

LSASD Project ID: 24-0278

Kingsport Sewage Treatment Plant

NPDES Compliance Sampling Inspection

**Location: 620 West Industry Drive,
Kingsport, Sullivan County, Tennessee**

Project Date(s): August 7th - 8th, 2024

Report Date: October 17th, 2024



Project Leader: Chris McHugh

Water Quality Section

Field Services Branch

Laboratory Services & Applied Science Division

USEPA – Region 4

980 College Station Road

Athens, Georgia 30605-2720

LSASD
LABORATORY SERVICES & APPLIED SCIENCE DIVISION

Project Requestor:

Jairo Castillo, P.E.
Section Chief
Wastewater Enforcement Section
Enforcement and Compliance Assurance Division
U.S. Environmental Protection Agency
61 Forsyth Street, SW
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404.562.9756 (office)

Analytical Support:

LSASD ASB Inorganic Chemistry Section
980 College Station Rd. Athens, GA 30605

Approvals:

Chris McHugh, Inspector
Water Quality Section
Field Services Branch

Date

Approving Officials:

Pete Kalla, Technical Reviewer
Water Quality Section
Field Services Branch

Date

Greg White, Supervisor
Water Quality Section
Field Services Branch

Date

Jairo Castillo, P.E., Supervisor
Wastewater Enforcement Section
Water Enforcement Branch

Date

1. Introduction

On August 7th-8th, 2024, staff of the United States Environmental Protection Agency (EPA) Region 4, Laboratory Services and Applied Science Division (LSASD), conducted a National Pollutant Discharge Elimination System (NPDES) Compliance Sampling Inspection (CSI) at the Kingsport Sewage Treatment Plant (STP) in Kingsport, Tennessee. The inspection was conducted under the authority of Section 308 of the Clean Water Act (CWA), as amended, and followed the procedures listed in the LSASD Project No. 24 – 0278 Sample and Analysis Plan (SAP). This report presents the results of the inspection. Table 1 lists the sampling participants and facility staff.

Table 1 – Inspection Personnel

Name	Organization	Date on Site	Contact Info
Chris McHugh	EPA Region 4 LSASD Inspection	08/07-08/2024	mchugh.christopher@epa.gov

2. Inspection Procedures

The objective of this inspection was to evaluate the condition of the STP and the permittee's self-monitoring program and offer compliance assistance as needed. Specific tasks included conducting an opening conference, interviewing facility staff, conducting a facility walkthrough, conducting records review, collecting a 24-hour effluent composite sample, observing the receiving waters, and conducting a closing conference.

3. EPA Sampling Results

A 24-hr effluent composite sampler was set-up at the effluent outfall. Samples were collected based on time composite due to the inability to set up a secondary ultrasonic flow meter on the facility's split flow rectangular finger weirs. The composite sample results are described in Table 2.

Table 2 – EPA Sampling Analytical Results

Analyte	EPA Analytical Results	Permitted Limit	Sample Location	Sample Date Time
Total Suspended Solids (TSS)	5.0 mg/L *U	≤ 45 mg/L Daily Max	EFF001	8/8/24 1410
BOD ₅	11.0 mg/L *A	≤ 45 mg/L Daily Max	EFF001	8/8/24 1410
NH ₃ as N	20 mg/L	NA, used to calculate Total Nitrogen	EFF001	8/8/24 1410
Total Kjeldahl Nitrogen (TKN)	22 mg/L	NA, used to calculate Total Nitrogen	EFF001	8/8/24 1410
Nitrate/Nitrite	0.081 mg/L	NA, used to calculate Total Nitrogen	EFF001	8/8/24 1410
Total Nitrogen	42.081 mg/L* calculated sum of NH ₃ , TKN, Nitrate/Nitrite	Report only mg/L	EFF001	8/8/24 1410
Total Phosphorus	2.7 mg/L	Report only mg/L	EFF001	8/8/24 1410
pH	7.24 S.U.	6.0 S.U. < pH < 9.0	EFF001	8/8/24 1414
Dissolved Oxygen (DO)	6.49 mg/L	≥ 1.0 mg/L Instantaneous Min	EFF001	8/8/24 1414

*A - The analyte was analyzed in replicate. Reported value is an average value of the replicates.

*U - The analyte was not detected at or above the reporting limit.

4. Facility Description

Kingsport STP is an activated sludge treatment plant (Figure 1) that has coarse bar screens and vortex grit removal followed by 3 rectangular primary clarifiers. It uses a repurposed final clarifier from the original plant as an intermediate polishing clarifier before flow is sent to the aeration basins. There are 4 final clarifiers after aeration. Following clarification, flow is directed into 2 channels for ultraviolet (UV) disinfection before discharging over 2 separate rectangular finger

weirs. Flow is combined after disinfection for final discharge via effluent outfall 001 into South Fork Holston. The original trickling filter equipment is still onsite and will be decommissioned at some point when the facility expands its treatment capacity. Waste sludge is thickened, dewatered, and sent to an anaerobic digester.

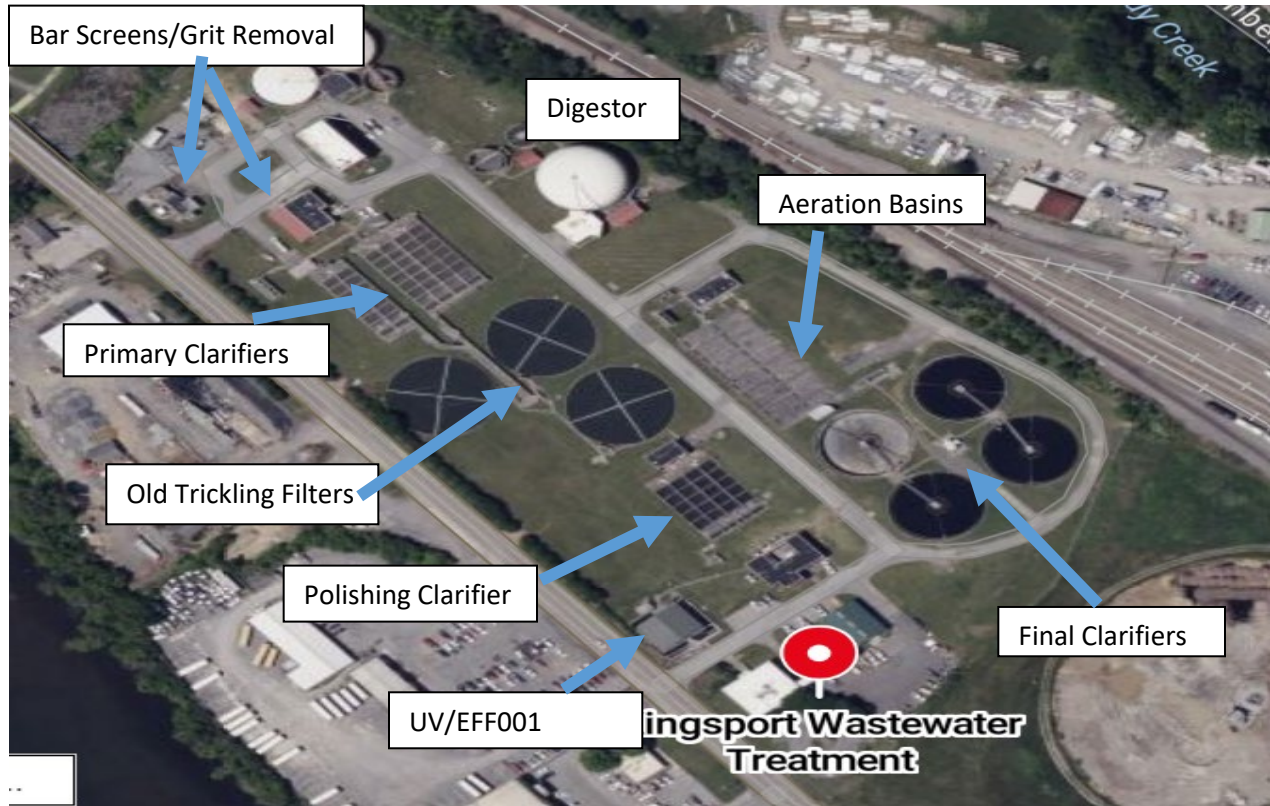


Figure 1 – Facility Aerial View

5. NPDES Permit

The facility's National Pollutant Discharge Elimination (NPDES) permit number TN0020095 was issued (renewed) by the State of Tennessee on January 1st, 2024, and expires on December 31st, 2028. The City of Kingsport is authorized to discharge treated municipal wastewater from Outfall 001 to South Fork Holston mile 2.2 from a treatment facility with a design capacity of 12.4 MGD. The permit includes effluent limits for Total Suspended Solids (TSS), 5-day Biochemical Oxygen Demand (BOD₅), Settable Solids, pH, Dissolved Oxygen (DO), Total Ammonia Nitrogen, Total Phosphorus, and E. coli.

6. Records and Reports

I. Discharge Monitoring Reports (DMR) Review

The facility has several violations listed for E. coli and SSO Dry Weather and SSO Wet Weather over the last 12 quarters.

II. Records Review

The facility maintains all its discharge monitoring reports and analytical records onsite and had at least 3 years of DMR records and 5 years of sludge records available.

III. Flow Measurement

The facility uses 2 rectangular finger weirs and ultrasonic flow meters to measure and record effluent flow rate for the two effluent discharge channels from the parallel UV disinfection channels. Both ultrasonic flow meters were last calibrated in June 2024. Due to the dual channel finger notch weirs, there was no practical method to accurately conduct an instantaneous flow check with the equipment brought to the inspection.

The facility maintains its annual calibration records for its influent and effluent flow meters.

IV. Sampling Review

The facility collects and analyzes 24-hr flow-based composite samples for its permit listed parameters as specified in the NPDES Permit TN0020095.

7. Operation and Maintenance

The facility is operating and working to maintain its treatment units to meet its NPDES permit requirements. In June 2024, the facility conducted a nutrient optimization study to evaluate ways to reduce nutrient removal for the plant under the Tennessee Nutrient Plant Optimization Program (TNPOP)

8. Effluent and Receiving Waters

The effluent discharge was clear and free of any excessive foam in the receiving stream.

9. Discussions and Findings

The following are recommendations based on the inspection:

- The facility should continue repairing the grit removal system to reduce floating grit in the aeration basin.
- Based on the Total Nitrogen of 42.081 mg/L from the 24-hr composite sample, the steps provided in the Tennessee Plant Optimization Program should help the STP enhance its biological nutrient removal.

Appendices

EPA Sample Analytical Results (TSS and Nutrients) – 10 Pages

EPA Sample Analytical Results (BOD₅) – 7 Pages

End of Report



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 4 Laboratory Services and Applied Science Division

980 College Station Road, Athens, Georgia 30605-2700

D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

August 23, 2024

MEMORANDUM

SUBJECT: FINAL Analytical Report
Project: 24-0278, Kingsport STP CSI

FROM: Kristin Trapp
LSB Inorganic Chemistry Section Chief

THRU: Stacie Masters, Chief
Laboratory Services Branch

TO: Asher Sampong

Attached are the final results for the analytical groups listed below. This report shall not be reproduced except in full without approval of the Region 4 laboratory. These analyses were performed in accordance with the Laboratory Services Branch's Laboratory Operations and Quality Assurance Manual (LSB LOQAM) found at www.epa.gov/region4/sesd/asbsop. Any unique project data quality objectives specified in writing by the data requestor have also been incorporated into the data unless otherwise noted in the Report Narrative. Chemistry data have been verified based on the LSB LOQAM specifications and have been qualified by this laboratory if the applicable quality control criteria were not met. Verification is defined in Chapter 5 of the LSB LOQAM. For a listing of specific data qualifiers and explanations, please refer to the Data Qualifier Definitions included in this report. The reported results are accurate within the limits of the method(s) and are representative only of the samples as received by the laboratory.

Analyses Included in this report:

Method Used:

Accreditations:

Classical/Nutrient Analyses (CNA)

Demand

SM 5210B (Water)

ISO



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Sample Disposal Policy

Due to limited space for long term sample storage, LSB's policy is to dispose of samples on a periodic schedule. Air samples collected in summa canisters will be disposed of 30 days following the issuance of this report. All other sample media including original samples, sample extracts and or digestates will be disposed of, in accordance with applicable regulations, 60 days from the date of this report.

This sample disposal policy does not apply to criminal samples which are held until the laboratory is notified by the criminal investigators that case development and litigation are complete.

These samples may be held in the laboratory's custody for a longer period of time. If samples require storage beyond the 60-day period, please contact the Sample Control Coordinator by e-mail at R4SampleCustody@epa.gov.



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SAMPLES INCLUDED IN THIS REPORT

Project: 24-0278, Kingsport STP CSI

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
24-0278-0001	E243205-01	Wastewater	8/8/24 14:10	8/9/24 9:07



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DATA QUALIFIER DEFINITIONS

A The analyte was analyzed in replicate. Reported value is an average value of the replicates.

ACRONYMS AND ABBREVIATIONS

CAS Chemical Abstracts Service

Note: Analytes with no known CAS identifiers have been assigned codes beginning with "E", the EPA ID as assigned by the EPA Substance Registry System (www.epa.gov/srs), or beginning with "R4-", a unique identifier assigned by the EPA Region 4 laboratory.

MDL Method Detection Limit - The minimum concentration of a substance (an analyte) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero.

MRL Minimum Reporting Limit - Analyte concentration that corresponds to the lowest demonstrated level of acceptable quantitation. The MRL is sample-specific and accounts for preparation weights and volumes, dilutions, and moisture content of soil/sediments.

TIC Tentatively Identified Compound - An analyte identified based on a match with the instrument software's mass spectral library. A calibration standard has not been analyzed to confirm the compound's identification or the estimated concentration reported.

ACCREDITATIONS:

ISO Accredited to ISO/IEC 17025:2017 and accreditation requirements for Forensic Science Testing Laboratories.

Refer to the certificate and scope of accreditation AT-2628 at:

<https://www.epa.gov/aboutepa/about-region-4s-laboratory-services-and-applied-science-division-lsasd>

NR Not accredited for this test.

DW Accredited for conformance with ISO/IEC 17025:2017 and testing elements in the Fifth Edition of the Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-R-05-004, 2005.

Refer to the certificate and scope of accreditation AT-2628 at:

<https://www.epa.gov/aboutepa/about-region-4s-laboratory-services-and-applied-science-division-lsasd>

ISO/DW Accredited to ISO/IEC 17025:2017 and accreditation requirements for Forensic Science Testing Labs, and conformance with ISO/IEC 17025:2017 and testing elements in the Manual for the Certification of Laboratories Analyzing Drinking Water.



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D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

Classical/Nutrient Analyses

Project: 24-0278, Kingsport STP CSI

Sample ID: 24-0278-0001

Lab ID: E243205-01

Station ID: EFF001

Matrix: Wastewater

Date Collected: 8/8/24 14:10

<i>CAS Number</i>	<i>Analyte</i>	<i>Results</i>	<i>Qualifiers</i>	<i>Units</i>	<i>MRL</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Method</i>
E1640606	BOD, 5 Day	11	A	mg/L	2.0	8/09/24 12:15	8/14/24 10:30	SM 5210B



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Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

Classical/Nutrient Analyses (CNA) - Quality Control

US-EPA, Region 4, LSASD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2408023 - C SM5210 BOD

Blank (2408023-BLK1)

Prepared: 08/09/24 Analyzed: 08/14/24

SM 5210B

BOD, 5 Day	U	2.0	mg/L							U
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LCS (2408023-BS1)

Prepared: 08/09/24 Analyzed: 08/14/24

SM 5210B

BOD, 5 Day	191.50	2.0	mg/L	198.00		96.7	84.6-115.4			A
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Notes and Definitions for QC Samples

- U The analyte was not detected at or above the reporting limit.
- A The analyte was analyzed in replicate. Reported value is an average value of the replicates.



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Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

September 5, 2024

MEMORANDUM

SUBJECT: FINAL Analytical Report
Project: 24-0278, Kingsport STP CSI

FROM: Kristin Trapp
LSB Inorganic Chemistry Section Chief

THRU: Stacie Masters, Chief
Laboratory Services Branch

TO: Asher Sampong

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Analyses Included in this report:

Method Used:

Accreditations:

Classical/Nutrient Analyses (CNA)

Ammonia as N	EPA 350.1 (Water)	ISO
Ammonia/TKN	EPA 351.2 (Water)	ISO
Nitrate and/or Nitrite	EPA 353.2 (Water)	ISO/DW
Phosphorous	EPA 365.1 (Water)	ISO
Solids	USGS I-3765-85 (Water)	ISO



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D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

SAMPLES INCLUDED IN THIS REPORT

Project: 24-0278, Kingsport STP CSI

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
24-0278-0001	E243205-01	Wastewater	8/8/24 14:10	8/9/24 9:07



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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980 College Station Road, Athens, Georgia 30605-2700

D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

DATA QUALIFIER DEFINITIONS

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D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

Classical/Nutrient Analyses

Project: 24-0278, Kingsport STP CSI

Sample ID: 24-0278-0001

Lab ID: E243205-01

Station ID: EFF001

Matrix: Wastewater

Date Collected: 8/8/24 14:10

<i>CAS Number</i>	<i>Analyte</i>	<i>Results</i>	<i>Qualifiers</i>	<i>Units</i>	<i>MRL</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Method</i>
7664-41-7	Ammonia as N	20		mg/L	0.50	8/09/24 10:52	8/12/24 14:18	EPA 350.1
E17148461	Total Kjeldahl Nitrogen	22		mg/L	0.50	8/12/24 10:08	8/20/24 12:25	EPA 351.2
E701177	Nitrate/Nitrite as N	0.081		mg/L	0.050	8/26/24 10:06	8/26/24 11:45	EPA 353.2
7723-14-0	Total Phosphorus	2.7		mg/L	0.050	8/14/24 16:40	8/15/24 14:49	EPA 365.1
E1642818	Total Suspended Solids	5.0	U	mg/L	5.0	8/13/24 9:07	8/13/24 9:07	USGS I-3765-85



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Classical/Nutrient Analyses (CNA) - Quality Control

US-EPA, Region 4, LSASD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2407074 - C 350.1 Ammonia

Blank (2407074-BLK1)

Prepared: 08/09/24 Analyzed: 08/12/24

EPA 350.1

Ammonia as N	U	0.050	mg/L							U
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LCS (2407074-BS1)

Prepared: 08/09/24 Analyzed: 08/12/24

EPA 350.1

Ammonia as N	1.0100	0.050	mg/L	1.0000		101	90-110			
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Matrix Spike (2407074-MS3)

Source: E243205-01

Prepared: 08/09/24 Analyzed: 08/12/24

EPA 350.1

Ammonia as N	2.8920		mg/L	1.0000	1.9700	92.2	90-110			
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Matrix Spike Dup (2407074-MSD3)

Source: E243205-01

Prepared: 08/09/24 Analyzed: 08/12/24

EPA 350.1

Ammonia as N	2.9430		mg/L	1.0000	1.9700	97.3	90-110	1.75	10	
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MRL Verification (2407074-PS1)

Prepared: 08/09/24 Analyzed: 08/12/24

EPA 350.1

Ammonia as N	0.051000	0.050	mg/L	0.050000		102	70-130			MRL-2
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Batch 2408018 - C 351.2 TKN

Blank (2408018-BLK1)

Prepared: 08/12/24 Analyzed: 08/20/24

EPA 351.2

Total Kjeldahl Nitrogen	U	0.050	mg/L							U
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LCS (2408018-BS1)

Prepared: 08/12/24 Analyzed: 08/20/24

EPA 351.2

Total Kjeldahl Nitrogen	1.3650	0.050	mg/L	1.4600		93.5	90-110			
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Matrix Spike (2408018-MS1)

Source: E243205-01

Prepared: 08/12/24 Analyzed: 08/20/24

EPA 351.2

Total Kjeldahl Nitrogen	22.350	0.50	mg/L	1.0000	21.890	46.0	90-110			XM-1
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Matrix Spike Dup (2408018-MSD1)

Source: E243205-01

Prepared: 08/12/24 Analyzed: 08/20/24

EPA 351.2

Total Kjeldahl Nitrogen	22.450	0.50	mg/L	1.0000	21.890	56.0	90-110	0.446	20	XM-1
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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980 College Station Road, Athens, Georgia 30605-2700

D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

Classical/Nutrient Analyses (CNA) - Quality Control

US-EPA, Region 4, LSASD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2408018 - C 351.2 TKN

MRL Verification (2408018-PS1)

Prepared: 08/12/24 Analyzed: 08/20/24

EPA 351.2

Total Kjeldahl Nitrogen	0.064000	0.050	mg/L	0.050000		128	70-130			MRL-2
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Batch 2408027 - C 2540 Solids

Blank (2408027-BLK1)

Prepared & Analyzed: 08/13/24

USGS I-3765-85

Total Suspended Solids	U	5.0	mg/L							U
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LCS (2408027-BS1)

Prepared & Analyzed: 08/13/24

USGS I-3765-85

Total Suspended Solids	101.20	5.0	mg/L	100.00		101	77.1-110			
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LCS Dup (2408027-BSD1)

Prepared & Analyzed: 08/13/24

USGS I-3765-85

Total Suspended Solids	102.90	5.0	mg/L	100.00		103	77.1-110	1.67	10	
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Duplicate (2408027-DUP1)

Source: E243205-01

Prepared & Analyzed: 08/13/24

XD-1

USGS I-3765-85

Total Suspended Solids	1.4000	5.0	mg/L		1.4000			0.00	10	U
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MRL Verification (2408027-PS1)

Prepared & Analyzed: 08/13/24

MRL-2

USGS I-3765-85

Total Suspended Solids	3.0000	5.0	mg/L	5.0000		60.0	57.1-130			U
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Batch 2408033 - C 365.1 TPhos

Blank (2408033-BLK1)

Prepared: 08/14/24 Analyzed: 08/15/24

EPA 365.1

Total Phosphorus	U	0.010	mg/L							U
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Blank (2408033-BLK2)

Prepared: 08/14/24 Analyzed: 08/16/24

EPA 365.1

Total Phosphorus	U	0.010	mg/L							U
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 4 Laboratory Services and Applied Science Division

980 College Station Road, Athens, Georgia 30605-2700

D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

Classical/Nutrient Analyses (CNA) - Quality Control

US-EPA, Region 4, LSASD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2408033 - C 365.1 TPhos

LCS (2408033-BS1)

Prepared: 08/14/24 Analyzed: 08/15/24

EPA 365.1

Total Phosphorus	0.40600	0.010	mg/L	0.39300		103	90-110
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LCS (2408033-BS2)

Prepared: 08/14/24 Analyzed: 08/16/24

EPA 365.1

Total Phosphorus	0.41100	0.010	mg/L	0.39300		105	90-110
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MRL Verification (2408033-PS1)

Prepared: 08/14/24 Analyzed: 08/15/24

MRL-2

EPA 365.1

Total Phosphorus	0.011000	0.010	mg/L	0.010000		110	70-130
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MRL Verification (2408033-PS2)

Prepared: 08/14/24 Analyzed: 08/16/24

MRL-2

EPA 365.1

Total Phosphorus	0.011000	0.010	mg/L	0.010000		110	70-130
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Batch 2408044 - C 353.2 NO3-NO2

Blank (2408044-BLK1)

Prepared & Analyzed: 08/26/24

EPA 353.2

Nitrate/Nitrite as N	U	0.050	mg/L							U
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LCS (2408044-BS1)

Prepared & Analyzed: 08/26/24

EPA 353.2

Nitrate/Nitrite as N	0.48780	0.050	mg/L	0.50000		97.6	90-110
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Matrix Spike (2408044-MS1)

Source: E243205-01

Prepared & Analyzed: 08/26/24

EPA 353.2

Nitrate/Nitrite as N	0.55480	0.050	mg/L	0.50000	0.080900	94.8	90-110
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Matrix Spike (2408044-MS2)

Source: E243205-01

Prepared & Analyzed: 08/26/24

EPA 353.2

Nitrate/Nitrite as N	0.61080	0.050	mg/L	0.50000	0.080900	106	90-110
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Matrix Spike Dup (2408044-MSD1)

Source: E243205-01

Prepared & Analyzed: 08/26/24

EPA 353.2

Nitrate/Nitrite as N	0.55870	0.050	mg/L	0.50000	0.080900	95.6	90-110	0.701	10
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 4 Laboratory Services and Applied Science Division

980 College Station Road, Athens, Georgia 30605-2700

D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

Classical/Nutrient Analyses (CNA) - Quality Control

US-EPA, Region 4, LSASD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2408044 - C 353.2 NO3-NO2

Matrix Spike Dup (2408044-MSD2)

Source: E243205-01

Prepared & Analyzed: 08/26/24

EPA 353.2

Nitrate/Nitrite as N	0.61520	0.050	mg/L	0.50000	0.080900	107	90-110	0.718	10	
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MRL Verification (2408044-PS1)

Prepared & Analyzed: 08/26/24

MRL-2

EPA 353.2

Nitrate/Nitrite as N	0.044300	0.050	mg/L	0.050000		88.6	70-130			U
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 4 Laboratory Services and Applied Science Division

980 College Station Road, Athens, Georgia 30605-2700

D.A.R.T. Id: 24-0278

Project: 24-0278, Kingsport STP CSI - Reported by Kristin Trapp

Notes and Definitions for QC Samples

U	The analyte was not detected at or above the reporting limit.
MRL-2	MRL verification for Non-Potable Water matrix
XD-1	Duplicate results less than MRL
XM-1	Sample background/spike ratio higher than method evaluation criteria