



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

Laboratory Services and Applied Science Division

11 Technology Drive

North Chelmsford, Massachusetts 01863-2431

Drafted Date: July 27, 2021
Finalized Date: August 24, 2021

Subject: Reconnaissance and Sampling Inspection Report
Clean Water Act – National Pollutant Discharge Elimination System
City of Worcester, MA

From: Michelle Coombs, Inspector \MRC\
Field Services Branch (FSB)
Laboratory Services and Applied Science Division (LSASD)

Reviewed By: Jerome Keefe, Investigations Team Leader, LSASD-FSB \JCK\
Jerome Keefe, Investigations Team Leader, LSASD-FSB

To: Denny Dart, Water Compliance Section Chief,
Enforcement and Compliance Assurance Division (ECAD-EWC)

CC: Douglas Koopman, Inspector, ECAD-EWC

I. Facility Information

- A. *Facility Name:* City of Worcester, MA
- B. *Facility Location:* 20 East Worcester St, Worcester, MA 01604
- C. *Facility Contact:* Jay J. Fink, P.E. Commissioner, Dept of Public Works and Parks, (508)929-1300, dpw@worcesterma.gov
- D. *NPDES Permit ID:* MAS010002 (MS4)

II. Background Information

- A. *Date/Start time of recon inspection:* July 13, 2021/8:50 AM
- B. *Weather conditions:* Cloudy, approximately 65°F
- C. *USEPA Representatives:* Michelle Coombs
- D. *State/Local Representatives:* None

- E. *Date/Start time of sampling inspection:* July 14, 2021/8:45 AM
- F. *Weather conditions:* Cloudy, approximately 70°F
- G. *USEPA Representatives:* Michelle Coombs & Shannon Brunelle (FSB)
- H. *State/Local Representatives:* None

I. Federally Enforceable Requirements Investigated:

Stormwater discharges and certain non-stormwater discharges from the City of Worcester, MA (the City's) Municipal Separate Storm Sewer (MS4) are authorized by the National Pollutant Discharge Elimination System (NPDES) General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (hereinafter, the Permit), issued by the Environmental Protection Agency (EPA)

Region 1. The City obtained coverage under the Permit with NPDES Permit ID MAS010002.

J. Pollutants Sampled: Pharmaceuticals and Personal Care Products (PPCPs), E. coli/Enterococcus, Ammonia (nitrogen), Total Chlorine, and Surfactants

III. Disclaimer:

Unless otherwise noted, this report describes conditions at the facility/property as observed by EPA inspector(s), and/or through records provided to and/or information reported to EPA inspector(s) by facility representatives and as understood by the inspector(s). This report may not capture all operations or activities ongoing at the time of the inspection. This report does not make final determinations on potential areas of concern. Nothing in this report affects EPA's authorities under federal statutes and regulations to pursue further investigation or action.

IV. Type and Purpose of Inspection(s)

The purpose of the reconnaissance inspection was to locate stormwater outfalls, associated manholes, and/or catch basins which discharge into the Fitzgerald Brook, Beaver Brook, Poor Farm Brook, Ararat Brook and Tatnuck Brook, while noting appearance, presence of flow, and access requirements for one or more sampling inspections.

The purpose of the compliance sampling inspection was to identify potential illicit connections or illegal discharges within the City of Worcester, MA MS4 that may adversely impact the water quality in the Fitzgerald Brook, Lake Quinsigamond, Beaver Brook, Poor Farm Brook, Ararat Brook and Tatnuck Brook. Samples were collected from twelve (12) locations in accordance with the FSB Investigations Team Stormwater Program Plan. Sample sites were identified during a reconnaissance inspection conducted on July 13, 2021.

V. Permittee Details

The City of Worcester occupies approximately 38 square miles in Worcester County, MA, approximately 40 miles west of Boston, MA. The City shares borders with the municipalities of Auburn, Grafton, Holden, Leicester, Millbury, Paxton, Shrewsbury, and West Boylston. According to the 2010 U.S. Census, the population of Worcester was 181,045. There is 1 CSO permitted to discharge into the receiving waters of Mill Brook (MA0102997).

VI. 07/13/2021 Reconnaissance Inspection Summary

On July 13, 2021, Michelle Coombs conducted an unannounced reconnaissance inspection of the Worcester, MA MS4. She was not accompanied by any city or state representatives. The inspection started in Fitzgerald Brook at approximately 8:50 AM. At the time of the inspection, the weather was cloudy with an ambient temperature of approximately 65°F.

According to Weather Underground for the Worcester Regional Airport (KMAWORCE80), the last precipitation event prior to the inspection occurred on July 12, 2021, with 1.01 inches

recorded. Approximately 1.79 inches of precipitation was recorded within the 72 hours before the inspection.

None of the locations visited during this inspection were field screened with the test kits or the YSI quality meter. Locations visited were noted for appearance, presence of flow, and access requirements. Photographs taken during the inspection are listed in Appendix A.

VII. 07/14/2021 Sampling Inspection Summary

On July 14, 2021, EPA employees Michelle Coombs and Shannon Brunelle conducted an unannounced compliance sampling inspection of the Worcester, MA MS4 at the locations described in Section VIII. They were not accompanied by any city or state representatives. The inspection started at Fitzgerald Brook at approximately 8:45 AM. At the time of the inspection, the weather was cloudy with an ambient temperature of approximately 70°F.

According to Weather Underground for the Worcester Regional Airport (KMAWORCE80), the last precipitation event prior to the inspection occurred on July 13, 2021, with 0.02 inches recorded. There was approximately 1.31 inches of precipitation recorded within the 72 hours before the inspection. According to the National Weather Service, in the month (to date) of July 14, 2021, the City observed 8.57 inches of rain, which is a 6.86-inch departure from the 30-year normal value of 1.71 inches. According to the US Drought Monitor, as of July 13, 2021, Worcester County is experiencing no drought conditions.

Due to time constraints, the sampling locations described in Section VIII were not field screened using test kits for ammonia (nitrogen), surfactants, or total chlorine. In-situ measurements for specific conductivity, salinity, and temperature were measured using a YSI water quality meter and recorded. Field data were recorded on field data sheets. Samples were delivered to and analyzed for E. coli and Enterococcus and PPCPs at the EPA New England Regional Laboratory (NERL) in North Chelmsford, MA. Table 1 below summarizes the sampling and analytical data. Photographs taken during the inspection are listed in Appendix A.

VIII. Description of Sampling Locations

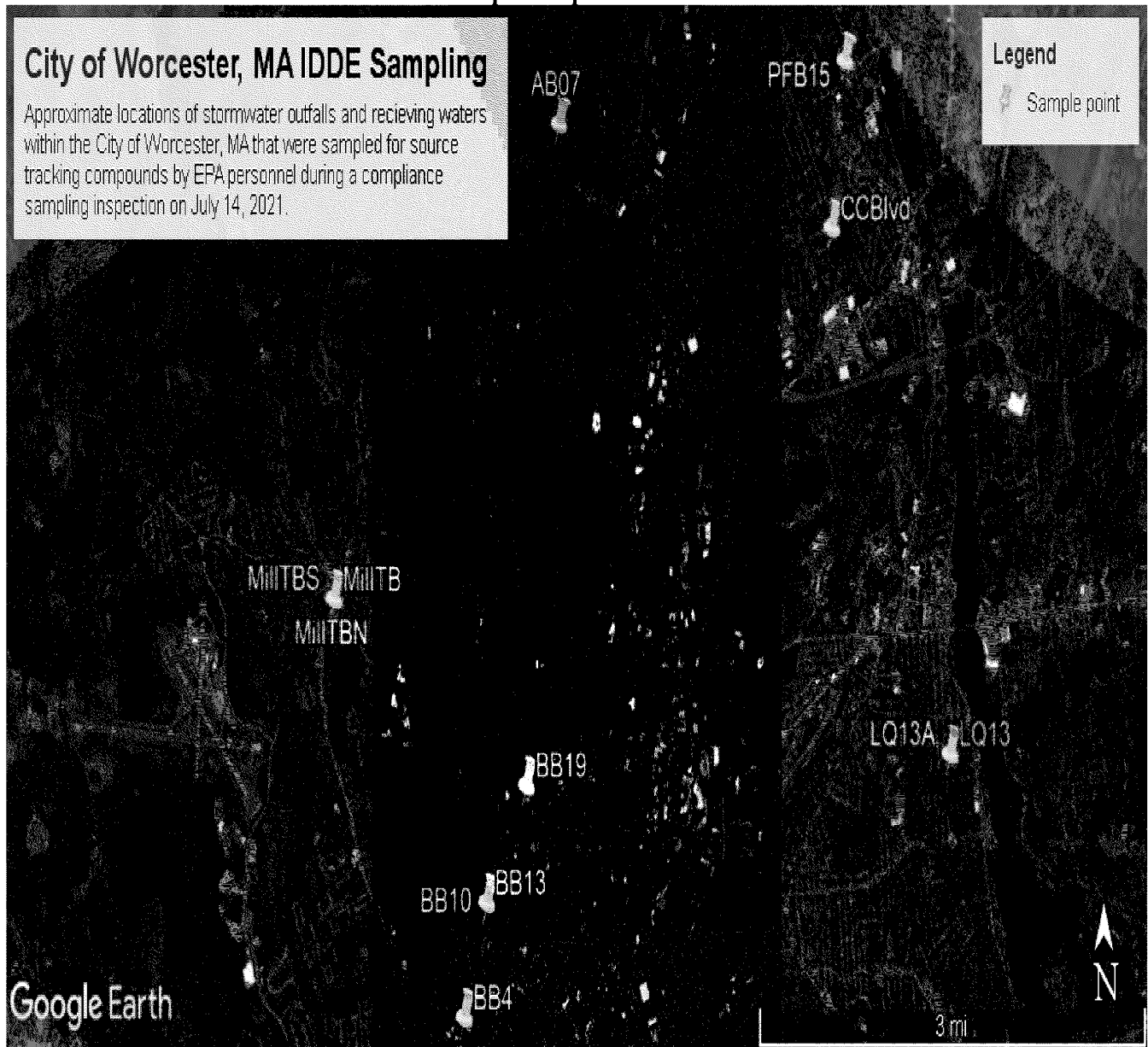
Photographs depicting each sample location are included in Appendix A of this report.

- **LQ13A:** A single clay outfall approximately 12 inches in diameter, flowing into a channelized stream located at 240 Coburn Ave. Discharge flow was approximately 8-10 gallons per minute (gpm) into Fitzgerald Brook. A musty odor was detected at the outfall. Sample was collected at the mouth of the outfall.
- **LQ13:** In-stream sample of flow collected from channelized stream at Fitzgerald Brook inside of the stormwater gate, prior to the confluence of the LQ13A outfall. A strong musty odor was detected, and trash, including rags, was observed downstream.
- **BB4:** A single steel outfall approximately 24 inches in diameter, located at 645 Park Ave. Discharge flow was approximately 30 gpm into Beaver Brook. Sample was taken from the mouth of the outfall. White suds were observed floating in the brook from upstream.
- **BB10:** A pair of reinforced concrete outfalls approximately 36 inches in diameter located on the northeast side of the bridge at the intersection of Maywood St and Beaver

Brook Pkwy. Discharge flow was approximately 50 gpm into Beaver Brook. Sample was collected from the mouth of the southernmost outfall. A musty odor was detected. White suds were observed floating in the brook from upstream.

- **BB13:** A pair of reinforced concrete outfalls approximately 36 inches in diameter located on the northeast side of the bridge at the intersection of Maywood St and Beaver Brook Pkwy. Discharge flow was approximately 50 gpm into Beaver Brook. Sample was collected from the mouth of the northernmost outfall. A musty odor was detected. White suds were observed floating in the brook from upstream.
- **BB19:** In-stream sample of Beaver Brook collected where Beaver Brook daylights at 300 Chandler Street. A slight musty odor was detected and trash, including rags, was observed downstream in the channel. Some white suds were observed floating in the brook from upstream.
- **MillTB:** In-stream sample of Tatnuck Brook, collected downstream of the Mill Street bridge after the waterfall and two MillTB outfalls below. The water color was slightly brown and turbid. A slightly musty odor was detected and a significant buildup of white suds and brown algae was observed along the left bank (looking downstream).
- **MillTBS:** A pair of reinforced concrete outfalls located on the northern bank of Tatnuck Brook downstream of the Mill Street bridge. Southernmost outfall is approximately 12 inches in diameter. Discharge flow was approximately 10-15 gpm into Tatnuck Brook. A slight petroleum odor was detected, oxidized iron precipitate was observed on the reinforced ledge of both outfalls. Sample was collected from the mouth of the outfall.
- **MillTBN:** A pair of reinforced concrete outfalls located on the northern bank of Tatnuck Brook downstream of the Mill Street bridge. Northernmost outfall is approximately 24 inches in diameter. Discharge flow was approximately 20 gpm into Tatnuck Brook. A slight petroleum odor was detected, oxidized iron precipitate was observed on the reinforced ledge of both outfalls. Sample was collected from the mouth of the outfall.
- **AB07:** A single reinforced concrete outfall approximately 24 inches in diameter, located adjacent to the residential property at 116 Holden Street. Discharge flow was approximately 20 gpm into Ararat Brook. A musty odor was detected and green algae growth was observed inside the pipe. Sample was collected from the mouth of the outfall.
- **PFB15:** A single concrete outfall approximately 30 inches in diameter located on the north side of 326 Clark Street. Discharge flow was approximately 30 gpm into Poor Farm Brook. A musty odor was detected and dark green algae growth in the pipe was observed. Sample was collected from the mouth of the outfall.
- **CCBlvd:** Sample was collected at a stormwater structure along Country Club Blvd at Poor Farm Brook, near the intersection with Shenandoah Circle. Flow from the brook was cascading over a ledge, and there appeared to be an outfall also flowing, but it was directly under the flow of the brook. The sample was collected from where the outfall appeared to be flowing. A slight chlorine odor was detected.

Map of Sample Locations



Note: the locations on the map were estimated using Google Earth and are used for display purposes only.

Table 1: Summary of Sampling and Analytical Data

Location	Site ID	LQ13A	LQ13	BB4	BB10	BB13	BB19
	Sample Date	07/14/2021	07/14/2021	07/14/2021	07/14/2021	07/14/2021	07/14/2021
	Sample Time	8:40 AM	8:50 AM	9:20 AM	9:50 AM	9:55 AM	10:15 AM
Coordinates ¹ (decimal degrees)	North	42.263966	42.263947	42.246054	42.253803	42.253820	42.261794
	West	-71.759445	-71.759442	-71.833607	-71.830239	-71.830391	-71.824230
YSI Meter	Salinity, ppt.	0.1	0.2	0.6	0.3	0.3	0.2
	Temperature, °C	16.7	16.9	19.3	17.0	16.7	16.9
	Conductivity, µS/cm	200	408	1,193	696	687	437
Field Test Kits (mg/L)	Ammonia	NA	NA	NA	NA	NA	NA
	Total Chlorine	NA	NA	NA	NA	NA	NA
	Surfactants	NA	NA	NA	NA	NA	NA
Bacteria (MPN/100mL)	E. coli	58	774	>9,678	>9,678	9,678	2,069
	Enterococcus	<10	241	213	813	620	426
PPCPs (ng/L)	Cotinine	ND	8.5	20	17	22	3.3
	Acetaminophen	ND	46	190	68	75	170
	Paraxanthine	3	47	110	130	160	72
	Atenolol	ND	ND	12	8.7	9.1	5
	Caffeine	4.7	55		230	290	120
	Metoprolol	ND	6.9	21	5.2	5.4	4.8
	Diphenhydramine	0.73	0.93	15	3.9	4	2.1
	Carbamazepine	ND	2.2	1.3	5.3	4.4	1.3

Abbreviations and Notes:

1. The coordinates listed in Table 1 were derived from the map created in Google Earth, therefore the coordinates are estimates of the actual locations.

N/A: Not Analyzed

ND: Not Detected above Reporting Limit

E. Coli: Red ≥ 10,000 col/100ml, Orange ≥ 1,260 col/100ml, Yellow ≥ 235 col/100ml, Black < 235 col/100ml

Enterococcus: Red ≥ 1,000 col/100ml, Orange ≥ 350 col/100ml, Yellow ≥ 61 col/100ml, Black < 61 col/100ml

NH₃: Red ≥ 6 mg/L, Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L

Cl₂: Red ≥ 1.0 mg/L, Orange ≥ 0.3 mg/L, Yellow ≥ 0.02 mg/L, Black < 0.02 mg/L

Surfactants: Red ≥ 1.0 mg/L, Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L (may give false positive at salinity greater than 1 ppt)

PPCPs: Dark Pink ≥ 10x the RL; Pink ≥ 10x the RL; Light Pink ≥ 3x the RL; No Pink < 3x the RL *

*See Reporting Limit (RL) values for each compound in attached Laboratory Report for Source Tracking

EPA notes while there are currently no numerical standards to compare pharmaceutical results against, it is EPA's experience that acetaminophen is the single best bacterial source tracking compound of those listed above, and any detection of this compound may indicate a source of sanitary sewage. With respect to all of the above compounds, when a sanitary sewage source is present, depending on the type of source, distance from the sample location, and the strength of the source, concentrations of these compounds may range from the low ng/l range up to thousands of ng/L.

Table 1: Summary of Sampling and Analytical Data, cont.

Location	Site ID	MillTB	MillTBS	MillTBN	AB07	PFB15	DUP01	CCBlvd
	Sample Date	07/14/2021	07/14/2021	07/14/2021	07/14/2021	07/14/2021	07/14/2021	07/14/2021
	Sample Time	10:42 AM	10:50 AM	10:56 AM	11:30 AM	11:55 AM	11:55 AM	12:20 PM
Coordinates ¹ (decimal degrees)	North	42.274592	42.274677	42.274713	42.307948	42.312472	42.312472	42.300584
	West	-71.853855	-71.853826	-71.853872	-71.819324	-71.774554	-71.774554	-71.776867
YSI Meter	Salinity, ppt.	0.1	0.8	0.3	0.5	0.2	NA	0.2
	Temperature, °C	18.6	18.8	17.2	17.1	18.0	NA	17.7
	Conductivity, µS/cm	220.5	1,651	700	969	457.9	NA	507
Field Test Kits (mg/L)	Ammonia	NA	NA	NA	NA	NA	NA	NA
	Total Chlorine	NA	NA	NA	NA	NA	NA	NA
	Surfactants	NA	NA	NA	NA	NA	NA	NA
Bacteria (MPN/100mL)	E. coli	212	4	346	248	774	NA	1,102
	Enterococcus	171	<10	272	10	399	NA	350
PPCPs (ng/L)	Cotinine	1.2	0.41	1.9	1.2	9	9.5	3.5
	Acetaminophen	33	ND	ND	8.5	48	64	20
	Paraxanthine	9.8	5.2	ND	6.9	48	58	19
	Atenolol	ND	ND	ND	4.1	5.5	6	7.7
	Caffeine	9.6	7	5.8	13	170	190	93
	Metoprolol	ND	ND	ND	1.8	16	17	4.3
	Diphenhydramine	ND	ND	ND	0.74	6.2	6.6	2.2
	Carbamazepine	1.4	0.52	1.9	ND	12	13	4.4

Abbreviations and Notes:

1. The coordinates listed in Table 1 were derived from the map created in Google Earth, therefore the coordinates are estimates of the actual locations.

N/A: Not Analyzed

ND: Not Detected above Reporting Limit

E. Coli: Red ≥ 10,000 col/100ml, Orange ≥ 1260 col/100ml, Yellow ≥ 235 col/100ml, Black < 235 col/100ml

Enterococcus: Red ≥ 1,000 col/100ml, Orange ≥ 350 Yellow ≥ 61 col/100ml, Black < 61 col/100ml

NH₃: Red ≥ 6 mg/L, Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L

Cl₂: Red ≥ 1.0 mg/L, Orange ≥ 0.3 mg/L, Yellow ≥ 0.02 mg/L, Black < 0.02 mg/L

Surfactants: Red ≥ 1.0 mg/L, Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L (may give false positive at salinity greater than 1 ppt)

PPCPs: Dark Pink ≥ 100x the RL; Pink ≥ 10x the RL; Light Pink ≥ 3x the RL; No Pink < 3x the RL

*See Reporting Limit (RL) values for each compound in attached Laboratory Report for Source Tracking

EPA notes while there are currently no numerical standards to compare pharmaceutical results against, it is EPA's experience that acetaminophen is the single best bacterial source tracking compound of those listed above, and any detection of this compound may indicate a source of sanitary sewage. With respect to all of the above compounds, when a sanitary sewage source is present, depending on the type of source, distance from the sample location, and the strength of the source, concentrations of these compounds may range from the low ng/l range up to thousands of ng/L.

IX. Appendix

Appendix A: Photograph Log

X. Attachments

Attachment A: Laboratory Report for PPCPs (Source Tracking) Analysis

Attachment B: Laboratory Report for E. coli Analysis

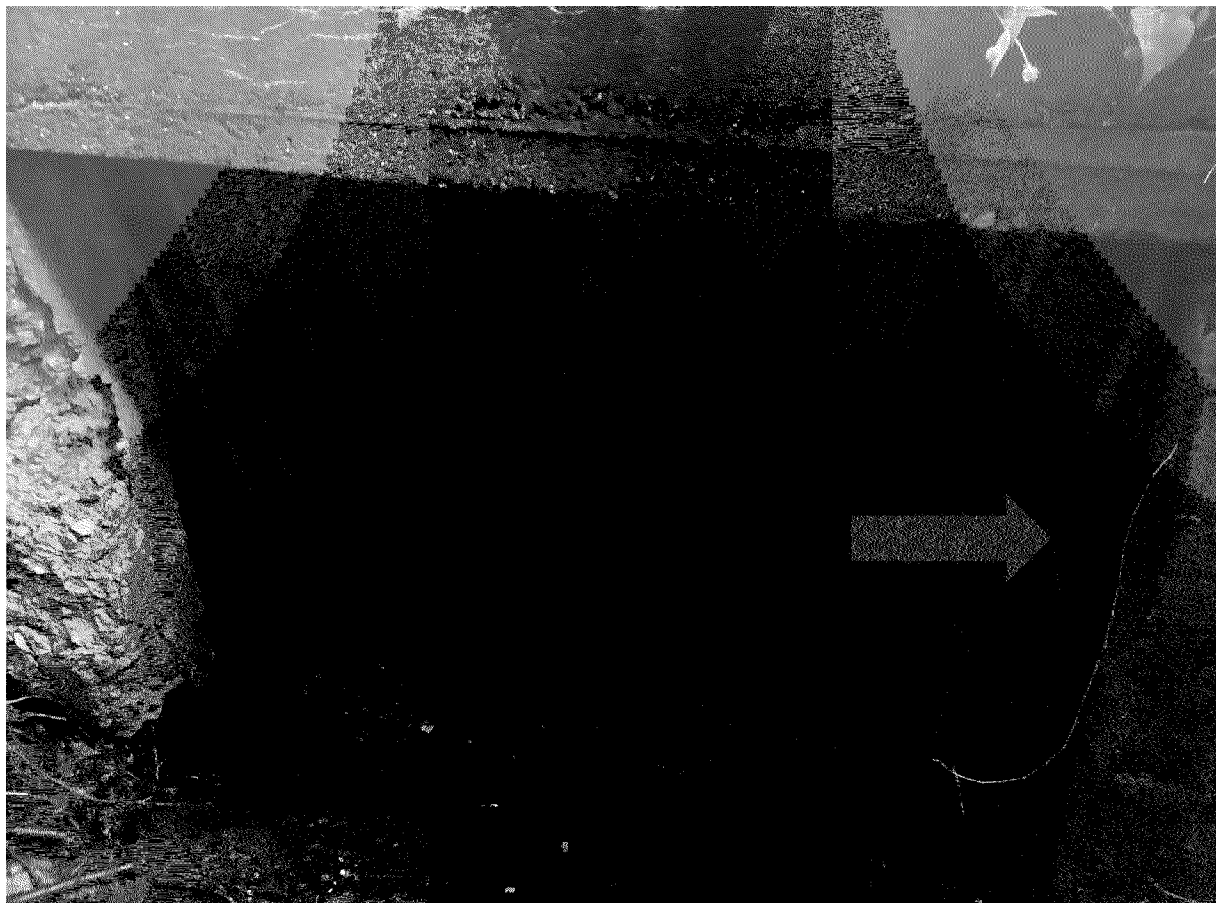
Attachment C: Laboratory Report for Enterococcus Analysis

End of Report

Appendix A

Photograph Log

Photo Name	Date Taken	Time Taken
LQ13A & LQ13	07/14/2021	8:35 AM
LQ13 Down	07/13/2021	8:56 AM
LQ13 Down (2)	07/13/2021	8:56 AM
BB4	07/13/2021	9:17 AM
BB10 Down	07/13/2021	9:30 AM
BB10 & BB13	07/14/2021	9:56 AM
BB19	07/14/2021	10:10 AM
MillTB Down	07/14/2021	10:38 AM
MillTB N&S	07/13/2021	10:07 AM
AB07	07/13/2021	10:24 AM
AB07 (2)	07/13/2021	10:24 AM
PFB15	07/13/2021	10:52 AM
CCBlvd	07/13/2021	11:14 AM
CCBlvd (2)	07/13/2021	11:15 AM



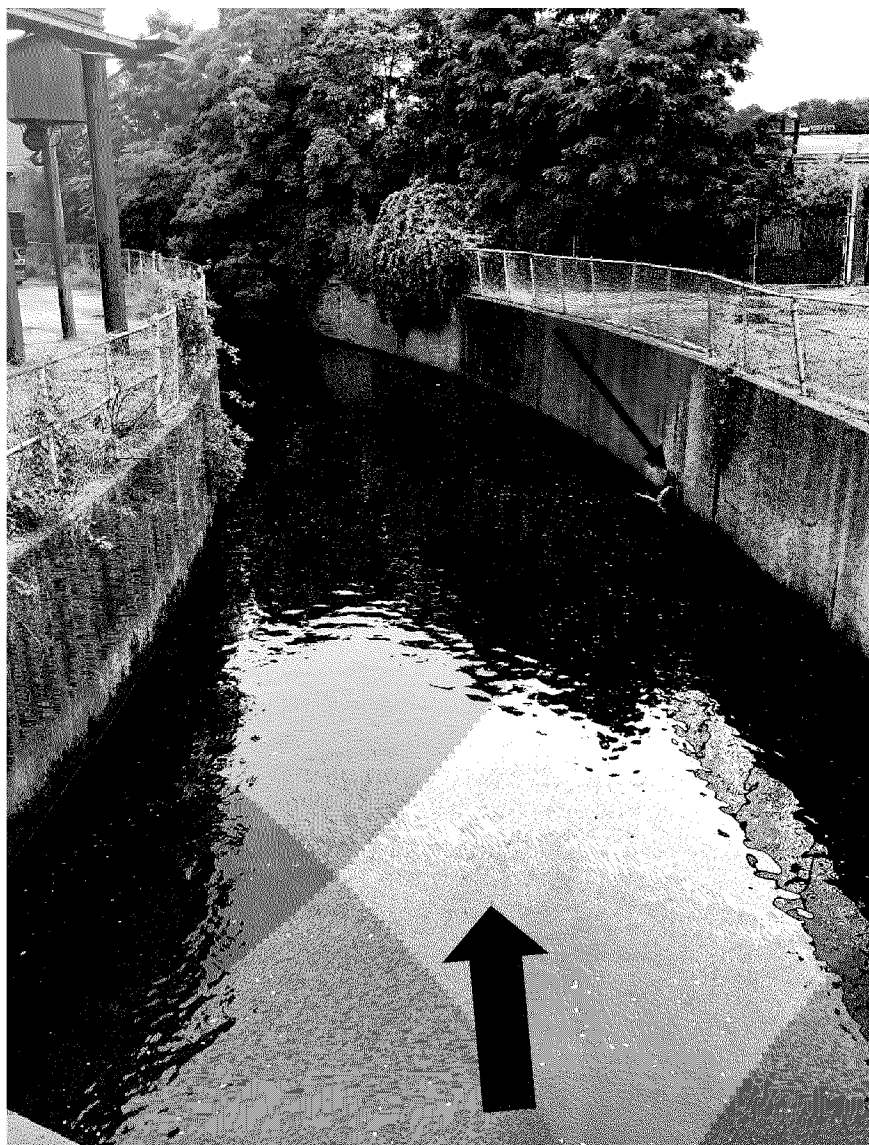
LQ13A & LQ13: Outfall located on the west side of the street at 240 Coburn Avenue. “LQ13” sample collection point indicated by a red “X”, collected upstream of “LQ13A” and the confluence of Fitzgerald Brook that flows into the gated stormwater structure. “LQ13A” sample collection point indicated by a red box. Flow direction indicated by a blue arrow.



LQ13 Down: Photo taken on the east side of the street at 240 Coburn Avenue. Fitzgerald Brook, downstream of the LQ13 & LQ13A sample collection points. Note the large amount of white suds on each side of the flow path.



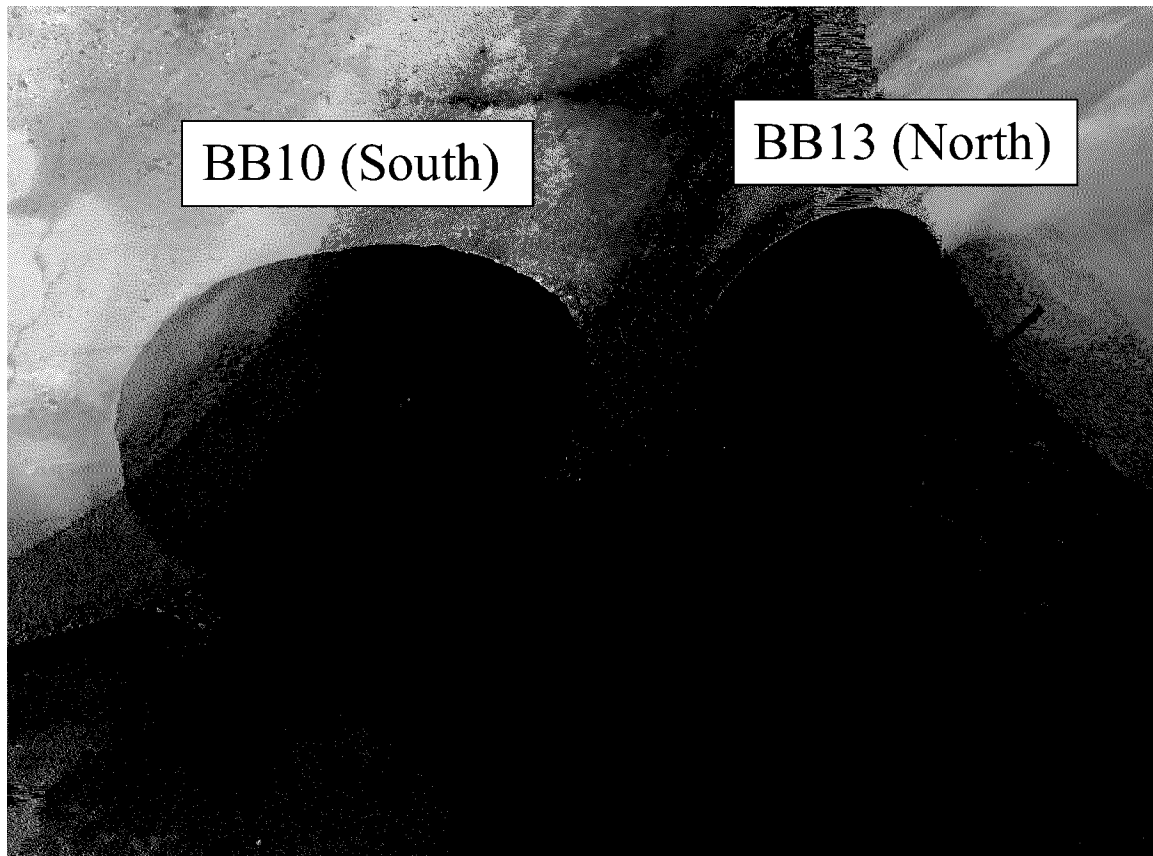
LQ13 Down (2): Photo taken on the east side of the street at 240 Coburn Avenue. Fitzgerald Brook, downstream of the previous photograph. Note the trash along the banks of the brook. Flow direction indicated by a blue arrow.



BB4: Outfall located at the intersection of Mill Street and Park Avenue to the south of Advanced Auto Parts parking lot. Sample collection point indicated by a red arrow. Beaver Brook flow direction indicated by a blue arrow.



BB10 Down: Outfalls located at the intersection of Beaver Brook Parkway to the southeast. Outfalls are located under the bridge, indicated by a red box. Beaver Brook flow direction indicated by a blue arrow.



BB10 & BB13: Outfalls located under the bridge at the intersection of Beaver Brook Parkway to the southeast. Sample collection points indicated by red arrows.



BB19: In-stream sample of Beaver Brook located at 300 Chandler Street. Sample collection point indicated by a red arrow. Flow direction indicated by a blue arrow.



MillTB Down: Downstream view of Tatnuck Brook along Mill Street with the “MillTB N & S” outfalls indicated by a red box. In-stream sample of MillTB collected just outside the bottom-right frame of the photograph.



MillTB N&S: Outfalls located on the northern bank of Tatnuck Brook downstream of the Mill Street bridge. Sample collection points indicated by black arrows.



AB07: Outfall located adjacent to the residential property at 116 Holden Street, indicated by a red box. Ararat Brook flow direction indicated by a blue arrow.



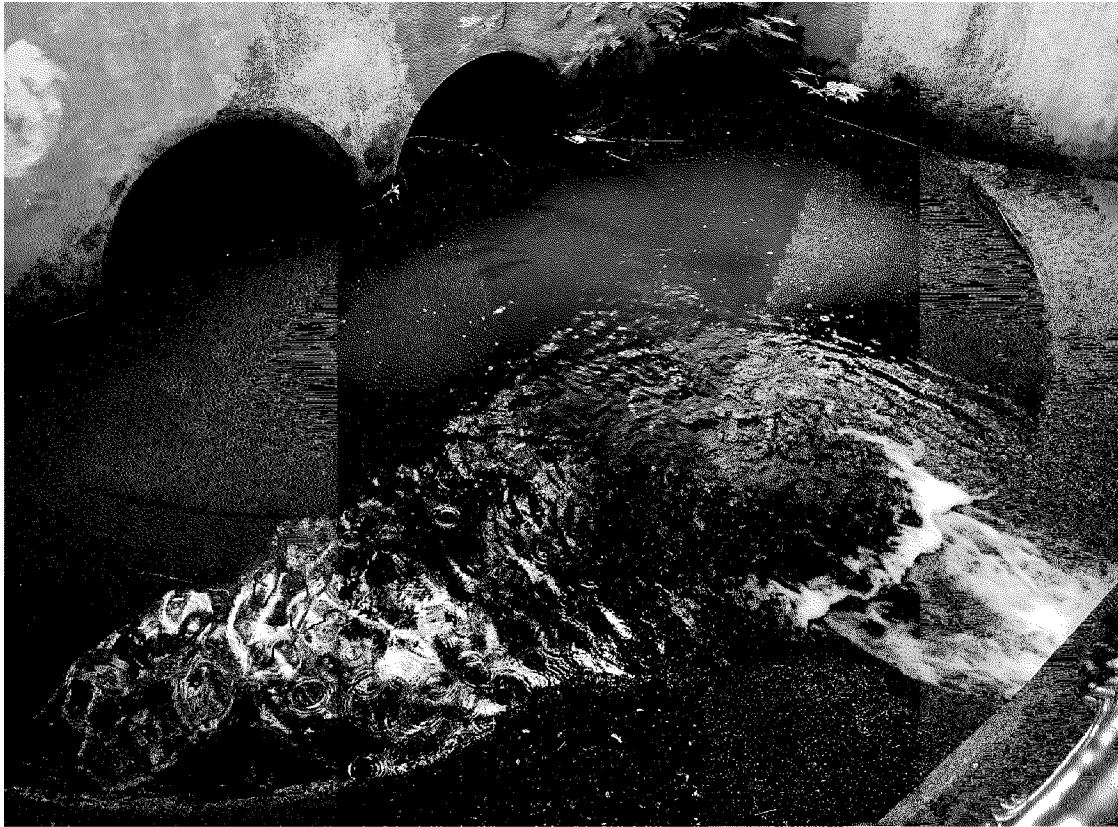
AB07 (2): Outfall located adjacent to the residential property at 116 Holden Street. Sample collection point indicated by a red arrow.



PFB15: Outfall located on the north side of 326 Clark Street discharging into Poor Farm Brook. Sample collection point indicated by a red arrow.



CCBlvd: Sample location along Country Club Blvd at Poor Farm Brook, near the intersection with Shenandoah Circle. Sample collection point indicated by a red arrow, where there appeared to be an outfall with flow beneath the flow of Poor Farm Brook.



CCBlvd (2): Downstream view of the Sample location along Country Club Blvd at Poor Farm Brook, near the intersection with Shenandoah Circle.

Attachment A
Laboratory Report for
Source Tracking Analysis

Author: LSASD Laboratory Services Branch
Pages: 20

Laboratory Report

July 28, 2021

Michelle Coombs - LFSB
US EPA New England R1

Project Number: 21070009
Project: Worcester, MA MS4
Analysis: HPLC/MS/MS Source Tracking Analysis
EPA Chemist: Peter Philbrook

Date Samples Received by the Laboratory: 07/14/2021

Analytical Procedure:

All samples were received and logged in by the laboratory according to the USEPA New England Laboratory SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, LSBSOP-LCMS_STA3.

The SOP is based on an EPA Regional Analytical Method developed at the EPA New England Laboratory.

Data were reviewed in accordance with the internal verification procedures described in the EPA New England Quality Manual for NERL.

Results relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be reproduced except in full, without written approval of the laboratory.

If you have any questions please call me at 617-918-8340 .

Sincerely,

21070009\$STA

Qualifiers:

RL = Reporting limit

ND = Not Detected above Reporting limit

NA = Not Applicable due to high sample dilutions or sample interferences

NC = Not calculated since analyte concentration is ND.

J = Estimated value

J1 = Estimated value due to MS recovery outside acceptance criteria

J2 = Estimated value due to LFB result outside acceptance criteria

J3 = Estimated value due to RPD result outside acceptance criteria

J4 = Estimated value due to LCS result outside acceptance criteria

E = Estimated value exceeds the calibration range

L = Estimated value is below the calibration range

B = Analyte is associated with the lab blank or trip blank contamination. Values are qualified when the observed concentration of the contamination in the sample extract is less than 10 times the concentration in the blank.

R = No recovery was calculated since the analyte concentration is greater than four times the spike level.

P = The confirmation value exceeded 35% difference and is less than 100%. The lower value is reported.

C = The identification has been confirmed by GC/MS.

A = Suspected Aldol condensation product.

N = Tentatively identified compound.

21070009\$STA

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	LQ13A	Lab Sample ID:	AB92835
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	ND	1	0.40	
103-90-2	Acetaminophen	ND	1	2.0	
611-59-6	Paraxanthine	3.0	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	4.7	1	4.0	
56392-17-7	Metoprolol	ND	1	2.0	
58-73-1	Diphenhydramine	0.73	1	0.40	
298-46-4	Carbamazepine	ND	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	77	59 - 137
Diphenhydramine-D3	60	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	LQ13	Lab Sample ID:	AB92836
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	8.5	1	0.40	
103-90-2	Acetaminophen	46	1	2.0	
611-59-6	Paraxanthine	47	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	55	1	4.0	
56392-17-7	Metoprolol	6.9	1	2.0	
58-73-1	Diphenhydramine	0.93	1	0.40	
298-46-4	Carbamazepine	2.2	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	77	59 - 137
Diphenhydramine-D3	59	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	BB4	Lab Sample ID:	AB92837
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	20	1	0.40	
103-90-2	Acetaminophen	190	1	2.0	
611-59-6	Paraxanthine	110	1	2.0	
29122-68-7	Atenolol	12	1	2.0	
58-08-2	Caffeine	10000	20	80	
56392-17-7	Metoprolol	21	1	2.0	
58-73-1	Diphenhydramine	15	1	0.40	
298-46-4	Carbamazepine	1.3	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	72	59 - 137
Diphenhydramine-D3	94	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	BB10	Lab Sample ID:	AB92838
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	17	1	0.40	
103-90-2	Acetaminophen	68	1	2.0	
611-59-6	Paraxanthine	130	1	2.0	
29122-68-7	Atenolol	8.7	1	2.0	
58-08-2	Caffeine	230	1	4.0	
56392-17-7	Metoprolol	5.2	1	2.0	
58-73-1	Diphenhydramine	3.9	1	0.40	
298-46-4	Carbamazepine	5.3	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	78	59 - 137
Diphenhydramine-D3	66	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	BB13	Lab Sample ID:	AB92839
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	22	1	0.40	
103-90-2	Acetaminophen	75	1	2.0	
611-59-6	Paraxanthine	160	1	2.0	
29122-68-7	Atenolol	9.1	1	2.0	
58-08-2	Caffeine	290	1	4.0	
56392-17-7	Metoprolol	5.4	1	2.0	
58-73-1	Diphenhydramine	4.0	1	0.40	
298-46-4	Carbamazepine	4.4	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	79	59 - 137
Diphenhydramine-D3	70	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	BB19	Lab Sample ID:	AB92840
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	3.3	1	0.40	
103-90-2	Acetaminophen	170	1	2.0	
611-59-6	Paraxanthine	72	1	2.0	
29122-68-7	Atenolol	5.0	1	2.0	
58-08-2	Caffeine	120	1	4.0	
56392-17-7	Metoprolol	4.8	1	2.0	
58-73-1	Diphenhydramine	2.1	1	0.40	
298-46-4	Carbamazepine	1.3	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	87	59 - 137
Diphenhydramine-D3	57	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	MillTB	Lab Sample ID:	AB92841
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	1.2	1	0.40	
103-90-2	Acetaminophen	33	1	2.0	
611-59-6	Paraxanthine	9.8	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	9.6	1	4.0	
56392-17-7	Metoprolol	ND	1	2.0	
58-73-1	Diphenhydramine	ND	1	0.40	
298-46-4	Carbamazepine	1.4	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	77	59 - 137
Diphenhydramine-D3	57	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	MillTBS	Lab Sample ID:	AB92842
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	0.41	1	0.40	
103-90-2	Acetaminophen	ND	1	2.0	
611-59-6	Paraxanthine	5.2	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	7.0	1	4.0	
56392-17-7	Metoprolol	ND	1	2.0	
58-73-1	Diphenhydramine	ND	1	0.40	
298-46-4	Carbamazepine	0.52	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	52	59 - 137
Diphenhydramine-D3	42	19 - 135

Comments: Surrogate recovery of phentermine was below QC limits, the surrogate recovery of diphenhydramine was acceptable - no action taken.

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	MillTBN	Lab Sample ID:	AB92843
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	1.9	1	0.40	
103-90-2	Acetaminophen	ND	1	2.0	
611-59-6	Paraxanthine	ND	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	5.8	1	4.0	
56392-17-7	Metoprolol	ND	1	2.0	
58-73-1	Diphenhydramine	ND	1	0.40	
298-46-4	Carbamazepine	ND	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	75	59 - 137
Diphenhydramine-D3	54	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	AB07	Lab Sample ID:	AB92844
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	1.2	1	0.40	
103-90-2	Acetaminophen	8.5	1	2.0	
611-59-6	Paraxanthine	6.9	1	2.0	
29122-68-7	Atenolol	4.1	1	2.0	
58-08-2	Caffeine	13	1	4.0	
56392-17-7	Metoprolol	1.8	1	2.0	L
58-73-1	Diphenhydramine	0.74	1	0.40	
298-46-4	Carbamazepine	ND	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	70	59 - 137
Diphenhydramine-D3	55	19 - 135

Comments: L = Estimated value is below the calibration range.

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	PFB15	Lab Sample ID:	AB92845
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	9.0	1	0.40	
103-90-2	Acetaminophen	48	1	2.0	
611-59-6	Paraxanthine	48	1	2.0	
29122-68-7	Atenolol	5.5	1	2.0	
58-08-2	Caffeine	170	1	4.0	
56392-17-7	Metoprolol	16	1	2.0	
58-73-1	Diphenhydramine	6.2	1	0.40	
298-46-4	Carbamazepine	12	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Phentermine-D5	76	59 - 137
Diphenhydramine-D3	60	19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	DUP01	Lab Sample ID:	AB92846
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	9.5	1	0.40	
103-90-2	Acetaminophen	64	1	2.0	
611-59-6	Paraxanthine	58	1	2.0	
29122-68-7	Atenolol	6.0	1	2.0	
58-08-2	Caffeine	190	1	4.0	
56392-17-7	Metoprolol	17	1	2.0	
58-73-1	Diphenhydramine	6.6	1	0.40	
298-46-4	Carbamazepine	13	1	0.40	

Surrogate Compounds

Recoveries (%)

QC Ranges

Phentermine-D5

82

59 - 137

Diphenhydramine-D3

64

19 - 135

Comments:

Worcester, MA MS4

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	CCBlvd	Lab Sample ID:	AB92847
Date of Collection:	7/14/2021	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	3.5	1	0.40	
103-90-2	Acetaminophen	20	1	2.0	
611-59-6	Paraxanthine	19	1	2.0	
29122-68-7	Atenolol	7.7	1	2.0	
58-08-2	Caffeine	93	1	4.0	
56392-17-7	Metoprolol	4.3	1	2.0	
58-73-1	Diphenhydramine	2.2	1	0.40	
298-46-4	Carbamazepine	4.4	1	0.40	

Surrogate Compounds	Recoveries (%)	QC Ranges
Diphenhydramine-D3	58	19 - 135
Phentermine-D5	67	59 - 137

Comments:

Worcester, MA MS4

Laboratory Blank

Client Sample ID:	N/A	Lab Sample ID:	N/A
Date of Collection:	N/A	Matrix:	Stormwater
Date of Preparation:	7/15/2021	Amount Prepared:	500 mL
Date of Analysis:	7/26/2021	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	ND	1	0.40	
103-90-2	Acetaminophen	ND	1	2.0	
611-59-6	Paraxanthine	ND	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	ND	1	4.0	
56392-17-7	Metoprolol	ND	1	2.0	
58-73-1	Diphenhydramine	ND	1	0.40	
298-46-4	Carbamazepine	ND	1	0.40	

Surrogate Compounds

Recoveries (%)

QC Ranges

Phentermine-D5

62

59 - 137

Diphenhydramine-D3

46

19 - 135

Comments:

Worcester, MA MS4

MATRIX SPIKE (MS) RECOVERY

Sample ID: AB92847

PARAMETER	SPIKE ADDED ng/L	SAMPLE CONCENTRATION ng/L	MS CONCENTRATION ng/L	MS % REC	QC LIMITS (% REC)
Acetaminophen	120	20.0	101	68	61 - 100
Atenolol	120	7.7	151	119	59 - 122
Caffeine	240	93.0	306	89	54 - 128
Carbamazepine	24.0	4.4	25.6	88	61 - 120
Cotinine	24.0	3.5	23.5	83	48 - 124
Diphenhydramine	24.0	2.2	20.5	76	30 - 130
Metoprolol	120	4.3	121	97	59 - 128
Paraxanthine	120	19.0	112	78	42 - 125

Worcester, MA MS4

Laboratory Duplicate Results

Sample ID: AB92844

PARAMETER	SAMPLE RESULT ng/L	SAMPLE DUPLICATE RESULT ng/L	PRECISION RPD %	QC LIMITS
Acetaminophen	8.5	10.6	22	50
Atenolol	4.1	4.95	19	50
Caffeine	13.0	16.9	26	50
Carbamazepine	ND	ND	NC	50
Cotinine	1.2	1.39	15	50
Diphenhydramine	0.74	0.618	18	50
Metoprolol	1.8	2.19	20	50
Paraxanthine	6.9	8.02	15	50

Worcester, MA MS4

Laboratory Fortified Blank (LFB) Results

PARAMETER	LFB AMOUNT SPIKED ng/L	LFB RESULT ng/L	LFB RECOVERY %	QC LIMITS %
Acetaminophen	120	82.3	69	53 - 105
Atenolol	120	114	95	62 - 117
Caffeine	240	200	83	50 - 127
Carbamazepine	24	20.8	87	28 - 126
Cotinine	24	18.7	78	52 - 134
Diphenhydramine	24	18.5	77	30 - 130
Metoprolol	120	109	91	33 - 139
Paraxanthine	120	99.4	83	61 - 113

Comments:

Samples in Batch: AB92835, AB92836, AB92837, AB92838, AB92839, AB92840, AB92841, AB92842, AB92843, AB92844, AB92845, AB92846, AB92847



$\frac{1}{n} \sum_{i=1}^n \log p_i$

$\frac{1}{n} \sum_{i=1}^n \log p_i$

PROJ. NO.		PROJECT NAME		NO. OF CONTAINERS		REMARKS	
21070009		Worcester MS4 - Worcester, MA					
SAMPLERS: (Signature)		(Signature)					
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION		
7/14	0840		X		LO13A	1	✓
7/14	0850		X		LO23	1	✓
7/14	0920		X		BB4	1	✓
0950	7/14		X		BB10	1	✓
0955	7/14		X		BB13	1	✓
7/14	1015		X		BB29	1	✓
7/14	1042		X		MILLTB	1	✓
7/14	1050		X		MILLTB5	1	✓
7/14	1056		X		MILLTB4	1	✓
7/14	1130		X		AB07	1	✓
7/14	1155		X		FE845	1	✓
7/14	1155		X		DU902	1	✓
7/14	1220		X		CCBWD	1	✓
7/14	MC7/14						
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)	
(Signature)		7/14/21 1419					
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)	
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time	
		7		(Signature)		7-14-21 1419	
Remarks		40C					

Attachment B
Laboratory Report for
E. coli Analysis

Author: LSASD Laboratory Services Branch
Pages: 4



United States Environmental Protection Agency
Laboratory Services and Applied Science Division
11 Technology Drive
North Chelmsford, MA 01863-2431

Microbiology Laboratory Report

August 09, 2021

Michelle Coombs - LFSB
US EPA New England R1

Project Number: 21070010
Project: Worcester, MA MS4
Analysis: E. Coli Defined Substrate
Analyst: Jack Paar

Date Samples Received by the Laboratory: 07/14/2021

Analytical Procedure:

All samples were received and logged in by the laboratory according to the USEPA New England Laboratory SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, TC/ECColilert4.

Sample preparation and analysis was done following the EPA Region I method: Total Coliform/E. coli by Defined Substrate.

Data were reviewed in accordance with the internal verification procedures described in the EPA New England OEME Biology QA Plan.

Results relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be reproduced except in full, without written approval of the laboratory.

If you have any questions please call me at 617-918-8604.

Sincerely,

Jack A. Paar, III
Biology Laboratory Manager

21070010ECMM

Water Microbiology Laboratory Data Qualifier Codes

J = Estimate
H = Exceeds holding time
I = Exceeds incubation time
At = Atypical overgrowth
S = Lost sample
V = Insufficient sample volume
TNTC = Too numerous to count
MB = Media blank
+++ = Positive control
--- = Negative control
SP = Spiked Sample
L = Estimated, result below reporting limit (RL)
ND = Not Detected, result less than RL
D = Lab Duplicate
P = Plate counts outside preferred range
FDUP = Field Duplicate collect time not specified on Chain of Custody. Field duplicate
LIMS default time = 12:00AM

21070010ECMM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1 - NEW ENGLAND
LABORATORY SERVICES BRANCH
Worcester, MA MS4

E. Coli Defined Substrate

Matrix: Stormwater

Sample Number	Lab ID	Date of Collection	Date of Analysis	Compound	Concentration MPN/100 mL	RL MPN/100 mL	Qualifier
LQ13A	AB92848	07/14/21 8:40 am	07/14/21 2:45 pm	E. Coli Defined Substrate	58	4	
LQ13	AB92849	07/14/21 8:50 am	07/14/21 2:45 pm	E. Coli Defined Substrate	774	4	
BB4	AB92850	07/14/21 9:20 am	07/14/21 2:45 pm	E. Coli Defined Substrate	>9678	4	
BB13	AB92851	07/14/21 9:55 am	07/14/21 2:45 pm	E. Coli Defined Substrate	>9678	4	
BB10	AB92852	07/14/21 9:50 am	07/14/21 2:45 pm	E. Coli Defined Substrate	9678	4	
BB19	AB92853	07/14/21 10:15 am	07/14/21 2:45 pm	E. Coli Defined Substrate	2069	4	
MillTB	AB92854	07/14/21 10:42 am	07/14/21 2:45 pm	E. Coli Defined Substrate	212	4	
MillTBS	AB92855	07/14/21 10:50 am	07/14/21 2:45 pm	E. Coli Defined Substrate	4	4	
MillTBN	AB92856	07/14/21 10:56 am	07/14/21 2:45 pm	E. Coli Defined Substrate	346	4	
AB07	AB92857	07/14/21 11:30 am	07/14/21 2:45 pm	E. Coli Defined Substrate	248	4	
PFB15	AB92858	07/14/21 11:55 am	07/14/21 2:45 pm	E. Coli Defined Substrate	774	4	
CCBlvd	AB92859	07/14/21 12:20 pm	07/14/21 2:45 pm	E. Coli Defined Substrate	1102	4	

Number of Samples: 12



REGION 1

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO. OF CONTAINERS		REMARKS											
SAMPLERS: (Signature)																	
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	ECMM	Entered									Sample #	
1	7/14	0840	X		LQ13A	1	✓	✓								Salinity: 0.1 ppt	1
2	7/14	0850	X		LQ13	1	✓	✓								0.2	2
3	7/14	0920	X		BB4	1	✓	✓								0.6	3
4	7/14	0955	X		BB13	1	✓	✓								0.3	4
5	7/14	0950	X		BB10	1	✓	✓								0.3	5
6	7/14	1015	X		BB19	1	✓	✓								0.2	6
7	7/14	1042	X		MILLTB	1	✓	✓								0.1	7
8	7/14	1050	X		MILLTBS	1	✓	✓								0.8	8
9	7/14	1056	X		MILLTBN	1	✓	✓								0.3	9
10	7/14	1130	X		ABD7	1	✓	✓								0.5	10
11	7/14	1155	X		PFB15	1	✓	✓								0.2	11
		1155	X		OUPB1 MC 7/14		✓	✓									
12	7/14	1220	X		CCBWD	1	✓	✓								0.2	12
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)							
		7/14/21 1415															
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)							
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time		Remarks									
						7/14/21 1415		FCE < 6°C									

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

1- 20568

Attachment C
Laboratory Report for
Enterococcus Analysis

Author: LSASD Laboratory Services Branch
Pages: 4



United States Environmental Protection Agency
Laboratory Services and Applied Science Division
11 Technology Drive
North Chelmsford, MA 01863-2431

Microbiology Laboratory Report

August 09, 2021

Michelle Coombs - LFSB
US EPA New England R1

Project Number: 21070010
Project: Worcester, MA MS4
Analysis: Enterococcus in Water
Analyst: Jack Paar

Date Samples Received by the Laboratory: 07/14/2021

Analytical Procedure:

All samples were received and logged in by the laboratory according to the USEPA New England Laboratory SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, ECA Enterolert3.

Sample preparation and analysis was done following the EPA Region I method: Enterococcus by Defined Substrate

Data were reviewed in accordance with the internal verification procedures described in the EPA New England OEME Biology QA Plan.

Results relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be reproduced except in full, without written approval of the laboratory.

If you have any questions please call me at 617-918-8604.

Sincerely,

Jack A. Paar, III
Biology Laboratory Manager

21070010ENTERO

Water Microbiology Laboratory Data Qualifier Codes

J = Estimate
H = Exceeds holding time
I = Exceeds incubation time
At = Atypical overgrowth
S = Lost sample
V = Insufficient sample volume
TNTC = Too numerous to count
MB = Media blank
+++ = Positive control
--- = Negative control
SP = Spiked Sample
L = Estimated, result below reporting limit (RL)
ND = Not Detected, result less than RL
D = Lab Duplicate
P = Plate counts outside preferred range
FDUP = Field Duplicate collect time not specified on Chain of Custody. Field duplicate
LIMS default time = 12:00AM

21070010ENTERO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 1 - NEW ENGLAND
 LABORATORY SERVICES BRANCH
Worcester, MA MS4
Enterococcus in Water

Matrix: Stormwater

Sample Number	Lab ID	Date of Collection	Date of Analysis	Compound	Concentration MPN/100mL	RL MPN/100mL	Qualifier
LQ13A	AB92848	07/14/21 8:40 am	07/14/21 2:45 pm	Enterococcus in Water	<10	10	
LQ13	AB92849	07/14/21 8:50 am	07/14/21 2:45 pm	Enterococcus in Water	241	10	
BB4	AB92850	07/14/21 9:20 am	07/14/21 2:45 pm	Enterococcus in Water	213	10	
BB13	AB92851	07/14/21 9:55 am	07/14/21 2:45 pm	Enterococcus in Water	813	10	
BB10	AB92852	07/14/21 9:50 am	07/14/21 2:45 pm	Enterococcus in Water	620	10	
BB19	AB92853	07/14/21 10:15 am	07/14/21 2:45 pm	Enterococcus in Water	426	10	
MillTB	AB92854	07/14/21 10:42 am	07/14/21 2:45 pm	Enterococcus in Water	171	10	
MillTBS	AB92855	07/14/21 10:50 am	07/14/21 2:45 pm	Enterococcus in Water	<10	10	
MillTBN	AB92856	07/14/21 10:56 am	07/14/21 2:45 pm	Enterococcus in Water	272	10	
AB07	AB92857	07/14/21 11:30 am	07/14/21 2:45 pm	Enterococcus in Water	10	10	
PFB15	AB92858	07/14/21 11:55 am	07/14/21 2:45 pm	Enterococcus in Water	399	10	
CCBlvd	AB92859	07/14/21 12:20 pm	07/14/21 2:45 pm	Enterococcus in Water	350	10	

Number of Samples: 12



REGION 1

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO. OF CONTAINERS		REMARKS											
SAMPLERS: (Signature)																	
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	ECMM	Entered									Sample #	
1	7/14	0840	X		LQ13A	1	✓	✓								Salinity: 0.1 ppt	1
2	7/14	0850	X		LQ13	1	✓	✓								0.2	2
3	7/14	0920	X		BB4	1	✓	✓								0.6	3
4	7/14	0955	X		BB13	1	✓	✓								0.3	4
5	7/14	0950	X		BB10	1	✓	✓								0.3	5
6	7/14	1015	X		BB19	1	✓	✓								0.2	6
7	7/14	1042	X		MILLTB	1	✓	✓								0.1	7
8	7/14	1050	X		MILLTBS	1	✓	✓								0.8	8
9	7/14	1056	X		MILLTBN	1	✓	✓								0.3	9
10	7/14	1130	X		ABD7	1	✓	✓								0.5	10
11	7/14	1155	X		PFB15	1	✓	✓								0.2	11
		1155	X		00P01 MC 7/14		✓	✓									
12	7/14	1220	X		CCBWD	1	✓	✓								0.2	12
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
<i>[Signature]</i>		7/14/21 1415		<i>[Signature]</i>													
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
<i>[Signature]</i>				<i>[Signature]</i>													
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time		Remarks									
<i>[Signature]</i>				<i>[Signature]</i>		7/14/21 1415		ICE < 6°C									

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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