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-KY0021571-10252022

Cumberland Wastewater Treatment Plant
River Road
Cumberland, Kentucky 40823

NPDES Permit Number: KY0021571

Date of Inspection: October 25, 2022

Inspectors:
William Joyner, EPA Region 4
Dennis Sayre, EPA Region 4

Title and Approval Sheet

Title: Compliance Evaluation Inspection Cumberland WWTP, Cumberland, KY

Approving Official:

Castillo, Jairo Digitally signed by Castillo, Jairo
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Dennis Sayre, Inspector
Wastewater Enforcement Section
Water Enforcement Branch

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1. Introduction

On October 25, 2022, representatives of the United States Environmental Protection Agency and Kentucky Department for Environmental Protection (KyDEP) conducted a Compliance Evaluation Inspection (CEI) on the Cumberland Wastewater Treatment Plant (WWTP), owned and operated by the City of Cumberland (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	Position	Number
Dennis Sayre	EPA Inspector	404-562-9756
William Joyner	EPA Inspector	404-562-8795
Robert Miller	KyDEP London Regional Office Manager	606-330-2080
Ryan Wilson	KyDEP Environmental Scientist IV	606-330-2080
Charles Raleigh	Mayor, City of Cumberland	606-589-2106
Cecil Lockaby	Class III Operator	606-589-2106

3. Facility Description

The WWTP is an activated sludge treatment plant with an average design flow of 0.5 million gallons per day (MGD) (Figure 1). The WWTP includes a comminutor, bar screens, and grit removal at the head works, one primary clarifier, a primary trickling filter, two intermediate clarifiers, a secondary trickling filter that is used as an ammonia stripper and additional treatment, a final clarifier, a chlorine contact chamber, and a step aerator. A sludge digester basin and drying beds are used to waste sludge. Disinfection and dechlorination is achieved using chlorine gas and sodium bisulfate.

Figure 1: Aerial Display of the WWTP

4. Inspection Procedures

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

5. Findings & Conclusions

The City has been in Significant Non-Compliance (SNC) for 12 of the past 12 calendar quarters, primarily due to noncompliance with a KyDEP Agreed Order, No. KY-DOW 110285 (AO), issued to the City by the Commonwealth on April 21, 2015 and amended on November 15, 2018. The City has also been in noncompliance with several other permit effluent limits through the period evaluated from October 2019 through September 2022, as noted Appendix 1, which includes exceedances in E.coli, Dissolved Oxygen (DO), Carbonaceous Biochemical Oxygen Demand [5 day, 20 C] ($CBOD_5$) percent removal, $CBOD_5$ loading and concentration, pH, Suspended Solids (SS) percent removal, and Total Suspended Solids (TSS).

A. Permit Review

The City's National Pollutant Discharge Elimination System (NPDES) permit (KY0021571) has an effective date of October 1, 2019 and expires on September 30, 2024. The permit has report-only requirements for flow, Total Nitrogen (TN), and Total Phosphorus (TP) and sets forth limits on the allowable levels of TSS, SS, $CBOD_5$, Ammonia [as Nitrogen] (NH_3-N), DO, E. coli, Total Residual Chlorine (TRC), and pH. Influent and effluent flow requires continuous monitoring.

B. Records and Reports

EPA's Integrated Compliance Information System (ICIS) database shows the facility to be in SNC due to permit limit exceedances as discussed above. Appendix 1 includes a list of effluent exceedances from October 2019 through September 2022. ICIS data can be reviewed on the EPA's Compliance History Online (ECHO)[1] public website. Numerous records deficiencies were noted on the City's Chain of Custody (COC) records and will be discussed in Section D (Sampling) below.

C. Flow Measurement

A Parshall flume and ultrasonic flow meter is used to measure influent flow rates. Effluent flow is measured using an ultrasonic flow meter at the Chlorine Contact Chamber. The effluent flow meter was last calibrated on October 31, 2018.

D. Sampling

The NPDES permit states that the City is to collect "A 24-hour composite … using an automated sampler set to collect equal volume aliquots of at least 100 ml each every 15 minutes over a 24 hour period," and must be maintained at between 0° C and 6° C at all times. Composite samples are to be collected for analysis of influent and effluent for $CBOD_5$, TSS, TN and TP, and for NH_3-N effluent.

Both the influent and effluent composite samplers where in a state of disrepair. Functionality could not be tested due to severely deteriorated and broken suction tubes (Figures 2 and 3).

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

Figure 2. Influent composite sampler. Suction tube was brittle, pinched, and had excessive bacteria lining in the interior of the tube.

Figure 3. Effluent composite sampler. Suction tube was brittle, broken, and had excessive bacteria lining the interior.

The EPA reviewed sampling COC sheets for samples collected on July 26, 2022, September 7, 9, 22, and 30, 2022, and October 10, 2022. Several COCs showed composite sampling times/dates that indicates that the City collected samples over a 24-hour period but also indicated that the one sample was grabbed at a specific time. For example, the September 15, 2022 COC shows a 24-hour sample collection that started at 0900 on September 14th and ended at 0900 on September 15th but also annotated that a grab sample was collected at 10:00, presumably for the composite sample analysis (Figure 4). The composite samplers were in such a condition that collecting composite samples would not be possible and has not been utilized for an extended period. Temperature of the samples was not recorded on any of the COC sheets reviewed.

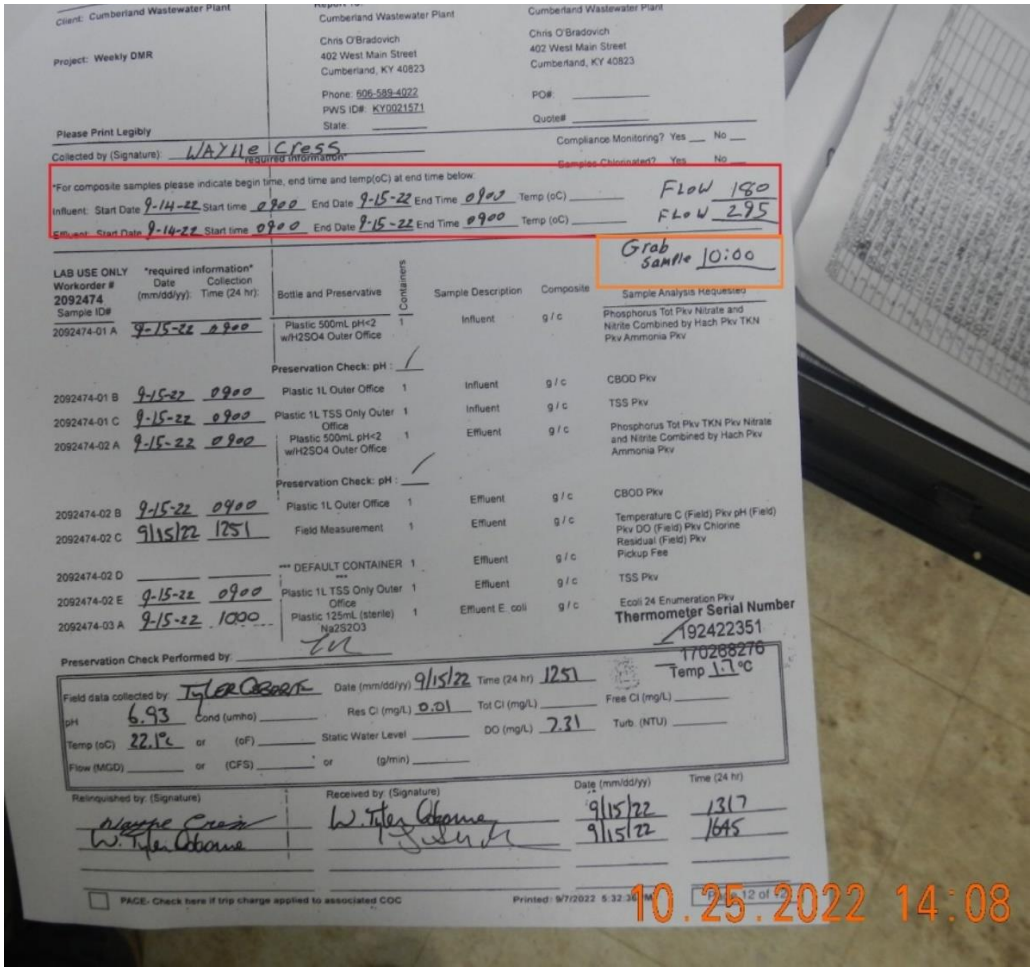

Figure 4. COC sheet dated 9/15/2022 shows composite samples collected from 0900, 9/14/2022 to 0900, 9/15/2022 (red box). The orange box shows a grab sample collected at 10:00, presumably for purposes of composite sampling analysis.

The COC sheet for samples collected on August 22, 2022 shows that sampling collected as a composite started at 9:00 a.m. on August 22nd and ended on August 22nd at 9:00 a.m., but also shows the grab sample was collected at 11:00 a.m., assuming that the annotation "Grab Sample" is for the composite sampling analysis (Figure 5).

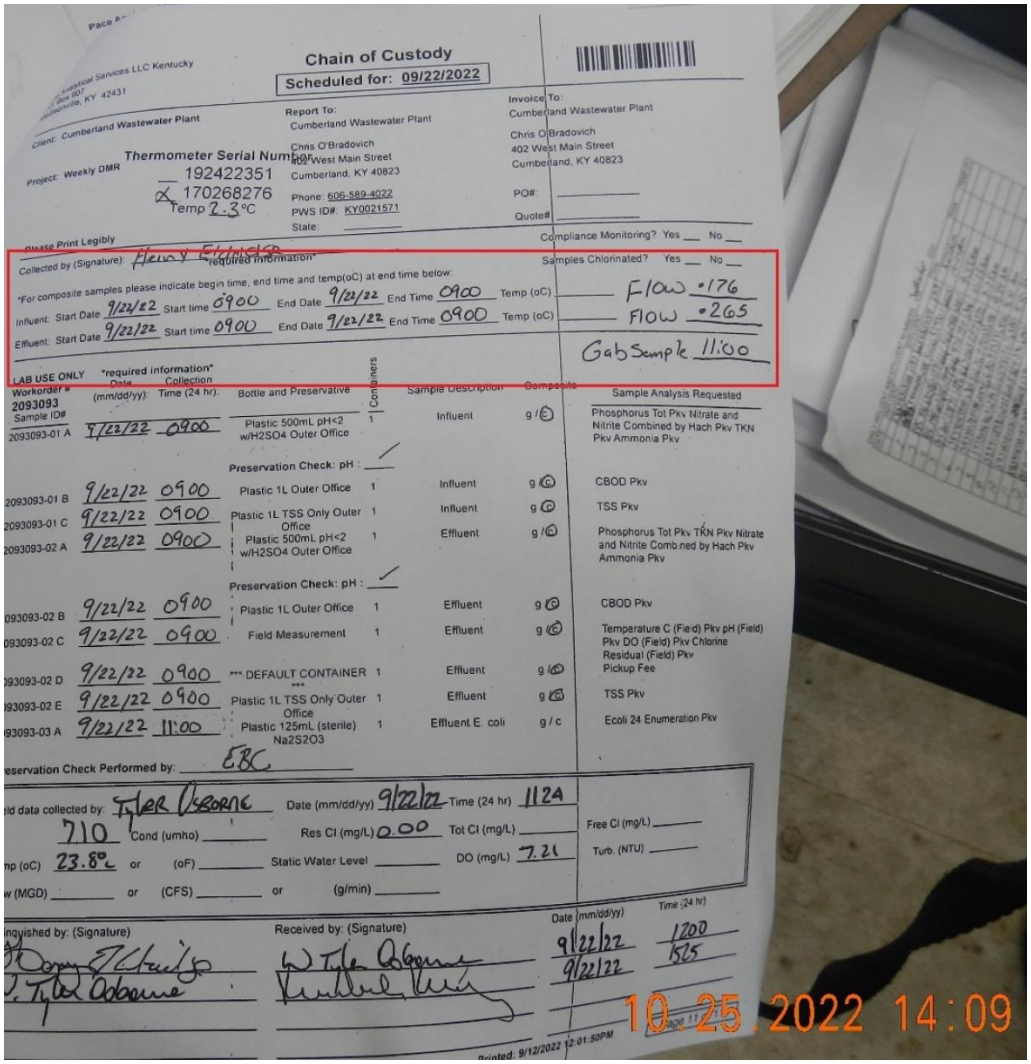

Figure 5. COC sheet dated 9/22/2022 shows composite samples collected from 0900, 9/22/2022 to 0900, 9/22/2022 (red box). The COC also shows a grab sample collected at 11:00, presumably for the purposes of composite sampling analysis.

City employees are tasked with setting up the composite samplers and collected the samples for change of custody to the contract laboratory, Pace Analytical Services, LLC, for analysis. The WWTP operator reportedly does not conduct any sampling for regulatory purposes.

E. Site Visit (Operation and Maintenance)

The main trickling filter unit and secondary tricking filter unit appeared to be in good working order. The secondary trickling filter showed minor damage to the modular plastic media at the surface but apparently not enough to affect the performance of the unit (Figure 6).

Figure 6. Secondary trickling filter unit. Red lines outline surface damage to the modular plastic media.

The primary clarifier is in a severe state of disrepair and corrosion (Figure 7). Excessive solids were observed floating in the clarifier.

Figure 7. Excessive solids observed floating in the clarifier.

The Return Activated Sludge/Waste Activated Sludge (RAS/WAS) line was blocked, prohibiting the ability to recirculate or waste sludge.

The wastewater in the clarifiers appeared gray in color and excessive suspended solids were observed at the surface (Figure 8). Dark or gray wastewater and solids at the surface is symptomatic of a malfunctioning RAS/WAS system among other possible causes.

Figure 8. Top bottom photos show gray coloration and clumps of solids (sludge) floating at the surface.

F. Effluent and Receiving Waters

The outfall discharge to the creek was slightly turbid but otherwise clear and free of solids (Figure 9).

Figure 9. Outfall at Poor Fork of the Cumberland River.

6. Discussion

Section 3.10. of the NPDES permit (Monitoring and Records) stipulates that "samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity." Composite sampling is intended to provide a representative sample of the average concentration of pollutants discharged over a 24-hour period. Analytical results reported for an undetermined period for influent and effluent $CBOD_5$, TSS, TN and TP, and for NH_3 -N effluent are not representative of the average 24-hour discharge. The City must repair and properly maintain the composite samplers, to include a scheduled maintenance period to change the suction tubes and pump tubing, clean and inspect, test the volume of sample aliquots collected, and maintain a buffered thermometer in the refrigerated compartment. EPA recommends that the City provide training to City personnel in the proper use and maintenance of the composite samplers. Improperly collecting composite samples invalidates analytical results intended to measure effluent limit requirements outlined in the NPDES permit.

Section 3.5. of the NPDES permit (Proper Operation and Maintenance) stipulates that "the permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit." The City must maintain an adequate RAS/WAS system to provide adequate compliance with NPDES permit effluent limits. The City must restore RAS/WAS operations, if not already completed.

The primary clarifier appears to be severely deteriorated. The City should provide for rehabilitative maintenance of the primary clarifier.

END OF REPORT

Appendix A. List of effluent violations.

Monitoring End Period	Parameter	Permit Limit	DMR Reported Value	Units	Monitoring Frequency	% Exceedence
3/31/2022	CBOD5 % Removal	85	81	%	MO AV MN	27
5/31/2022	CBOD5 % Removal	85	61	%	MO AV MN	160
7/31/2022	CBOD5 % Removal	85	78	%	MO AV MN	47
5/31/2022	CBOD5 Load	166.8	213.24	lb/d	MX WK AV	28
5/31/2022	CBOD5 Concentration	40	47	mg/L	MX WK AV	18
12/31/2019	E. coli	130	248	#/100mL	30DA GEO	91
12/31/2019	E. coli	240	60000	#/100mL	7 DA GEO	24900
1/31/2020	E. coli	240	816	#/100mL	7 DA GEO	240
2/29/2020	E. coli	130	167	#/100mL	30DA GEO	28
2/29/2020	E. coli	240	579	#/100mL	7 DA GEO	141
3/31/2020	E. coli	240	60000	#/100mL	7 DA GEO	24900
3/31/2020	E. coli	130	154	#/100mL	30DA GEO	18
6/30/2020	E. coli	240	60000	#/100mL	7 DA GEO	24900
5/31/2021	E. coli	240	60000	#/100mL	7 DA GEO	24900
6/30/2021	E. coli	240	548	#/100mL	7 DA GEO	128
1/31/2022	E. coli	240	435	#/100mL	7 DA GEO	81
10/31/2019	Oxygen, dissolved [DO]	7	3.9	mg/L	INST MIN	44
3/31/2021	Oxygen, dissolved [DO]	7	4.94	mg/L	INST MIN	29
4/30/2021	Oxygen, dissolved [DO]	7	4.16	mg/L	INST MIN	41
5/31/2021	Oxygen, dissolved [DO]	7	3	mg/L	INST MIN	57
6/30/2021	Oxygen, dissolved [DO]	7	3.2	mg/L	INST MIN	54
7/31/2021	Oxygen, dissolved [DO]	7	6.6	mg/L	INST MIN	6
3/31/2021	pH	9	10.99	SU	MAXIMUM	
12/31/2019	Suspended Solids, % removal	85	82	%	MO AV MN	20
1/31/2020	Suspended Solids, % removal	85	81	%	MO AV MN	27
10/31/2020	Suspended Solids, % removal	85	67	%	MO AV MN	120
12/31/2020	Suspended Solids, % removal	85	78	%	MO AV MN	47
1/31/2022	Suspended Solids, % removal	85	52	%	MO AV MN	220
2/28/2022	Suspended Solids, % removal	85	60	%	MO AV MN	167
3/31/2022	Suspended Solids, % removal	85	45	%	MO AV MN	267
4/30/2022	Suspended Solids, % removal	85	68	%	MO AV MN	113
5/31/2022	Suspended Solids, % removal	85	38	%	MO AV MN	313
6/30/2022	Suspended Solids, % removal	85	79	%	MO AV MN	40
7/31/2022	Suspended Solids, % removal	85	43	%	MO AV MN	280
8/31/2022	Suspended Solids, % removal	85	78	%	MO AV MN	47
1/31/2022	Total Suspended Solids	189.5	230.6	lb/d	MX WK AV	22
1/31/2022	Total Suspended Solids	126.4	127	lb/d	MO AVG	0