

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-TN0060186 -101322

Huntsville-Helenwood STP
377 Fire Department Lane
Helenwood, Tennessee, 37755
NPDES Permit Number: TN0060186
Date of Inspection: October 13, 2022

Title and Approval Sheet

Title: Compliance Evaluation Inspection Town of Huntsville, Huntsville-Helenwood STP

Approving Official:

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COMPLIANCE EVALUATION INSPECTION REPORT
Huntsville-Helenwood STP

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1. Introduction

On October 13, 2022, representatives of the United States Environmental Protection Agency and Tennessee Department of Environment and Conservation (TDEC) conducted a Compliance Evaluation Inspection (CEI) on the Huntsville-Helenwood Sewage Treatment Plant (STP), owned and operated by the Town of Huntsville (Town). 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
Danny Phillips	STP Class III Operator	423-663-3471
Jonathan Storey	STP Operator	423-663-3471
Brett Ward	Municipal Technical Advisory Service, Utility Operations Consultant	423-836-3192

3. Facility Description

The STP is a Schreiber Continuously Sequencing Reactor (Schreiber CSR) with an average design flow of 0.2 million gallons per day (MGD). The Schreiber CSR is a Biological Nutrient Removal (BNR) system contained in a single basin¹. It produces the three process phases required for BNR - oxic, anoxic and anaerobic - in one basin, performed sequentially and repetitively over time. The STP is configured with an influent pump station, a headworks structure that contains a Parshall flume and ultrasonic flow meter to measure influent flow, two CSRs, a sludge digester basin, an equalization basin to capture excess wet weather flow, and related appurtenances, (Figure 1). Disinfection is achieved using an ultra-violet light system. The STP serves the unincorporated community of Helenwood, Tennessee.

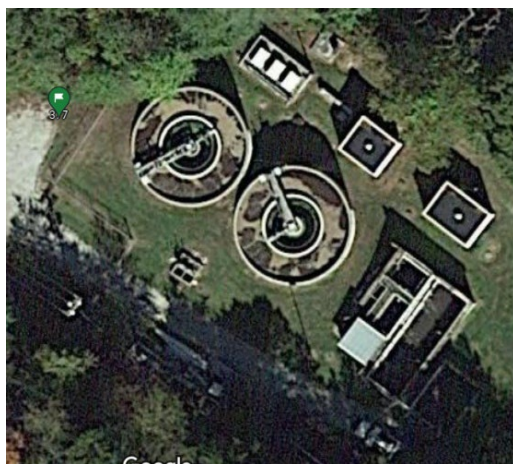


Figure 1: Aerial Display of the STP

¹ <https://www.parkson.com/products/schreiber-csr>

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4. Inspection 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 conducting interviews with STP staff, reviewing Discharge Monitoring Reports (DMRs) and other STP records, and conduct a site visit throughout the STP.

5. Findings & Conclusions

The Town has been in Significant Non-Compliance (SNC) for 5 of the past 12 calendar quarters, primarily due to Ammonia (as Nitrogen) (NH₃-N) exceedances. The Town has also been in non-compliance with several other permit effluent limits as noted Appendix 1, which includes exceedances in E.coli, Dissolved Oxygen (DO), Total Suspended Solids (TSS), and Settleable Solids (SS). The STP is generally in good condition but has non-operational critical components that limit the ability to maintain quality effluent. The Town has acquired \$1.2M in grant funding from the Appalachian Regional Commission (ARC) to address STP deficiencies.

A. Permit Review

The Town's National Pollutant Discharge Elimination System (NPDES) permit has an effective date of August 1, 2019, and expires on July 31, 2024. The permit has report-only requirements for flow, Total Nitrogen, and Total Phosphorus and sets forth limits on the allowable levels of TSS, SS, carbonaceous biological oxygen demand (CBOD₅), NH₃-N, DO, E. coli, and pH. The permit also requires continuous monitoring of the STP effluent flow.

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 July 2019 through July 2022. ICIS data can be reviewed on the EPA's Compliance History Online (ECHO)² public website.

C. Flow Measurement

A Parshall flume and ultrasonic flow meter is used to measure influent flow rates. The inflow measured 157.92 gallons per minute (instantaneous) or approximately 0.227 MGD at the time of inspection, which is approximately 13.5% above the STPs average design flow. The ultrasonic flow meter was calibrated on April 23, 2022. The STP does not have a flow measuring device to measure the effluent flow rate. Influent flow rate is currently being reported as effluent flow rate.

² <https://echo.epa.gov>

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D. Sampling

Composite samples are collected using the proportional-to-flow method. The composite sampler appeared to be in good condition.

The EPA reviewed the sampling Chain of Custody (COC) sheet for samples collected in February and April 2022 and subsequent lab reports. Samples for Total Nitrogen and Phosphorous are analyzed by Waypoint Analytical. No deficiencies were noted.

The STP operators perform analytical laboratory analysis on all other pollutants (pH, DO, settleable solids, CBOD₅, and ammonia and E. coli) using lab equipment at the facility or at the Huntsville STP (the Town's other STP). There are no COCs maintained for in-house sampling.

Calibration logs were maintained on-site. Sampling buffers were within the expiration date.

E. Site Visit (Operation and Maintenance)

The STP utilized an EQ basin to capture excess wet weather flow. The EQ basin appeared to be in good operating condition.

The influent pump was non-operational. Flow was being pumped from the influent pump wet well using a portable pump. The pumps are being serviced under warranty.

The influent appeared to be very thin (void of solids), indicating excessive rain derived infiltration and inflow (RDII) in the sewage collection system, (Picture 1).



Picture 1. Influent stream.

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The mixed liquor suspended solids (MLSS) in both Schreiber CSR basins was light brown in color and appeared to be very thin (Picture 2).



Picture 2. Thin MLSS in outer aeration basin.

One of three aerators was non-operational.

The Return Activated Sludge (RAS) system was degraded or non-operational. Post inspection communication with the STP lead operator indicates that the RAS system deficiency has been corrected.

F. Effluent and Receiving Waters

The STP's effluent appeared clear. The effluent flow rate at the time of was minimal (Picture 3).



Picture 3. Effluent discharge.

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The STP discharges into Phillips Creek. The outfall at the creek was not readily accessible.

G. Sludge Handling

Sludge from the STP is hauled to the Huntsville STP for processing. Sludge records are maintained at the Huntsville STP.

6. Discussion

A Director's Order (Case No. WPC22-0053) was issued to the Town on August 8, 2022, that directs the Town to submit a Corrective Action Plan/Engineering Report (CAP/ER) to TDEC that provides plans eliminate effluent limit exceedances. The final compliance date for the Director's Order is to be proposed by the Town in the CAP/ER. The CAP/ER is due to TDEC for review and approval on or about November 8, 2022.

The thin MLSS can be attributed to two critical elements. First, an inadequate RAS circulation will degrade the MLSS food to mass (or food to microorganism (F/M)) ratio which can result in effluent exceedances. Second, the low solids content of the influent also degrades the MLSS F/M ratio. Adequate F/M ratio cannot be achieved in an activated sludge process if the RAS system is degraded. Correcting the RAS system should help in achieving adequate F/M ratio. However, a prolonged low solids content in the influent will severely degrade the overall F/M ratio in the treatment process, affecting the treatment efficiency of the plant, which leads to effluent violations of N-NH₃, TSS, solids % removal, and settleable solids as shown in Appendix A. Low solids content in the influent is indicative of excessive RDII in the sanitary sewer collection system. The EPA recommends that the Town evaluate the sewer system for defects and make the necessary corrections to decrease the RDII being transmitted to the STP.

Accurate flow measurement at the effluent is critical in calculating percentage removal of solids. Section 1.1 of the NPDES permit requires that effluent flow be continuously measured. The Town must install a continuous flow metering device to measure STP effluent flow rates.

The Town must maintain sampling records (as example, the COC sheets used by Waypoint Analytical) for in-house sampling in accordance with Section 1.2.4. (Recording of Results) of the NPDES permit. Section 1.2.4 states:

“For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The exact place, date and time of sampling or measurements;
- b. The exact person(s) collecting samples or measurements;
- c. The dates and times the analyses were performed;
- d. The person(s) or laboratory who performed the analyses;
- e. The analytical techniques or methods used, and;
- f. The results of all required analyses.”

END OF REPORT

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Appendix A. List of effluent violations.

Parameter Description	Permit Limit Value	Monitoring Frequency	Monitoring Period	Reported Value	% Over Limit
E. coli	941 MPN/100mL	Daily Max	2/29/2020	2419.6 MPN/100mL	157%
E. coli	941 MPN/100mL	Daily Max	3/31/2020	1046.2 MPN/100mL	11%
E. coli	941 MPN/100mL	Daily Max	8/31/2020	2419.6 MPN/100mL	157%
E. coli	941 MPN/100mL	Daily Max	9/30/2020	2419.6 MPN/100mL	157%
E. coli	941 MPN/100mL	Daily Max	11/30/2020	1119.9 MPN/100mL	19%
E. coli	941 MPN/100mL	Daily Max	1/31/2022	2419.6 MPN/100mL	157%
E. coli	941 MPN/100mL	Daily Max	2/28/2022	2419.6 MPN/100mL	157%
E. coli	941 MPN/100mL	Daily Max	5/31/2022	2419.6 MPN/100mL	157%
E. coli	941 MPN/100mL	Daily Max	7/31/2022	2419.6 MPN/100mL	157%
E. coli	126 MPN/100mL	MO GEO MN	2/28/2022	870.9 MPN/100mL	591%
Ammonia (NH3-N)	3 mg/L	Daily Max	10/31/2021	9.5 mg/L	217%
Ammonia (NH3-N)	5 mg/L	Daily Max	12/31/2021	5.3 mg/L	6%
Ammonia (NH3-N)	5 mg/L	Daily Max	1/31/2022	8.8 mg/L	76%
Ammonia (NH3-N)	5 mg/L	Daily Max	2/28/2022	6.9 mg/L	38%
Ammonia (NH3-N)	4 lb/d	MO AVG	1/31/2022	5.8 lb/d	45%
Ammonia (NH3-N)	4 lb/d	MO AVG	2/28/2022	4.9 lb/d	23%
Ammonia (NH3-N)	1 mg/L	MO AVG	7/31/2020	1.7 mg/L	70%
Ammonia (NH3-N)	1 mg/L	MO AVG	10/31/2020	1.1 mg/L	10%
Ammonia (NH3-N)	1 mg/L	MO AVG	6/30/2021	1.2 mg/L	20%
Ammonia (NH3-N)	1 mg/L	MO AVG	10/31/2021	3.5 mg/L	250%
Ammonia (NH3-N)	2.4 mg/L	MO AVG	12/31/2021	3.1 mg/L	29%
Ammonia (NH3-N)	2.4 mg/L	MO AVG	1/31/2022	5.4 mg/L	125%
Ammonia (NH3-N)	2.4 mg/L	MO AVG	2/28/2022	3.9 mg/L	63%
Ammonia (NH3-N)	1 mg/L	MO AVG	5/31/2022	1.8 mg/L	80%
Ammonia (NH3-N)	1 mg/L	MO AVG	6/30/2022	1.4 mg/L	40%
Ammonia (NH3-N)	1 mg/L	MO AVG	7/31/2022	1.3 mg/L	30%
Ammonia (NH3-N)	6 lb/d	WKLY AVG	2/29/2020	6.9 lb/d	15%
Ammonia (NH3-N)	3 lb/d	WKLY AVG	10/31/2020	4.3 lb/d	43%
Ammonia (NH3-N)	3 lb/d	WKLY AVG	10/31/2021	5.1 lb/d	70%
Ammonia (NH3-N)	6 lb/d	WKLY AVG	12/31/2021	8.2 lb/d	37%
Ammonia (NH3-N)	6 lb/d	WKLY AVG	1/31/2022	13.3 lb/d	122%
Ammonia (NH3-N)	6 lb/d	WKLY AVG	2/28/2022	8.3 lb/d	38%
Ammonia (NH3-N)	3.75 mg/L	WKLY AVG	1/31/2020	4.2 mg/L	12%
Ammonia (NH3-N)	1.5 mg/L	WKLY AVG	7/31/2020	2.9 mg/L	93%
Ammonia (NH3-N)	1.5 mg/L	WKLY AVG	10/31/2020	2.4 mg/L	60%
Ammonia (NH3-N)	1.5 mg/L	WKLY AVG	6/30/2021	1.6 mg/L	7%
Ammonia (NH3-N)	1.5 mg/L	WKLY AVG	10/31/2021	9.5 mg/L	533%
Ammonia (NH3-N)	3.75 mg/L	WKLY AVG	12/31/2021	5.3 mg/L	41%

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Parameter Description	Permit Limit Value	Monitoring Frequency	Monitoring Period	Reported Value	% Over Limit
Ammonia (NH3-N)	3.75 mg/L	WKLY AVG	1/31/2022	8.8 mg/L	135%
Ammonia (NH3-N)	3.75 mg/L	WKLY AVG	2/28/2022	6.9 mg/L	84%
Ammonia (NH3-N)	3.75 mg/L	WKLY AVG	4/30/2022	4.2 mg/L	12%
Ammonia (NH3-N)	1.5 mg/L	WKLY AVG	5/31/2022	3 mg/L	100%
Ammonia (NH3-N)	1.5 mg/L	WKLY AVG	6/30/2022	2.4 mg/L	60%
Ammonia (NH3-N)	1.5 mg/L	WKLY AVG	7/31/2022	2.8 mg/L	87%
Oxygen, dissolved [DO]	6 mg/L	MIN	7/31/2020	5.5 mg/L	8%
Oxygen, dissolved [DO]	6 mg/L	MIN	8/31/2021	5.8 mg/L	3%
Oxygen, dissolved [DO]	6 mg/L	MIN	2/28/2022	5.9 mg/L	2%
Solids, settleable	1 mL/L	Daily Max	10/31/2019	1.5 mL/L	50%
Solids, settleable	1 mL/L	Daily Max	6/30/2020	2 mL/L	100%
Solids, settleable	1 mL/L	Daily Max	8/31/2020	3 mL/L	200%
Solids, suspended	85 %	MO AV MIN	2/28/2022	81.6 %	23%
Solids, total suspended	45 mg/L	Daily Max	2/28/2022	52 mg/L	16%
Solids, total suspended	67 lb/d	WKLY AVG	2/28/2022	102.3 lb/d	53%
Solids, total suspended	40 mg/L	WKLY AVG	2/28/2022	52 mg/L	30%