	834 lb/d	1,155 lb/d	917 lb/d	934 lb/d	1,668 lb/d
Mthly Avg. Loading	997 lb/d	705 lb/d	1,0421b/d	751 lb/d	905 lb/d	1,251 lb/d

TSS-Outfall 001 (OFB)

Permit Limits:	15 mg/L, MaxWklyAvg. Concentration
	10 mg/L, Max Mthly Avg. Concentration

16,000 lb/d, MaxWklyAvg. Loading 11,000 lb/d, Max Mthly Avg. Loading

Results:	March 2024.		April 2024.		May2024.	
	Back River	Patapsco	Back River	Patapsco	Back River	Pataspco
Max Wkly Avg. Conc.	1.07 mg/L	0.94 mg/L	1.93 mg/L	1.83 mg/L	0.81 mg/L	0.98 mg/L
MthlyAvg. Conc.	0.94 mg/L	0.82 mg/L	1.07 mg/L	1.19 mg/L	0.72 mg/L	0.85 mg/L
MaxWklyAvg. Loading	1,160 lb/d	1,019 lb/d	2,0921b/d	1,984 lb/d	878 lb/d	1,063 lb/d
Mthly Avg. Loading	1,019 lb/d	889 lb/d	1,160 lb/d	1,290 lb/d	781 lb/d	922 lb/d

TSS-Outfall 002 (96SC)

Permit Limits: 45 mg/L, Max Wkly Avg. Concentration 30 mg/L, Max Mthly Avg. Concentration 18,770 lb/d, MaxWklyAvg. Loading 12,520 lb/d, Max Mthly Avg. Loading

Results:	March 2024.		April 2024.		May2024.	
	Back River	Patapsco	Back River	Patapsco	Back River	Pataspco
MaxWklyAvg.Conc.	1.07 mg/L	0.8 mg/L	2.46 mg/L	2.36 mg/L	0.83 mg/L	0.94 mg/L
MthlyAvg. Conc.	0.96 mg/L	0.78 mg/L	1.21 mg/L	1.19 mg/L	0.7 mg/L	0.83 mg/L
MaxWklyAvg. Loading	446 lb/d	334 lb/d	1,026 lb/d	984 lb/d	346 lb/d	392 lb/d
Mthly Avg. Loading	400 lb/d	325 lb/d	505 lb/d	496 lb/d	292 lb/d	346 lb/d

Total Ammonia, Nitrogen as N-Outfall 001 (OFB)

Permit Limits: 3.0 mg/L, Max Wkly Avg. Concentration (11/1-4/30) 2.0 mg/L, Max Mthly Avg. Concentration

Permit Limits: N/A, Max WklyAvg. Concentration (5/1-10/31 5.1 mg/L, Max MthlyAvg. Concentration

NA, Max Wkly Avg. Loading

5,529 lb/d, Max Mthly Avg. Loading

3,300 lb/d, MaxWkly Avg. Loading

2,200 lb/d, Max Mthly Avg. Loading

Results:	March 2024.		April 2024.		May2024.	
	Back River	Marte/	Back River	Marte/	Back River	Martel
Max Wkly Avg. Conc.	1.06 mg/L	0.98 mg/L	0.27 mg/L	0.23 mg/L	0.39 mg/L	0.21 mg/L
MthlyAvg. Conc.	0.65 mg/L	0.58 mg/L	0.21 mg/L	0.21 mg/L	0.3 mg/L	0.2 mg/L
MaxWklyAvg. Loading	1,149 lb/d	1,063 lb/d	293 lb/d	249 lb/d	423 lb/d	130 lb/d
Mthly Avg. Loading	705 lb/d	629 lb/d	228 lb/d	228 lb/d	325 lb/d	217 lb/d

Total Ammonia, Nitrogen as N-Outfall 002 (96SC)

Permit Limits: N/A, Max WklyAvg. Concentration (11/1-4/30) 5.1 mg/L, Max MthlyAvg. Concentration

Permit Limits: 3.0 mg/L, Max Wkly Avg. Concentration (5/1-10/31 2.0 mg/L, Max Mthly Avg. Concentration N/A, Max Wkly Avg. Loading 2,130 lb/d, Max Mthly Avg. Loading

1,250 lb/d, MaxWklyAvg. Loading 830 lb/d, MaxMthlyAvg. Loading

Results:	March 2024.		April 2024.		May2024.	
	Back River	Marte/	Back River	Marte/	Back River	Martel
MaxWklyAvg.Conc.	1.02 mg/L	1.0 mg/L	0.26 mg/L	0.2 mg/L	0.33 mg/L	0.2 mg/L
MthlyAvg. Conc.	0.69 mg/L	0.62 mg/L	0.21 mg/L	0.2 mg/L	0.2 mg/L	0.2 mg/L
MaxWklyAvg. Loading	425 lb/d	417 lb/d	108 lb/d	83.4 lb/d	137.6 lb/d	83.4 lb/d
Mthly Avg. Loading	288 lb/d	259 lb/d	87.6 lb/d	83.4 lb/d	83.4 lb/d	83.4 lb/d

Total Phosphorus - Outfall 001 (OFB)

Permit Limits: 0.30 mg/L, Max WklyAvg. Concentration 0.20 mg/L, Max MthlyAvg. Concentration

330 lb/d, Max Wkly Avg. Loading 220 lb/d, Max Mthly Avg. Loading

Results:	March 2024.		April 2024.		May2024.	
	Back River	Marte/	Back River	Marte/	Back River	Martel
MaxWklyAvg.Conc.	0.06 mg/L	0.07 mg/L	0.08 mg/L	0.07 mg/L	0.08 mg/L	0.06 mg/L
MthlyAvg. Conc.	0.06 mg/L	0.06 mg/L	0.07 mg/L	0.06 mg/L	0.07 mg/L	0.06 mg/L
MaxWklyAvg. Loading	65.05 lb/d	75.89 lb/d	86.74 lb/d	75.89 lb/d	86.74 lb/d	65.05 lb/d
Mthly Avg. Loading	65.05 lb/d	65.05 lb/d	75.89 lb/d	65.05 lb/d	75.89 lb/d	65.05 lb/d

Inspection Date:August 14, 2024Site Name:Back River WWTPFacility Address:8201 Eastern Ave, Baltimore, MD 21224

Total Phosphorus - Outfall 002 (96SC)

Permit Limits:	0.30 mg/L, MaxWklyAvg. Concentration
	0.20 mg/L, Max Mthly Avg. Concentration

125 lb/d, Max Wkly Avg. Loading 83 lb/d, Max Mthly Avg. Loading

Results:	March 2024.		April 2024.		May2024.	
	Back River	Marte/	Back River	Martel	Back River	Martel
Max Wkly Avg. Conc.	0.06 mg/L	0.08 mg/L	0.09 mg/L	0.08 mg/L	0.09 mg/L	0.06 mg/L
MthlyAvg. Conc.	0.06 mg/L	0.06 mg/L	0.08 mg/L	0.06 mg/L	0.08 mg/L	0.06 mg/L
MaxWklyAvg. Loading	25.02 lb/d	33.36 lb/d	37.53 lb/d	33.36 lb/d	37.53 lb/d	25.02 lb/d
Mthly Avg. Loading	25.02 lb/d	25.02 lb/d	33.36 lb/d	25.02 lb/d	33.36 lb/d	25.02 lb/d

- Permit Compliance

Effluent limits shown are those current to the permit authorization listed above. The calculations for loading were completed using the average daily flow of 130 Million Gallons per Day (MGD) for Outfall 001 (OFB), and 50 MGD for Outfall 002 (96SC). The designations OFB and 96SC for each outfall are Back River's internal reference for each outfall. The review showed that the results provided from Back River, Patapsco, and Martel are in compliance with permit effluent limitations.

- Potential Bias

In the results reviewed and presented above, no apparent or potential bias in favor of Back River was observed. The results from Back River compared to Patapsco or Martel are either within a small margin of each other and, effectively, the same result, or the results from Back River are either higher or lower than the comparison lab. The difference observed did not appear to trend towards a bias to Back River's benefit.

- Relative Percent Difference (RPD)

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

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

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 Back River's internal lab compared to the outside labs; 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. It is considered that a laboratory with effective QA/QC processes and Standard Operating Procedures (SOPs) should present an RPD distribution closer to zero.

The RPD results comparing Back River to the outside labs from all three (3) months of data provided (March 2024, April 2024, and May 2024) were combined in this analysis. Each value represents the RPD between Back River's results on a given sample compared to the outside lab's results on the same sample. RPD results from samples Outfall 001 (OFB) and Outfall 002 (96SC) are combined and presented together on one RPD Distribution chart.



Chart 01: BOD, Back River / Patapsco RPD.



Chart 02: SS, Back River / Patapsco RPD.



Chart 03: Ammonia, Back River / Martel RPD.

August 14, 2024 Back River WWTP 8201 Eastern Ave, Baltimore, MD 21224



Chart 04: Total Phosphorus, TP, Back River / Martel RPD.



Chart 05: Nitrite / Nitrate, Back River / Martel RPD.



Chart 06: TKN, Back River / Martel RPD.

Inspection Date:August 14, 2024Site Name:Back River WWTPFacility Address:8201 Eastern Ave, Baltimore, MD 21224

RPD results in excess of 125% were considered outliers and excluded from the results. These are the raw results without any consideration or allowances given. For example, considering the challenges associated with quantifying the differences between two separate labs, it would be reasonable to give an allowance of 15% which would reduce the individual RPD results of each sample by 15%. If given, this allowance would effectively combine the first two bars of each of the graphs presented above which contain a majority of the samples.

The results of the RPD comparison between Back River and the outside labs are distributed closer to zero with the exception of the Nitrite / Nitrate RPD comparison. In its raw form without any allowance given, it is not trending to zero and is instead distributed around 50% RPD. However, giving an allowance would change the distribution closer to zero. Any additional percent allowance added would only improve their results. The percent tolerance to allow is debatable given the wide variety of variables one might try to capture.

Conclusion

The lab walkthrough did not reveal any violations, issues, or concerns related to the NPDES Guidelines for onsite laboratory inspections and 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 Back River WWTP compared to outside labs was within permit effluent limitations. The data provided did not indicate a potential bias in Back River's results related to permit compliance. The RPD analysis shows that Back River's lab results are distributed closer to zero and any allowance or tolerance to account for variability in sampling and testing between outside labs would only improve their results.

Back River WWTP's onsite lab appears to be capable of completing their own nutrient tests and analysis in compliance with permit requirements.

Regular inspections will continue.

Inspector: 10/23/2024	_ Received by:	
Christopher Lepadatu /Date christopher.lepadatu@maryland.gov 410-537-3521		Signature/Date
		Print Name