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-TN0020885 -101222
Oliver Springs STP
435 Joel Road
Oliver Springs, Tennessee, 37840
NPDES Permit Number: TN0020885
Date of Inspection: October 12, 2022

Title and Approval Sheet

Title: Compliance Evaluation Inspection Town of Oliver Springs, Oliver Springs STP

Approving Official:

JAIRO CASTILLO Digitally signed by JAIRO CASTILLO Date: 2022.12.09 15:59:40 -05'00'

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1. Introduction

On October 12, 2022, representatives of the United States Environmental Protection Agency, Region 4 and Tennessee Department of Environment and Conservation (TDEC) conducted a Compliance Evaluation Inspection (CEI) on the Oliver Springs Sewage Treatment Plant (STP), owned and operated by the Town of Oliver Springs (Town). The STP is located at 435 Joel Road Oliver Springs, Tennessee. 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
Sarah Snyder	TDEC Inspector	865-809-5086
Robert Ramsey	Water Resources/Facilities Manager, Knoxville Field Office	865-203-3523
Thomas McCormick	City Manager	865-435-7722
Travis Thrasher	STP Lead Operator	865-426-9476

3. Facility Description

The STP is an Oxidation Ditch type of activated sludge wastewater treatment system with an average design flow of 0.74 million gallons per day (MGD). The STP consists of an equalization (EQ) basin, head works with a vortex grit and solids removal device, a primary clarifier, one Oxidation Ditch with variable speed propeller mixers, two secondary clarifiers, a tertiary filtration system, chlorine contact chambers with two independent flow paths, a step aerator, and related appurtenances. Disinfection and dechlorination is achieved using chlorine gas and sodium bisulfate.

Figure 1: Aerial Display of the STP

4. Inspections Procedures

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

5. Findings & Conclusions

The Town has been in Significant Non-Compliance (SNC) for 8 of the past 12 calendar quarters, primarily due to Ammonia (as Nitrogen) (NH3-N) and Total Residual Chlorine (TRC) exceedances. Of note, the Town has been in SNC for one of the past 4 quarters. The Town has also been in non-compliance with several other permit effluent limits as noted Appendix 1, which includes exceedances in E. coli, Total Nitrogen (TN), Total Phosphorus (TP), Total Suspended Solids (percent removal). The Town also reported several wet weather sanitary sewer overflows (SSOs).

The Town was issued a TDEC Commissioner's Order (WPC14-002) in July 2014 for numerous effluent limit violations from the STP as well as SSOs from the collection system. The Order required the Town to develop and implement corrective action plans to eliminate SSOs and to rehabilitate the STP to prevent further violations of the National Pollutant Discharge Elimination System (NPDES) permit. The Order also directed the Town to develop and implement a Sewage Overflow Response Plan to ensure proper response to SSOs and to develop and implement various Capacity, Management, Operations, and Maintenance (CMOM) programs to facilitate proper asset management of the sewer system. The Order was concluded and terminated by TDEC on July 7, 2021.

A. Permit Review

The Town's NPDES permit has an effective date of August 1, 2018, and expires on June 30, 2023. The permit has report-only requirements for flow and concentrations of TN, and TP and sets forth limits on the allowable levels of Total Suspended Solids (TSS), Settleable Solids, carbonaceous biochemical oxygen demand ($CBOD_5$), Total Phosphorus (loading only), NH3-N, Dissolved Oxygen (DO), E. coli, TRC, and pH. The permit also requires continuous monitoring of the STP influent and effluent flow rate.

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 is a list of effluent exceedances from October 2019 through October 2022. ICIS data can be reviewed on the EPA's Enforcement and Compliance History Online (ECHO)[1] public website.

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

C. Flow Measurement

A Parshall flume and ultrasonic flow meter is used to measure influent flow rate. Effluent flow rate is measured using ultrasonic metering device that measures the depth of effluent in the chlorine contact chamber (CCC). The CCC is divided into two independent flow paths of which is selected by the operator and can be operated simultaneously or independently. The effluent ultrasonic transducer is mounted on a galvanized pipe and is manually pivoted to read one CCC depth at a time, (Figure 2). Flow readings are doubled when both paths are being utilized.

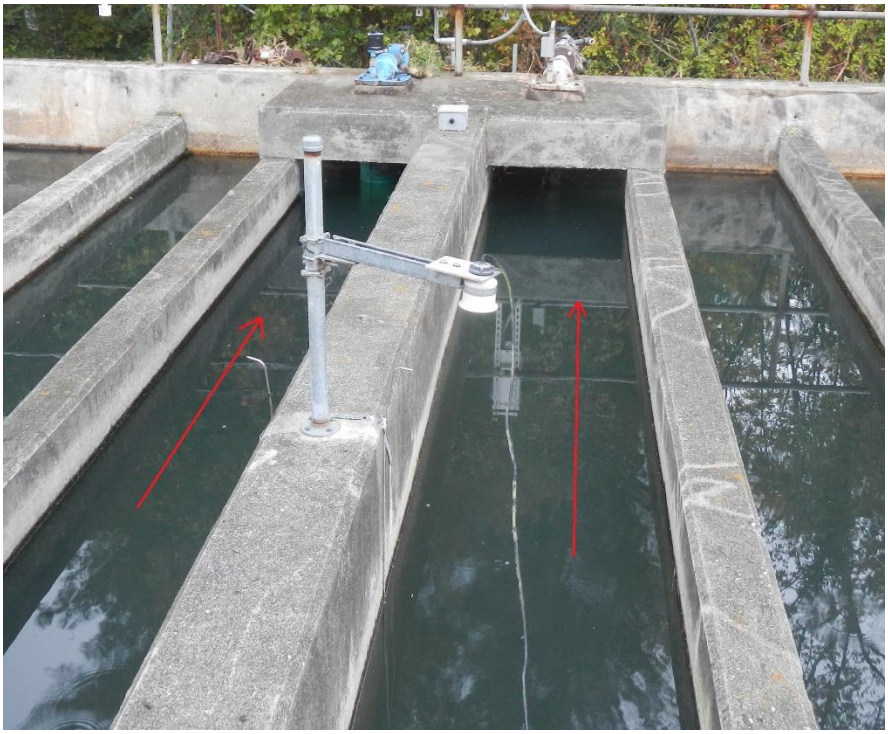

Figure 2. Effluent ultrasonic transducer. Red arrows represent separate Flow paths in the CCC.

D. Sampling

Composite effluent samples are collected at the bottom of the step aeration basin. Two buffered thermometers were located in the refrigeration bin of the composite sampler unit. The composite sampler appeared to be in good condition. The STP operators analyze samples for all pollutants indicated in the NPDES permit with exception of TN and TP. Waypoint Analytical conducts sample analysis for TN and TP.

The EPA reviewed laboratory bench sheets for the month of July 2022 and reviewed the sampling Chain of Custody (COC) sheet for samples collected in December 2021 and July 2022 and subsequent lab reports. No deficiencies were noted.

E. Site Visit (Operation and Maintenance)

The STP utilizes an EQ basin to capture excess wet weather flow. The EQ basin was constructed as part of capital improvements associated with the 2014 Commissioner's Order and appeared to be in good operating condition.

The Headworks consists of a vortex grit removal unit, and a Parshall flume with an ultrasonic meter (Figure 3).

Figure3. Headworks grit removal unit and influent Parshall flume.

The influent appeared to be very thin (void of solids), indicating excessive rain derived infiltration and inflow (RDII) in the sewage collection system.

The mixed liquor suspended solids (MLSS) in the Oxidation Ditch was dark brown and experiencing thick brown foaming that covered approximately 15 to 20% of the surface (Figure 4). Variable drive propeller mixers were installed in 2016 and are used to circulate and aerate the MLSS.

Figure 4. Oxidation Ditch MLSS.

One of the clarifiers was experiencing excessive foaming (Figure 5).

Figure 5. Excessive foaming in Clarifier.

Nutrient removal is achieved by alternating aerobic and anaerobic zones around the oxidation ditch. Continuous DO meters are installed to assist in the process. New DO meters were installed in September/October 2021.

The operator stated that the Return Activated Sludge/Waste Activated Sludge (RAS/WAS) valve is a ¼ turn valve (¼ turn valves fully opens or closes the valve with a 90-degree turn). The type of valve installed does not allow for fine tuning adjustments of RAS which can limit the STP operator's ability to maintain proper concentrations of biomass in the oxidation ditch.

F. Effluent and Receiving Waters

The STP discharges into Poplar Creek. The outfall at the creek was not readily accessible. The effluent was clear, Figure 6.


Figure 6. Left, effluent discharged from CCC. Right, step aeration.

6. Sludge Handling

Sludge is thickened in a sludge digester basin and dewatered using a screw press before hauling to the local landfill.

7. Discussion

Documents provided by TDEC show that the Town has invested at least $7M on collection system rehabilitation, mostly pipe lining, and another $7M on STP rehabilitation in efforts to comply with the Commissioner's Order. The Town's NPDES compliance history has improved significantly since the first calendar quarter following termination of the Commissioner's Order. Table 1 below is a summary of violations taken from Appendix A following termination of the Order. STP rehabilitation appears to have substantially corrected chronic NH3-N and e. coli exceedances, among other effluent violations of the past.

The appearance of the influent suggests that RDII in the collection system is still a significant problem. The use of the EQ basin greatly assists with stabilizing sewage diluted with RDII to the STP, but prolonged RDII diluted influent will eventually impact the performance of the STP. Prolonged RDII diluted influent prompts the operator to maintain older MLSS in the oxidation ditch to make up for the loss of food for the microorganisms, which in turn contributes to thick brown foaming at the surface of the oxidation ditch and in the clarifiers and can also lead to effluent violations of ammonia and suspended solids removal efficiency (such as the violations noted in Table 1 below). Also, treating excessive RDII at the STP increases treatment costs and increases wear and tear on the STP equipment.

The EPA strongly recommends that the Town continue to improve the collection system to remove excess RDII. The EPA also recommends the Town conduct a flow study throughout the sewage collection system, if not already completed or planned, to ascertain where the RDII is coming from following the rehabilitation efforts. Special attention should be given in assessing manhole crowns and sewage laterals.

Measuring effluent flow from an ultrasonic transducer that is not stationary does not provide for a reliable flow reading. The pivot point on the mounting pole will loosen over time and cause the transceiver to tilt and draw closer to the effluent which will impact its accuracy. The EPA recommends adding an additional flow meter to maintain continuous monitoring for both CCC flow paths and replacing the pivoting transducer mount with a permanent/solid mount. The EPA also recommends replacing the ¼ turn RAS/WAS control valve with a multi-turn valve as explained in Section 5.E above.

End of Reporting Month	Wet Weather SSO	Phosphorus (lb/yr)	Ammonia (Daily Max mg/L)	Ammonia (Wk Ave mg/L)	Ammonia (Mo Ave mg/L)	SS % Removal	$CBOD_5$ (Weekly Ave lb/day)
7/31/2021	X	X	X	X	X		
8/31/2021	X	X	X	X			
9/30/2021	X	X	X	X			
12/31/2021		X					X
1/31/2022							
2/28/2022	X						
2/28/2022							
3/31/2022				X	X		
2/28/2022							
7/31/2022	X						X
9/30/2022	X					X	

Table 1. Summary of violations reported from July 1, 2021, through October 31, 2022.

END OF REPORT

Appendix A. List of effluent violations.

Monitoring Period End Date	Parameter Description	Permit Limit Value	DMR Reported Value	Units	Monitoring Frequency	% Exceeded	Violation Severity
10/31/2020	NH3-N	9.3	20.877	lb/d	MO AVG	124	Significant Noncompliance Effluent Violation
12/31/2020	NH3-N	43	66.079	lb/d	MO AVG	54	Significant Noncompliance Effluent Violation
1/31/2021	NH3-N	43	69.423	lb/d	MO AVG	61	Significant Noncompliance Effluent Violation
1/31/2021	NH3-N	7	9.865	mg/L	MO AVG	41	Significant Noncompliance Effluent Violation
7/31/2021	NH3-N	9.3	14.185	lb/d	MO AVG	53	Significant Noncompliance Effluent Violation
7/31/2021	NH3-N	1.5	3.288	mg/L	MO AVG	119	Significant Noncompliance Effluent Violation
8/31/2021	NH3-N	9.3	13.118	lb/d	MO AVG	41	Significant Noncompliance Effluent Violation
1/31/2022	NH3-N	43	67.025	lb/d	MO AVG	56	Significant Noncompliance Effluent Violation
2/28/2022	NH3-N	43	64.155	lb/d	MO AVG	49	Significant Noncompliance Effluent Violation
8/31/2019	Chlorine, total residual	0.08	0.38	mg/L	DAILY MX	375	Significant Noncompliance Effluent Violation
10/31/2019	Chlorine, total residual	0.08	0.16	mg/L	DAILY MX	100	Significant Noncompliance Effluent Violation
11/30/2019	Chlorine, total residual	0.08	0.67	mg/L	DAILY MX	738	Significant Noncompliance Effluent Violation
12/31/2019	Chlorine, total residual	0.08	2.24	mg/L	DAILY MX	2700	Significant Noncompliance Effluent Violation
1/31/2020	Chlorine, total residual	0.08	0.85	mg/L	DAILY MX	963	Significant Noncompliance Effluent Violation

Monitoring Period End Date	Parameter Description	Permit Limit Value	DMR Reported Value	Units	Monitoring Frequency	% Exceeded	Violation Severity
4/30/2020	Chlorine, total residual	0.08	0.95	mg/L	DAILY MX	1088	Significant Noncompliance Effluent Violation
7/31/2020	Chlorine, total residual	0.08	0.31	mg/L	DAILY MX	288	Significant Noncompliance Effluent Violation
1/31/2021	Chlorine, total residual	0.08	0.29	mg/L	DAILY MX	263	Significant Noncompliance Effluent Violation
2/28/2021	Chlorine, total residual	0.08	0.47	mg/L	DAILY MX	488	Significant Noncompliance Effluent Violation
10/31/2020	NH3-N	1.5	1.588	mg/L	MO AVG	6	Noncompliance Effluent Violation
12/31/2020	NH3-N	7	8.646	mg/L	MO AVG	24	Noncompliance Effluent Violation
3/31/2022	NH3-N	43	58.751	lb/d	MO AVG	37	Noncompliance Effluent Violation
3/31/2022	NH3-N	7	8.101	mg/L	MO AVG	16	Noncompliance Effluent Violation
2/29/2020	Nitrogen, total [as N]	30782.8	45538.4	lb/yr	ANNL TOT	48	Noncompliance Effluent Violation
3/31/2020	Nitrogen, total [as N]	30782.8	45156.8	lb/yr	ANNL TOT	47	Noncompliance Effluent Violation
4/30/2020	Nitrogen, total [as N]	30782.8	41547.7	lb/yr	ANNL TOT	35	Noncompliance Effluent Violation
5/31/2020	Nitrogen, total [as N]	30782.8	42744.9	lb/yr	ANNL TOT	39	Noncompliance Effluent Violation
6/30/2020	Nitrogen, total [as N]	30782.8	40476.1	lb/yr	ANNL TOT	31	Noncompliance Effluent Violation
7/31/2020	Nitrogen, total [as N]	30782.8	39781.5	lb/yr	ANNL TOT	29	Noncompliance Effluent Violation
8/31/2020	Nitrogen, total [as N]	30782.8	39140.9	lb/yr	ANNL TOT	27	Noncompliance Effluent Violation
9/30/2020	Nitrogen, total [as N]	30782.8	38658.8	lb/yr	ANNL TOT	26	Noncompliance Effluent Violation
10/31/2020	Nitrogen, total [as N]	30782.8	38628.5	lb/yr	ANNL TOT	25	Noncompliance Effluent Violation
11/30/2020	Nitrogen, total [as N]	30782.8	38121.9	lb/yr	ANNL TOT	24	Noncompliance Effluent Violation
12/31/2020	Nitrogen, total [as N]	30782.8	38048.5	lb/yr	ANNL TOT	24	Noncompliance Effluent Violation

Monitoring Period End Date	Parameter Description	Permit Limit Value	DMR Reported Value	Units	Monitoring Frequency	% Exceeded	Violation Severity
10/31/2020	NH3-N	3	6.94	mg/L	DAILY MX	131	Noncompliance Effluent Violation
10/31/2020	NH3-N	14.2	20.876	lb/d	WKLY AVG	47	Noncompliance Effluent Violation
12/31/2020	NH3-N	62	71.688	lb/d	WKLY AVG	16	Noncompliance Effluent Violation
1/31/2021	NH3-N	62	69.422	lb/d	WKLY AVG	12	Noncompliance Effluent Violation
1/31/2021	NH3-N	15	18.5	mg/L	DAILY MX	23	Noncompliance Effluent Violation
3/31/2021	NH3-N	62	63.677	lb/d	WKLY AVG	3	Noncompliance Effluent Violation
5/31/2021	NH3-N	3	3.13	mg/L	DAILY MX	4	Noncompliance Effluent Violation
6/30/2021	NH3-N	3	3.23	mg/L	DAILY MX	8	Noncompliance Effluent Violation
7/31/2021	NH3-N	2.3	3.0686	mg/L	WKLY AVG	33	Noncompliance Effluent Violation
7/31/2021	NH3-N	3	16.2	mg/L	DAILY MX	440	Noncompliance Effluent Violation
8/31/2021	NH3-N	3	5.71	mg/L	DAILY MX	90	Noncompliance Effluent Violation
8/31/2021	NH3-N	2.3	3.66	mg/L	WKLY AVG	59	Noncompliance Effluent Violation
8/31/2021	NH3-N	14.2	39.71	lb/d	WKLY AVG	180	Noncompliance Effluent Violation
9/30/2021	NH3-N	14.2	21.455	lb/d	WKLY AVG	51	Noncompliance Effluent Violation
9/30/2021	NH3-N	3	8.27	mg/L	DAILY MX	176	Noncompliance Effluent Violation
9/30/2021	NH3-N	2.3	4.196	mg/L	WKLY AVG	82	Noncompliance Effluent Violation
12/31/2021	NH3-N	62	69.506	lb/d	WKLY AVG	12	Noncompliance Effluent Violation
1/31/2022	NH3-N	62	100.536	lb/d	WKLY AVG	62	Noncompliance Effluent Violation
2/28/2022	NH3-N	62	141.9	lb/d	WKLY AVG	129	Noncompliance Effluent Violation

Monitoring Period End Date	Parameter Description	Permit Limit Value	DMR Reported Value	Units	Monitoring Frequency	% Exceeded	Violation Severity
3/31/2022	NH3-N	62	73.039	lb/d	WKLY AVG	18	Noncompliance Effluent Violation
3/31/2022	NH3-N	10	10.73	mg/L	WKLY AVG	7	Noncompliance Effluent Violation
2/29/2020	Phosphorus, total [as P]	4830.2	6302	lb/yr	ROLL AVG	30	Noncompliance Effluent Violation
3/31/2020	Phosphorus, total [as P]	4830.2	5827.9	lb/yr	ROLL AVG	21	Noncompliance Effluent Violation
4/30/2020	Phosphorus, total [as P]	4830.2	6298.9	lb/yr	ROLL AVG	30	Noncompliance Effluent Violation
5/31/2020	Phosphorus, total [as P]	4830.2	6566	lb/yr	ROLL AVG	36	Noncompliance Effluent Violation
6/30/2020	Phosphorus, total [as P]	4830.2	6007.9	lb/yr	ROLL AVG	24	Noncompliance Effluent Violation
7/31/2020	Phosphorus, total [as P]	4830.2	5771.4	lb/yr	ROLL AVG	19	Noncompliance Effluent Violation
8/31/2020	Phosphorus, total [as P]	4830.2	5793.2	lb/yr	ROLL AVG	20	Noncompliance Effluent Violation
9/30/2020	Phosphorus, total [as P]	4830.2	5854.4	lb/yr	ROLL AVG	21	Noncompliance Effluent Violation
10/31/2020	Phosphorus, total [as P]	4830.2	6176	lb/yr	ROLL AVG	28	Noncompliance Effluent Violation
11/30/2020	Phosphorus, total [as P]	4830.2	6002.4	lb/yr	ROLL AVG	24	Noncompliance Effluent Violation
12/31/2020	Phosphorus, total [as P]	4830.2	6131.8	lb/yr	ROLL AVG	27	Noncompliance Effluent Violation
1/31/2021	Phosphorus, total [as P]	4830.2	5762.8	lb/yr	ROLL AVG	19	Noncompliance Effluent Violation
4/30/2021	Phosphorus, total [as P]	4830.2	5233.8	lb/yr	ROLL AVG	8	Noncompliance Effluent Violation
5/31/2021	Phosphorus, total [as P]	4830.2	53984	lb/yr	ROLL AVG	1018	Noncompliance Effluent Violation
6/30/2021	Phosphorus, total [as P]	4830.2	5010	lb/yr	ROLL AVG	4	Noncompliance Effluent Violation
7/31/2021	Phosphorus, total [as P]	4830.2	5044.9	lb/yr	ROLL AVG	4	Noncompliance Effluent Violation
8/31/2021	Phosphorus, total [as P]	4830.2	5074.2	lb/yr	ROLL AVG	5	Noncompliance Effluent Violation
9/30/2021	Phosphorus, total [as P]	4830.2	4859.5	lb/yr	ROLL AVG	1	Noncompliance Effluent Violation
12/31/2021	Phosphorus, total [as P]	4830.2	5146.1	lb/yr	ROLL AVG	7	Noncompliance Effluent Violation
10/31/2019	E. coli	941	2419.6	#/100mL	DAILY MX	157	Noncompliance Effluent Violation

Monitoring Period End Date	Parameter Description	Permit Limit Value	DMR Reported Value	Units	Monitoring Frequency	% Exceeded	Violation Severity
11/30/2019	E. coli	941	1119.9	#/100mL	DAILY MX	19	Noncompliance Effluent Violation
11/30/2020	E. coli	941	1011.2	#/100mL	DAILY MX	7	Noncompliance Effluent Violation
12/31/2021	BOD5	154	183.4	lb/d	WKLY AVG	19	Noncompliance Effluent Violation
2/28/2022	BOD5	154	182	lb/d	WKLY AVG	18	Noncompliance Effluent Violation
4/30/2021	CBOD, % removal	40	21.1	%	DAILY MN	32	Noncompliance Effluent Violation
10/31/2019	Solids, suspended % removal	40	**-40**	%	DAILY MN	133	Noncompliance Effluent Violation
11/30/2019	Solids, suspended % removal	40	**-33.3**	%	DAILY MN	122	Noncompliance Effluent Violation
12/31/2019	Solids, suspended % removal	40	**-30.4**	%	DAILY MN	117	Noncompliance Effluent Violation
9/30/2021	Solids, suspended % removal	40	20	%	DAILY MN	33	Noncompliance Effluent Violation
12/31/2019	SSO, Dry Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
7/31/2019	SSO, Wet Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
10/31/2019	SSO, Wet Weather	0	2	occur/mo	MO TOTAL		Noncompliance Effluent Violation
12/31/2019	SSO, Wet Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
3/31/2021	SSO, Wet Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
5/31/2021	SSO, Wet Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
7/31/2021	SSO, Wet Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
8/31/2021	SSO, Wet Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
9/30/2021	SSO, Wet Weather	0	3	occur/mo	MO TOTAL		Noncompliance Effluent Violation
2/28/2022	SSO, Wet Weather	0	2	occur/mo	MO TOTAL		Noncompliance Effluent Violation
7/31/2022	SSO, Wet Weather	0	1	occur/mo	MO TOTAL		Noncompliance Effluent Violation
9/30/2022	SSO, Wet Weather	0	1	occur/mo	MO TOTAL		Noncompliance Effluent Violation