United States Environmental Protection Agency Region 4
Enforcement and Compliance Assurance Division
Water Enforcement Branch
61 Forsyth Street, SW
Atlanta, Georgia 30303

Compliance Evaluation Inspection Report

Project No. CV-FL0020427 - 12082022

Neptune Beach Wastewater Treatment Facility
2010 Forest Avenue
Neptune Beach, Florida 32266
NPDES Permit Number: FL0020427
Date of Inspection: December 8, 2022

Title and Approval Sheet

Title: Compliance Evaluation Inspection City of Neptune Beach, FL, Neptune Beach WWTF

Approving Official:

LAURIE JONES

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1. Introduction

On December 8, 2022, representatives of the United States Environmental Protection Agency Region 4 and the Florida Department of Environmental Protection (FDEP) conducted a Compliance Evaluation Inspection (CEI) on the Neptune Beach Wastewater Treatment Facility (WWTF), owned and operated by the City of Neptune Beach (City). The inspection was conducted under the authority of Section 308 of the Clean Water Act (CWA), as amended. This report provides a summary of the inspection.

2. Participants

Name	Organization	email
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3. Facility Description

The WWTF is an activated sludge wastewater treatment plant that consists of two biological treatment paths (Plant 1 and Plant 2), with common headworks, disinfection, and effluent disposal systems. The combined (Plant 1 and Plant 2) design capacity is 1.60 million gallons per day (MGD), according to the City's 2018 NPDES permit application. However, permitted capacity is limited to 0.90 MGD (discussed below in the Permit Review section) and the Outfall design capacity is limited to 1.40 MGD. Plant 1 and Plant 2 operate in parallel.

Plant 1 is a 0.80 MGD design flow Integrated Fixed-Film Activated Sludge (IFAS) plant consisting of one Anoxic Tank, one IFAS Tank, two Secondary Clarifiers, and an Aerobic Digester. Plant 2 is an above ground package plant with two integrated tanks that was initially configured to operate as a contact stabilization plant or as an extended aeration plant. Plant 2 was not operational during the inspection due to ongoing efforts to rehabilitate and reconfigure the system to operate as a Modified Ludzak–Ettinger (MLE) process plant, which should enhance Plant 2's ability to treat for nutrients.

The headworks consists of two mechanical screens following by grit removal equipment, an influent wet-well, two master lift stations (one station delivers to the Plant 1 and the other to the Plant 2), and two equalization tanks operating in series.

The effluent from both Plant's clarifiers is filtered through an Ultrascreen Microfilter before entering the Chlorine Contact Chamber. Disinfection is achieved using sodium hypchlorite and dechlorination is achieved using Sodium Bisulfate. The Chlorine Contact Chamber effluent dicharges into a 42,000-gallon Reuse Storage Basin, and one 2,000-gallon Hydro-pneumatic Tank prior to being discharged into the St. Johns River by the Effluent Pump and force main. Reuse water is currently only used internally within the WWTF.

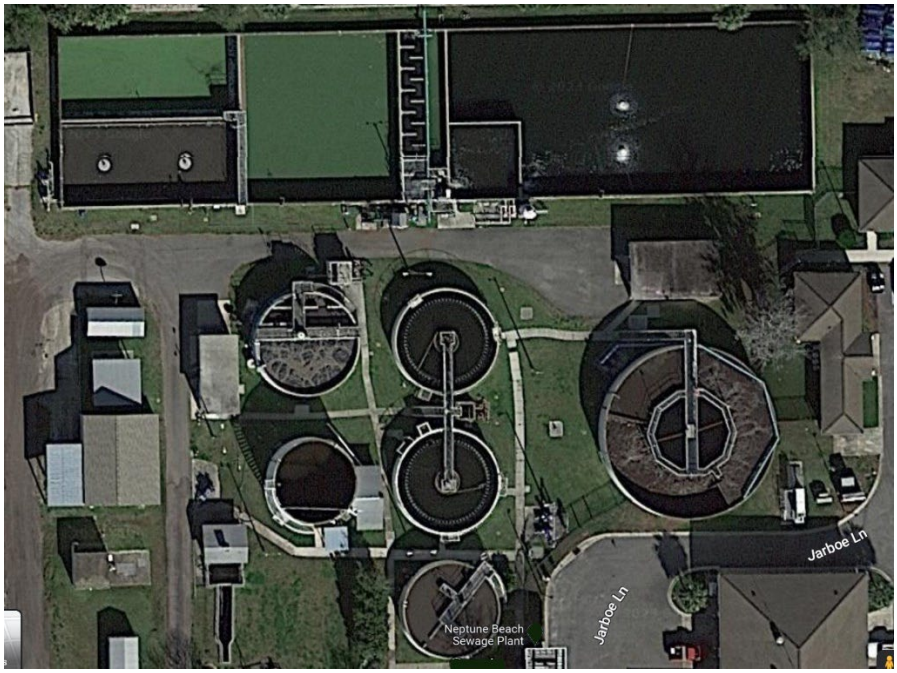

Figure 1: Aerial Display of the WWTF.

4. Inspection Procedures

The overall objective of this CEI was to evaluate the condition and operational performance of the WWTF and the City's self-monitoring program and to offer compliance assistance as needed. Specific tasks included conducting interviews with WWTF staff, reviewing Discharge Monitoring Reports (DMRs) and other WWTF records, and conducting a site visit throughout the WWTF.

5. Findings & Conclusions

The City has been in Significant Non-Compliance (SNC) for effluent limit exceedances of Total Nitrogen [as N] (TN) throughout the evaluation period for each month of December 2019 through December 2022. The WWTF was generally in good operational condition and appeared well maintained; Plant 2 was not operational and not evaluated.

A. Permit Review

The City's NPDES permit has an effective date of May 1, 2019, and an expiration date of April 30, 2024. The WWTF is classified as a major (greater that 1.0 MGD discharger); however it is currently limited in the NPDES permit to 0.90 MGD (Average Annual Daily Flow) (0.80 MGD for

the IFAS Plant 1 + 0.10 MGD for Plant 2) due to the nutrient removal capacities of the combined treatment facilities.

The NPDES permit authorizes the City to upgrade Plant 2 to a Modified Ludzack-Ettinger process plant. Upon completion and placing into service, the permitted capacity of Plant 2 will increase to 0.45 MGD and the total (Plant 1 and 2) permitted capacity will be increased to 1.25 MGD.

B. Records and Reports

The EPA's Integrated Compliance Information System (ICIS) database shows the City to be in Significant Noncompliance for exceeding NPDES effluent limits for Total Nitrogen (TN). A complete list of effluent limit exceedances can be found in Appendix 1 for the period from December 2019 through December 2022 based on data compiled from DMRs. The City also exceeded effluent limits for Enterococci, Total Residual Chlorine, Whole Effluent Toxicity, and Total Phosphorus as outlined in Appendix 1. ICIS data can be reviewed on the EPA's Compliance History Online (ECHO)[1] public website.

The EPA further reviewed reported DMR values for TN loading reported in pounds/year (lb/yr) and calculated using a 12 month running total. Table 1 shows monthly load and total annual waste load allocations. Note the months of April 2020 and December 2022 were reported with an incorrect decimal place. No other reporting period total annual waste load calculations were affected by this error.

Monitoring Period End Date	Parameter Description	Permit Limit Value (Annual totals - lb/yr)	DMR Reported Value (lb/yr)	DMR Reported Value (lb/mo)
1/31/2020	Nitrogen, total [as N]	13559	18672	1682
2/29/2020	Nitrogen, total [as N]	13559	18719	1739
3/31/2020	Nitrogen, total [as N]	13559	18033	1617
4/30/2020	Nitrogen, total [as N]	13559	17.826	1289
5/31/2020	Nitrogen, total [as N]	13559	16975	826
6/30/2020	Nitrogen, total [as N]	13559	16045	693
7/31/2020	Nitrogen, total [as N]	13559	15267	692
8/31/2020	Nitrogen, total [as N]	19000	15090	810
9/30/2020	Nitrogen, total [as N]	19000	15085	877
10/31/2020	Nitrogen, total [as N]	19000	15456	1747
11/30/2020	Nitrogen, total [as N]	19000	15401	1635
12/31/2020	Nitrogen, total [as N]	19000	15387	1834
1/31/2021	Nitrogen, total [as N]	19000	16149	2444

Table 1. Reported TN values.

[1] https://echo.epa.gov

Monitoring Period End Date	Parameter Description	Permit Limit Value (Annual totals - lb/yr)	DMR Reported Value (lb/yr)	DMR Reported Value (lb/mo)
2/28/2021	Nitrogen, total [as N]	19000	16320	1910
3/31/2021	Nitrogen, total [as N]	19000	16947	2245
4/30/2021	Nitrogen, total [as N]	19000	18030.3	2317.3
5/31/2021	Nitrogen, total [as N]	19000	19167	1962
6/30/2021	Nitrogen, total [as N]	19000	20063	1667
7/31/2021	Nitrogen, total [as N]	19000	21587	2135
8/31/2021	Nitrogen, total [as N]	19000	22442	1666
9/30/2021	Nitrogen, total [as N]	19000	24020	2457
10/31/2021	Nitrogen, total [as N]	19000	24298	2025
11/30/2021	Nitrogen, total [as N]	19000	23686	1023.67
12/31/2021	Nitrogen, total [as N]	19000	23310	1457
1/31/2022	Nitrogen, total [as N]	19000	23952.2	3085.36
2/28/2022	Nitrogen, total [as N]	19000	25307	3266
3/31/2022	Nitrogen, total [as N]	19000	24947	1884
4/30/2022	Nitrogen, total [as N]	19000	26002	3372
5/31/2022	Nitrogen, total [as N]	19000	28009	3969
6/30/2022	Nitrogen, total [as N]	19000	30241	3898
7/31/2022	Nitrogen, total [as N]	19000	30498	2393
8/31/2022	Nitrogen, total [as N]	13559	30474.32	1660.58
9/30/2022	Nitrogen, total [as N]	13559	29845.24	1827.92
10/31/2022	Nitrogen, total [as N]	13559	29478.24	1658.48
11/30/2022	Nitrogen, total [as N]	13559	30402.88	1948.31
12/31/2022	Nitrogen, total [as N]	13559	30.612	2139

Table 1 (cont.): Reported TN values.

NPDES permit limit for TN is 13,559 lb/yr (total annual sum), however FDEPs Consent Order OGC File No. 20-0773, allowed an interim limit of 19,000 lb/yr for the duration of the initial Consent Order (discussed in the *Discussion* section of the report).

C. Flow Measurement

Influent and effluent flow is measured using magnetic flow meters. Effluent flow measured 0.61mgd (instantaneous reading).

D. Sampling

The composite samplers used for influent and effluent sampling are ISCO portable sampling units. Samples are collected for analysis by Advanced Environmental Laboratories, Inc. The EPA

reviewed the Chain of Custody (COC) sheet and subsequent lab report for enterococci grab samples collect on November 3 and 28, 2022, and for composite samples collected on November 4, 2022. The COC sheets include the sample collection time/date but does not have a box to indicate the begin time/date of the composite sampling, (Figure 1); however, the start time/date is recorded in the operator's log.

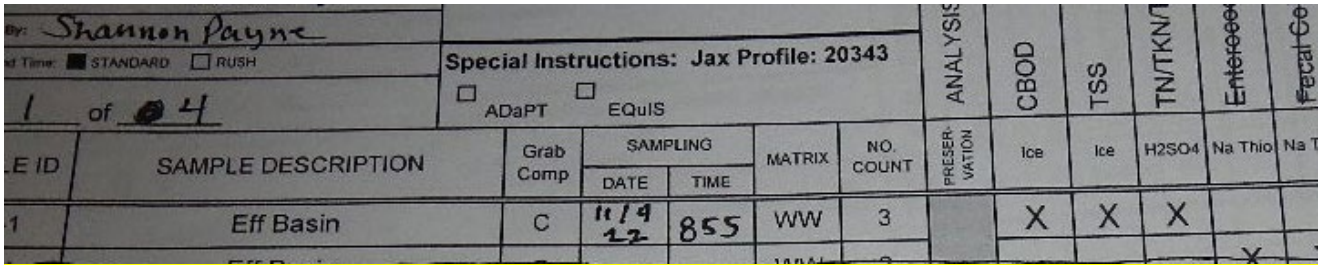

Figure 1: Advanced Environmental Lab COC sheet cut-out.

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Inspectors observed one of the WWTF's staff set up and test one of the portable composite samplers to verify that the equipment is pulling the correct amount of volume, or at least 100mL per pull. The sampler was set to pull 110mL samples but pulled a volume of 500mL. Post inspection correspondence with the City's DW/WW Division Chief shows that the City approved a purchase order for a stationary composite sampling unit (HACH model AS950) on December 9, 2022 for sampling effluent.

Chronic Whole Effluent Toxicity sampling protocol in the permit is not consistent. Section I.1 stipulates that Chronic Whole Effluent Toxicity, 7-Day IC25 (*Americamysis Bahia* and Menidia Beryllina) is to be collected by grab sample. Whereas Section 1.A.19.c. (Sampling Requirements) states, "(1) For each routine test or additional follow-up test conducted, a total of three 24-hour, flow-composite samples of final effluent shall be collected and used in accordance with the sampling protocol discussed in EPA-821-R-02-014, Section 8."

E. Site Visit (Operation and Maintenance)

(All Photo references can be found in Appendix 2)

A WWTF site visit concentrated on Plant 1 and common components of Plants 1 and 2 since Plant 2 was down for renovation. The WWTF appeared well maintained. All major systems were operational apart from Plant 2, unless otherwise stated below. The following observations were noted:

- There is an auxiliary generator located on-site that can provide power to continue to treat sewage in the event of a power outage. The generator is exercised every Tuesday under load.
- A MUNOX® system was installed approximately one year ago. The MUNOX system injects nitrobacter bacteria into the waste stream to aid in nitrogen removal, (Photo 1).
- The influent composite sampler is a portable unit and appears to be in good condition, (Photo 2). This sampler was not tested for accuracy of volumetric pulls.
- Observed effluent composite sampler test described above, (Photo 3).
- Observed the following equipment/systems throughout the WWTF:
    - Headworks and grit removal system.

- Bleach pump room. The City is planning to replace the current single walled chlorine tanks with double walled tanks.
- Return Activated Sludge (RAS) system.
- MicroC® system. The MicroC system injects a proprietary carbon source into the treatment train (at the RAS system) to augment Biochemical Oxygen Demand (BOD) removal during low BOD events, such as low flow conditions and wet weather conditions.
- Waste Activated Sludge pump and pipes.
- IFAS tank, (Photo 4 and 5). This IFAS uses free floating media (round balls) in the Mixed Liquor Suspended Solids (MLSS) in the activated sludge tank to facilitate biomass growth and strengthen the treatment process. Nitrobacter and other biomass clings to the balls to aid BOD removal and denitrification. The DW/WW Division Chief remarked that the media is due for change-out. The MLSS concentration is currently targeted at 2500 mg/L to facilitate higher Dissolved Oxygen levels that enables the plant to convert a higher amount of influent ammonia (NH3) to Nitrates (NO3).
- The IFAS blowers consist of two main blowers and a supplemental (smaller) blower. The supplemental blower was recently added and is not yet operational. The supplemental blower was added to aid in Dissolved Oxygen (DO) content in the MLSS. Raising the DO level using the supplemental pump, once online, should allow the MLSS to maintain a higher concentration of 3000 to 3500 mg/L, allowing for a more efficient biomass.
- The operator used a sludge-judge to measure the sludge depth in one of two clarifiers, (Photo 6). The sludge depth measured approximately 2 feet.
- The Ultrascreen Microfilter, which is a 6-disc, 5-micron filter, removes solids from the effluent of the clarifiers prior to entering the Chlorine Contact Chamber. Disc back-wash is discharged into a dedicated tank for recirculating back into the WWTF. The discs require periodic change-out. The Microfilter system lacks redundancy.
- The influent to the Chlorine Contact Chamber contained small floating particles, indicating that the Microfilter discs may be at or near the end of their service life, (Photo 7). There is a Reject Basin next to the Chlorine Contact Chamber that can be used to pump effluent back into the WWTF if the effluent is not treated sufficiently.

F. Sludge Handling

Waste sludge is collected in the Digester Tank. The City installed a new ProMix® polymer system to aid in dewatering the sludge prior to mechanical dewatering. The City uses a 2-meter belt press to dewater sludge. Dewatered sludge is conveyed to a dumpster and periodically hauled to local landfills. Sludge hauling manifests are maintained on site.

G. Effluent and Receiving Water

The City is permitted to discharge effluent from Outfall D-001 to the St. Johns River as described above. The discharge at the end of the force main (into the river) is not accessible; however, the effluent in the Reuse Storage Basin prior to pumping into the force main appeared to be clear, viewed from the Chlorine Contact Chamber.

6. Discussion

The FDEP issued the City a Consent Order (CO), OGC 20-0773, on August 11, 2020 (effective date), to address chronic effluent exceedances of TN. The CO requires the City to "submit a compliance plan (Plan) to meet final effluent limits for Total Nitrogen and all other parameters as specified in the Permit." The final compliance date in the CO is set to be two years of the effective date of this Order (or August 11, 2022), however, FDEP has drafted an Amended CO, as evidenced in a FDEP letter to the City dated November 11, 2022 (*Subject: Department of Environmental Protection v. City of Neptune Beach, Facility ID No. FL0020427, OGC File No. 20-0773)* that will extend the final compliance date, which is pending the City's signature. The DW/WW Division Chief informed the EPA that the delay in signing the document is due to City Manager vacancy. The previous City Manager signed the CO for the City on August 6, 2020 and has since vacated the position.

The EPA recommends the following:

- Replace the Ultrascreen Microfilter discs to alleviate the floating fines observed in the Chlorine Contact Chamber, should, upon inspection, the discs be at the end of their service life.
- Work with FDEP to correct the Whole Effluent Toxicity sampling protocol in the NPDES permit.
- Submit corrections to the April 2020 and December 2022 TN, as shown in Table 1, to FDEP's e-reporting system, (this is a permit requirement).
- Communicate with the FDEP regarding signature authority for the Amended CO. Specifically, what other official of the City, other than the City Manager, can sign the document and what needs to be done to make that change in the draft Amended CO.
- Consider purchasing and installing an additional microfilter system to create redundancy in the treatment train. Redundant systems will reduce wear and tear on the mechanical components as well as increase the filter discs service life and provide a back-up to facilitate maintenance. Lack of redundancy may severely hamper operations in the event of a catastrophic failure.

END OF REPORT

Appendix 1. List of effluent violations.

Parameter Description	Permit Limit Value	Unit	Monitoring Fequency	Monitoring Period End Date	DMR Reported Value	% Exceeded	Violation Severity
Chlorine, total residual (before Dechlor)	0.5	mg/L	MIN 5day/wk	5/31/2021	0.3	40	Noncompliance Effluent Violation
Enterococci: group D, MF trans, M-E, EIA	35	#/100mL	MO GEO MEAN	5/31/2021	163	366	Noncompliance Effluent Violation
Enterococci: group D, MF trans, M-E, EIA	140	#/100mL	MO MAX	5/31/2021	200	43	Noncompliance Effluent Violation
IC25 Static Renewal 7 Day Chronic Menidia menidia	100	%	MIN S/A	9/30/2022	37.05	63	Noncompliance Effluent Violation
IC25 Static Renewal 7 Day Chronic Mysidopsis bahia	100	%	MIN S/A	5/31/2020	44.47	56	Noncompliance Effluent Violation
IC25 Static Renewal 7 Day Chronic Mysidopsis bahia	100	%	MIN S/A	9/30/2022	74.17	26	Noncompliance Effluent Violation
IC25 Static Renewal 7 Day Chronic Menidia menidia	100	%	MIN S/A	9/30/2022	37.05	63	Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	12/31/2019	18541	37	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	1/31/2020	18672	38	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	2/29/2020	18719	38	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	3/31/2020	18033	33	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	5/31/2020	16975	25	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	6/30/2020	16045	18	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	7/31/2020	15267	13	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	5/31/2021	19167	1	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	6/30/2021	20063	6	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	7/31/2021	21587	14	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	8/31/2021	22442	18	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	9/30/2021	24020	26	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	10/31/2021	24298	28	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	11/30/2021	23686	25	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	12/31/2021	23310	23	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	1/31/2022	23952.2	26	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	2/28/2022	25307	33	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	3/31/2022	24947	31	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	4/30/2022	26002	37	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	5/31/2022	28009	47	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	6/30/2022	30241	59	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	19000	lb/yr	Annual Total	7/31/2022	30498	61	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	8/31/2022	30474.32	125	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	9/30/2022	29845.24	120	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	10/31/2022	29478.24	117	Significant Noncompliance Effluent Violation
Nitrogen, total [as N]	13559	lb/yr	Annual Total	11/30/2022	30402.88	124	Significant Noncompliance Effluent Violation
Phosphorus, total [as P]	4015	lb/yr	Annual Total	5/31/2022	4231	5	Noncompliance Effluent Violation
Phosphorus, total [as P]	4015	lb/yr	Annual Total	6/30/2022	4060	1	Noncompliance Effluent Violation
Phosphorus, total [as P]	4015	lb/yr	Annual Total	7/31/2022	4149	3	Noncompliance Effluent Violation

Appendix 2: Photo Log

Photo 1. MUNOX® system storage tank and supply pump.

Photo 2: Portable ISCO composite sampler located at the Headworks.

Photo 3. Effluent composite sampler test.

Photo 4. IFAS re-aeration zone.

Photo 5. IFAS post anoxic zone and re-aeration zone.

Photo 6. Sludge judge measuring the sludge blanket depth at approximately 2 feet off the bottom of the clarifier.

Photo 7. Influent of the Chlorine Contact Chamber. Note small floating particles.