



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

Laboratory Services and Applied Science Division

11 Technology Drive

North Chelmsford, Massachusetts 01863-2431

Drafted Date: 08/26/2022

Finalized Date: 10/6/2022

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

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

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

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

CC: Elizabeth Kudarauskas, Water Technical Lead, ECAD-EWC

I. Facility Information

- A. Facility Name:* City of Methuen, MA
- B. Facility Location:* 41 Pleasant St, Searles Bldg. Room 206, Methuen, MA 01844
- C. Facility Contact:* Stephen Gagnon, Engineering Dept. Administrator,
SJGagnon@ci.methuen.ma.us, (978) 983-8550
- D. NPDES Permit ID:* MA041210 (MS4)

II. Background Information

- A. Date/Start time of recon inspection:* 08/24/2022, 11:15 AM
- B. Weather conditions:* Mostly cloudy, ~70°F
- C. USEPA Representatives:* Shannon Brunelle, Michelle Coombs
- D. State/Local Representatives:* None
- A. Date/Start time of sampling inspection:* 09/06/2022, 10:00 AM
- B. Weather conditions:* Overcast, rain, ~70°F
- C. USEPA Representatives:* Michelle Coombs and Caitlin Brown (LSASD)
- D. State/Local Representatives:* None
- E. Federally Enforceable Requirements Investigated:*
Stormwater discharges and certain non-stormwater discharges from the City of Methuen, MA (the City's) Municipal Separate Storm Sewer Systems (MS4) are authorized by the National Pollutant Discharge Elimination System (NPDES) General Permit for the Discharge of Stormwater from Small MS4 (hereinafter, the Permit), issued by the Environmental Protection Agency (EPA) Region 1. The City of Methuen obtained coverage under the Permit with NPDES Permit ID MA041210.

F. 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 evaluate access requirements of various locations along Bloody Brook, while noting appearance and presence of flow for one or more sampling inspections.

The purpose of the sampling inspection was to identify potential illicit connections or illegal discharges within the City of Methuen, MA MS4 that may adversely impact the water quality in Bloody Brook. Samples were collected from eight (8) locations in accordance with the FSB Investigations Team Stormwater Program Plan. Sample sites were identified during a reconnaissance inspection conducted on 08/24/2022.

V. Permittee Details

The City of Methuen, MA occupies approximately 23 square miles in Essex County, MA, approximately 30 miles northwest of Boston, MA. The City of Methuen shares borders with the municipalities of Haverhill to the northeast, North Andover to the east, Lawrence and Andover to the south, Dracut (Middlesex County) to the west, Pelham, New Hampshire (Hillsborough County) to the northwest, and Salem, New Hampshire (Rockingham County) to the north. According to the 2020 U.S. Census, the regulated population of Methuen was 53,059. Bloody Brook is listed as an MS4 receiving water in the City of Methuen Notice of Intent (NOI) for coverage under the permit.

VI. 08/24/2022 Reconnaissance Inspection Summary

On Wednesday, August 24, 2022, EPA employees Shannon Brunelle and Michelle Coombs ("the EPA Inspection Team") conducted an unannounced reconnaissance inspection of the City of Methuen MS4. They were not accompanied by any city or state representatives. The inspection started at approximately 11:15 AM where Bloody Brook flows underground at the CVS on Jackson St. At the time of the inspection, the weather was approximately 70°F with mostly cloudy skies.

According to the National Weather Service (NWS) for the Lawrence Municipal Airport (KLWM), the last precipitation event prior to the inspection occurred on August 23, 2022, with 0.05 inches recorded. There was 0.27 inches precipitation recorded within the 72 hours before the inspection. In the month of August (to date), the area observed 0.52 inches of rain, which is

approximately 22% of the 30-year normal value of 2.38 inches. According to the US Drought Monitor, as of 08/30/2022, Essex County was experiencing extreme drought conditions.

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. 09/06/2022 Sampling Inspection Summary

On Tuesday, September 6, 2022, EPA employees Michelle Coombs and Caitlin Brown (“the EPA Inspection Team”) conducted an unannounced compliance sampling inspection of the City of Methuen, MA MS4 at the locations described in Section VIII. They were not accompanied by any city or state representatives. The inspection started at approximately 10 AM where Bloody Brook flows underground at the CVS on Jackson St. At the time of the inspection, the weather was approximately 70°F and raining with overcast skies.

According to the NWS for the KLWM, the last precipitation event prior to the inspection occurred on September 5, 2022, with 1.25 inches recorded. In the month of September (to date), 1.85 inches of rain was observed, which is approximately 264% normal of the 30-year normal value of 0.70 inches. According to the US Drought Monitor, as of September 6, 2022, Essex County is experiencing severe to extreme drought conditions.

The sampling locations described in Section VIII were not field screened with the test kits for ammonia (nitrogen), surfactants, and total chlorine due to high flow conditions and a strong dilution factor potential, with the exception of “BrookOut”. In-situ measurements were taken using a YSI meter for specific conductivity, salinity, and temperature at all locations. All 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.

VIII. Description of Sampling Locations (in order of collection time)

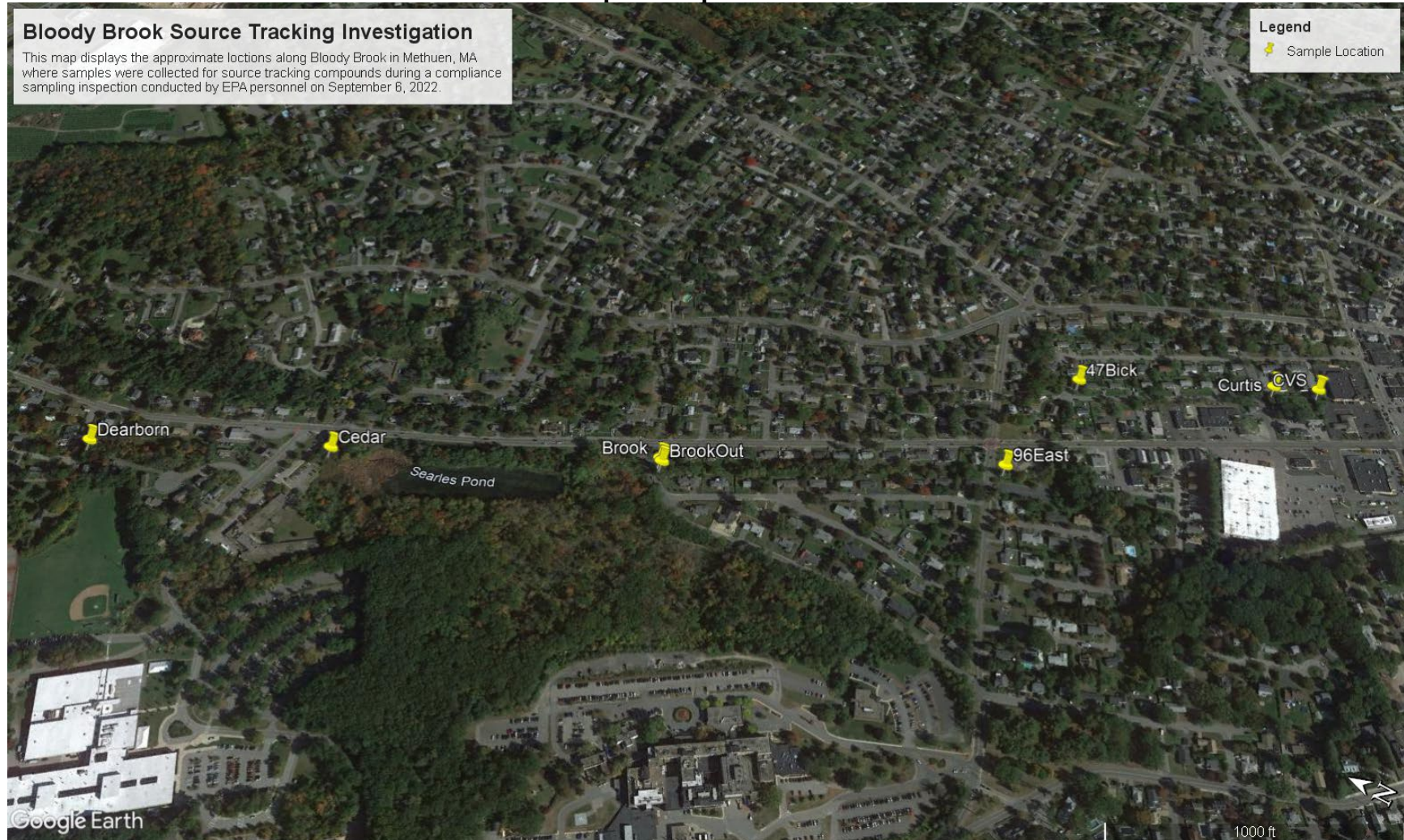
Photographs depicting each sample location are included in Appendix A of this report.

- **CVS**: An in-stream sample of Bloody Brook collected near the CVS parking lot at the corner of Jackson Street and Swan Street. Some trash and duckweed was observed floating on the stream surface. Sample was collected from the stream prior to the reinforced concrete inflow pipe that flows under the parking lot. The outfall adjacent to this inflow point was dry and not flowing.
- **Curtis**: An in-stream sample of Bloody Brook collected at a single steel ovular stream culvert approximately 30 inches in diameter located on Curtis Street near the intersection with Bicknell Avenue. Discharge flow was approximately 50 gallons per minute (gpm) and is Bloody Brook upstream of “CVS”. Sample was collected at the mouth of the culvert. A smaller concrete outfall to the left of the culvert was flowing, and upon further examination, the flow was coming from a catch basin nearby on Curtis Street.
- **47Bick**: An in-stream sample of Bloody Brook collected at a single reinforced concrete stream culvert approximately 24 inches in diameter located at 47 Bicknell Street where Bloody Brook daylight from underneath Bicknell Avenue. Stream flow was

approximately 15 gpm and is an upstream location of “Curtis”. Sample was collected at the mouth of the culvert.

- **96East**: An in-stream sample of Bloody Brook collected at a concrete stream culvert where the brook flows underneath East Street near the intersection with Jackson Street. Outfall characteristics could not be determined due to thick vegetation overgrowth over the culvert. Sample was collected at the base of the vegetation, approximately 6 inches from the mouth of the culvert.
- **BrookOut**: A single concrete outfall approximately 15 inches in diameter located adjacent to 180 Jackson Street. Discharge flow was approximately 5-7 gpm into Bloody Brook. Sample was collected at the mouth of the outfall.
- **Brook**: An in-stream sample of Bloody Brook collected at a rectangular stream culvert that directs flow underneath Brook Street near the intersection of Jackson Street. Sample was collected at the mouth of the culvert. Trash was observed downstream along both banks.
- **Cedar**: A single white PVC pipe approximately 24 inches in diameter located on the south side of the Cedar View Nursing Home. Discharge flow was approximately 12-15 gpm. A slight musty odor was detected. Sample was collected at the mouth of the outfall.
- **Dearborn**: An in-stream sample of Bloody Brook collected at a singular steel stream culvert approximately 48 inches in diameter where the brook flows underneath Dearborn Road. Discharge flow was approximately 50 gpm. Some trash was observed downstream and along the banks. Orange staining of the sediment was observed, and a slight musty odor was detected. Sample was collected at the mouth of the culvert.

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	CVS	Curtis	47Bick	96East	BrookOut	Brook	Cedar	Dearborn
	Sample Date	9/6/22	9/6/22	9/6/22	9/6/22	9/6/22	9/6/22	9/6/22	9/6/22
	Sample Time	10:00	10:14	10:31	10:46	11:11	11:13	11:43	11:58
Coordinates ¹ (Decimal degrees)	North	42.723491	42.723956	42.725974	42.726326	42.729698	42.729732	42.733045	42.735490
	West	-71.158446	-71.158704	-71.160000	-71.162087	-71.164418	-71.164377	-71.166526	-71.168122
YSI Meter	Salinity, ppt.	0.2	0.2	0.2	0.3	0.0	0.3	0.1	0.1
	Temperature, °C	19.1	19.2	19.2	19.1	19.6	19.3	19.2	19.6
	Conductivity, µS/cm	391.5	437	453.2	527	25	600	120.2	112.5
Field Test Kits (mg/L)	Ammonia	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A
	Total Chlorine	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A
	Surfactants	N/A	N/A	N/A	N/A	0.25	N/A	N/A	N/A
Bacteria (MPN/100mL)	E. coli	3,080	2,908	9,678	3,080	689	2,190	3,683	3,683
	Enterococcus	8,164	19,863	12,997	5,172	3,654	1,317	12,033	8,664
PPCPs (ng/L)	Cotinine	19	17	18	16	13	19	26	32
	Acetaminophen	11	9.0	13	8.9	13	10	6.9	10
	Paraxanthine	22	14	14	14	7.7	20	7.1	8.6
	Atenolol	ND	ND	ND	ND	ND	ND	ND	ND
	Caffeine	180	130	210	120	55	130	160	200
	Metoprolol	ND	ND	ND	ND	ND	ND	ND	ND
	Diphenhydramine	ND	ND	ND	ND	ND	ND	ND	ND
	Carbamazepine	ND	ND	ND	ND	ND	ND	ND	ND

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 ≥ 410 col/100ml, Black < 410 col/100ml

Entero: Red ≥ 1,000 col/100ml, Orange ≥ 350 Yellow ≥ 130 col/100ml, Black < 130 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	Time	Date
CVS	10:04	9/6/22
Curtis	10:19	9/6/22
47Bick	10:34	9/6/22
96East	10:49	9/6/22
BrookOut	11:10	9/6/22
Brook	11:10	9/6/22
Cedar	11:43	9/6/22
Dearborn	11:59	9/6/22



CVS: In-stream sample of Bloody Brook collected just before the opening of the culvert pipe that flows under the parking lot. Flow direction indicated by a blue arrow. Sample point is indicated by a red “X”.



Curtis: In-stream sample of Bloody Brook collected at the stream culvert on Curtis St. Flow direction indicated by a blue arrow. Sample point is indicated by a red “X”. The smaller flowing outfall is indicated by a red circle.



47Bick: In-stream sample of Bloody Brook at approximately 47 Bicknell Street. Flow direction indicated by a blue arrow. Sample point indicated by a red “X”.



96East: In-stream sample of Bloody Brook at the stream culvert in the parking lot of 96 East Street. Flow direction indicated by a blue arrow. Sample point indicated by a red “X”.



BrookOut: A singular concrete outfall, flowing into Bloody Brook on Brook Street. Flow direction is indicated by a blue arrow. Sample point is indicated by a red “X”.



Brook: In-stream sample of Bloody Brook at the stream culvert on Brook St. Note “BrookOut” is located on the left side of the photo (red circle). Flow direction is indicated by a blue arrow. Sample point is indicated by a red “X”.



Cedar: A white PVC outfall located on the south side of the Cedar View Nursing Home. Flow direction indicated by a blue arrow. Sample point indicated by a red “X”.



Dearborn: An in-stream sample of Bloody Brook collected at the stream culvert on Dearborn Road. Flow direction indicated by a blue arrow. Sample point indicated by a red "X".

Attachment A
Laboratory Report for
Source Tracking Analysis

Author: LSASD Laboratory Services Branch (LSB)
Pages: 14

Laboratory Report

September 15, 2022

Michelle Coombs - LFSB
US EPA New England R1

Project Number: 22090004
Project: MS4 Methuen, MA
Analysis: HPLC/MS/MS Source Tracking Analysis
EPA Chemist: Peter Philbrook

Date Samples Received by the Laboratory: 09/06/2022

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,

22090004\$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.

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	CVS	Lab Sample ID:	AC01526
Date of Collection:	9/06/2022	Matrix:	Stormwater
Date of Preparation:	9/07/2022	Amount Prepared:	500 mL
Date of Analysis:	9/12/2022	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	19	1	0.40	
103-90-2	Acetaminophen	11	1	2.0	
611-59-6	Paraxanthine	22	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	180	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	74	37 - 113
Diphenhydramine-D3	52	8 - 114

Comments:

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	CURTIS	Lab Sample ID:	AC01527
Date of Collection:	9/06/2022	Matrix:	Stormwater
Date of Preparation:	9/07/2022	Amount Prepared:	500 mL
Date of Analysis:	9/12/2022	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	9.0	1	2.0	
611-59-6	Paraxanthine	14	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	130	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	76	37 - 113
Diphenhydramine-D3	48	8 - 114

Comments:

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	47BICK	Lab Sample ID:	AC01528
Date of Collection:	9/06/2022	Matrix:	Stormwater
Date of Preparation:	9/07/2022	Amount Prepared:	500 mL
Date of Analysis:	9/12/2022	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	18	1	0.40	
103-90-2	Acetaminophen	13	1	2.0	
611-59-6	Paraxanthine	14	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	210	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	72	37 - 113
Diphenhydramine-D3	46	8 - 114

Comments:

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	96EAST	Lab Sample ID:	AC01529
Date of Collection:	9/06/2022	Matrix:	Stormwater
Date of Preparation:	9/07/2022	Amount Prepared:	500 mL
Date of Analysis:	9/12/2022	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	16	1	0.40	
103-90-2	Acetaminophen	8.9	1	2.0	
611-59-6	Paraxanthine	14	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	120	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	77	37 - 113
Diphenhydramine-D3	52	8 - 114

Comments:

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	BROOKOUT	Lab Sample ID:	AC01530
Date of Collection:	9/06/2022	Matrix:	Stormwater
Date of Preparation:	9/07/2022	Amount Prepared:	500 mL
Date of Analysis:	9/12/2022	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	13	1	0.40	
103-90-2	Acetaminophen	13	1	2.0	
611-59-6	Paraxanthine	7.7	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	55	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	78	37 - 113
Diphenhydramine-D3	30	8 - 114

Comments:

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID: BROOK
Date of Collection: 9/06/2022
Date of Preparation: 9/07/2022
Date of Analysis: 9/12/2022
Dry Weight Prepared: N/A
Wet Weight Prepared: N/A

Lab Sample ID: AC01531
Matrix: Stormwater
Amount Prepared: 500 mL
Percent Solids: N/A
Extract Dilution: 1
pH: N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	19	1	0.40	
103-90-2	Acetaminophen	10	1	2.0	
611-59-6	Paraxanthine	20	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	130	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	70	37 - 113
Diphenhydramine-D3	45	8 - 114

Comments:

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID:	CEDAR	Lab Sample ID:	AC01532
Date of Collection:	9/06/2022	Matrix:	Stormwater
Date of Preparation:	9/07/2022	Amount Prepared:	500 mL
Date of Analysis:	9/12/2022	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	26	1	0.40	
103-90-2	Acetaminophen	6.9	1	2.0	
611-59-6	Paraxanthine	7.1	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	160	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	74	37 - 113
Diphenhydramine-D3	45	8 - 114

Comments:

MS4 Methuen, MA

HPLC/MS/MS Source Tracking Analysis

Client Sample ID: DEARBORN
Date of Collection: 9/06/2022
Date of Preparation: 9/07/2022
Date of Analysis: 9/12/2022
Dry Weight Prepared: N/A
Wet Weight Prepared: N/A

Lab Sample ID: AC01533
Matrix: Stormwater
Amount Prepared: 500 mL
Percent Solids: N/A
Extract Dilution: 1
pH: N/A

CAS Number	Compound	Concentration ng/L	Dilution	RL ng/L	Qualifier
486-56-6	Cotinine	32	1	0.40	
103-90-2	Acetaminophen	10	1	2.0	
611-59-6	Paraxanthine	8.6	1	2.0	
29122-68-7	Atenolol	ND	1	2.0	
58-08-2	Caffeine	200	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	70	37 - 113
Diphenhydramine-D3	44	8 - 114

Comments:

MS4 Methuen, MA

Laboratory Blank

Client Sample ID:	N/A	Lab Sample ID:	N/A
Date of Collection:	N/A	Matrix:	Stormwater
Date of Preparation:	9/07/2022	Amount Prepared:	500 mL
Date of Analysis:	9/12/2022	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	83	37 - 113
Diphenhydramine-D3	100	8 - 114

Comments:

MS4 Methuen, MA

MATRIX SPIKE (MS) RECOVERY

Sample ID: AC01533

PARAMETER	SPIKE ADDED ng/L	SAMPLE CONCENTRATION ng/L	MS CONCENTRATION ng/L	MS % REC	QC LIMITS (% REC)
Acetaminophen	120	10.0	98.3	74	55 - 99
Atenolol	120	ND	107	89	24 - 160
Caffeine	240	201	409	87	34 - 131
Carbamazepine	24.0	ND	23.9	100	61 - 107
Cotinine	24.0	32.0	55.5	96	48 - 112
Diphenhydramine	24.0	ND	9.75	41	17 - 112
Metoprolol	120	ND	85.6	71	31 - 137
Paraxanthine	120	8.6	122	95	41 - 132

MS4 Methuen, MA

Laboratory Fortified Blank (LFB) Results

PARAMETER	LFB AMOUNT SPIKED ng/L	LFB RESULT ng/L	LFB RECOVERY %	QC LIMITS %
Acetaminophen	120	84.1	70	45 - 106
Atenolol	120	126	105	33 - 129
Caffeine	240	186	78	41 - 120
Carbamazepine	24	19.1	80	63 - 108
Cotinine	24	19.3	80	55 - 106
Diphenhydramine	24	21.2	88	15 - 113
Metoprolol	120	112	93	41 - 122
Paraxanthine	120	111	93	52 - 115

Comments:

Samples in Batch: AC01526, AC01527, AC01528, AC01529, AC01530, AC01531, AC01532, AC01533, AC01534

Page: 8 of 8

EPA Security Booth: 617-918-8468 | Desk: x8305

Sampler's Name and Signature:

Michelle Coombs

[illegible]

FSBFORM-CHAINCUSTODY
Revision 0
03/21/2022

Attachment B
Laboratory Report for
E. coli Analysis

Author: LSASD-LSB
Pages: 4



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

Microbiology Laboratory Report

October 03, 2022

Michelle Coombs - LFSB
US EPA New England R1

Project Number: 22090007
Project: MS4 Methuen, MA
Analysis: E. Coli Defined Substrate
Analyst: Jack Paar

Date Samples Received by the Laboratory: 09/06/2022

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 LSASD 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

22090007ECMM

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

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1 - NEW ENGLAND
LABORATORY SERVICES BRANCH
MS4 Methuen, MA
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
CVS	AC01549	09/06/22 10:00 am	09/06/22 2:30 pm	E. Coli Defined Substrate	3080	4	
CURTIS	AC01550	09/06/22 10:14 am	09/06/22 2:30 pm	E. Coli Defined Substrate	2908	4	
47BICK	AC01551	09/06/22 10:31 am	09/06/22 2:30 pm	E. Coli Defined Substrate	9678	4	
96EAST	AC01552	09/06/22 10:46 am	09/06/22 2:30 pm	E. Coli Defined Substrate	3080	4	
BROOKOUT	AC01553	09/06/22 11:11 am	09/06/22 2:30 pm	E. Coli Defined Substrate	689	4	
BROOK	AC01554	09/06/22 11:13 am	09/06/22 2:30 pm	E. Coli Defined Substrate	2190	4	
CEDAR	AC01555	09/06/22 11:43 am	09/06/22 2:30 pm	E. Coli Defined Substrate	3683	4	
DEARBORN	AC01556	09/06/22 11:58 am	09/06/22 2:30 pm	E. Coli Defined Substrate	3683	4	

Number of Samples: 8



US EPA Region 1

11 Technology Drive, N. Chelmsford, MA 01863

CHAIN OF CUSTODY RECORD

EPA Security Booth: 617-918-8468 | Desk: x8305

Page: 1 of 2

EPA Project No: 22090007		Project Name & Location: Methuen MS4 - Methuen, MA				Sampler's Name and Signature: Michelle Coombs																
Matrix (insert letter in column below)		Preservative (insert # in box to the right) ---->				Analysis Requested												Sample Log-in Contacts/Info				
A. Drinking water B. Ground/Well water C. Storm water D. Surface water E. Wastewater		F. Soil/Sediment/Solid G. Oil/Solvent/Liquid H. Soil Gas I. Air Canister J. _____		1. Ice 2. H ₂ SO ₄ , pH<2 3. HNO ₃ , pH<2 4. HCl, pH<2 5. Na ₂ S ₂ O ₃		6. NaOH, pH>12 7. Ascorbic Acid 8. MeOH 9. Other _____ 10. Other _____		# of Containers													1st - Doris Guzman: 617-918-8618 2nd - Dan Casey: x8648 3rd - Vinora Nicholls: x8394 EPA Staff: If after hours or nobody is available, leave cooler(s) and signed COC in the walk-in fridge (Room 190A) and email Doris for next day check-in.	
Lab ID	Sample ID	Date	Time	Comp	Grab	Matrix	ECMM		ENTERO											Sample Specific Comments		
	MC 916																					
	CVS	09/06/2022	10:00		✓	C	1	✓	✓							1						
	CURTIS	09/06/2022	10:14		✓	C	1	✓	✓							2						
	47BICK	09/06/2022	10:31		✓	C	1	✓	✓							3						
	96EAST	09/06/2022	10:46		✓	C	1	✓	✓							4						
	BROOKOUT	09/06/2022	11:11		✓	C	1	✓	✓							5						
	BROOK	09/06/2022	11:13		✓	C	1	✓	✓							6						
	CEDAR	09/06/2022	11:43		✓	C	1	✓	✓							7						
	DEARBORN	09/06/2022	11:58		✓	C	1	✓	✓							8						
Relinquished by: (Signature) <i>Michelle Coombs</i>		Received by: (Signature) <i>Nathan Raines</i>				Date 9/6/22		Time 1402		Remarks No Samples Transferred. LIMS Login Only Temp: 8°C												
Relinquished by: (Signature)		Received by: (Signature)				Date		Time														
Relinquished by: (Signature)		Received for Laboratory by: (Signature)				Date		Time														

Distribution: Original Accompanies Shipment. Copy to Coordinator Field Files.

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Revision 0
03/21/2022

Attachment C
Laboratory Report for
Enterococcus Analysis

Author: LSASD-LSB
Pages: 4



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

Microbiology Laboratory Report

October 03, 2022

Michelle Coombs - LFSB
US EPA New England R1

Project Number: 22090007
Project: MS4 Methuen, MA
Analysis: Enterococcus in Water
Analyst: Jack Paar

Date Samples Received by the Laboratory: 09/06/2022

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 LSASD 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

22090007ENTERO

Water Microbiology Laboratory
Data Qualifier Codes

J = Estimate
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I = Exceeds incubation time
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--- = 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

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

Matrix: Stormwater

Sample Number	Lab ID	Date of Collection	Date of Analysis	Compound	Concentration MPN/100mL	RL MPN/100mL	Qualifier
CVS	AC01549	09/06/22 10:00 am	09/06/22 2:30 pm	Enterococcus in Water	8164	10	
CURTIS	AC01550	09/06/22 10:14 am	09/06/22 2:30 pm	Enterococcus in Water	19863	10	
47BICK	AC01551	09/06/22 10:31 am	09/06/22 2:30 pm	Enterococcus in Water	12997	10	
96EAST	AC01552	09/06/22 10:46 am	09/06/22 2:30 pm	Enterococcus in Water	5172	10	
BROOKOUT	AC01553	09/06/22 11:11 am	09/06/22 2:30 pm	Enterococcus in Water	3654	10	
BROOK	AC01554	09/06/22 11:13 am	09/06/22 2:30 pm	Enterococcus in Water	1317	10	
CEDAR	AC01555	09/06/22 11:43 am	09/06/22 2:30 pm	Enterococcus in Water	12033	10	
DEARBORN	AC01556	09/06/22 11:58 am	09/06/22 2:30 pm	Enterococcus in Water	8664	10	

Number of Samples: 8



US EPA Region 1

11 Technology Drive, N. Chelmsford, MA 01863

CHAIN OF CUSTODY RECORD

EPA Security Booth: 617-918-8468 | Desk: x8305

Page: 1 of 2

EPA Project No: 22090007		Project Name & Location: Methuen MS4 - Methuen, MA					Sampler's Name and Signature: Michelle Coombs																
Matrix (insert letter in column below)		Preservative (insert # in box to the right) ---->					Analysis Requested													Sample Log-in Contacts/Info			
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	CVS	09/06/2022	10:00		✓	C	1	✓	✓								1						
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	47BICK	09/06/2022	10:31		✓	C	1	✓	✓								3						
	96EAST	09/06/2022	10:46		✓	C	1	✓	✓								4						
	BROOKOUT	09/06/2022	11:11		✓	C	1	✓	✓								5						
	BROOK	09/06/2022	11:13		✓	C	1	✓	✓								6						
	CEDAR	09/06/2022	11:43		✓	C	1	✓	✓								7						
	DEARBORN	09/06/2022	11:58		✓	C	1	✓	✓								8						
Relinquished by: (Signature) <i>Michelle Coombs</i>		Received by: (Signature) <i>Nathan Raines</i>					Date 9/6/22		Time 1402		Remarks No Samples Transferred. LIMS Login Only Temp: 8°C												
Relinquished by: (Signature)		Received by: (Signature)					Date		Time														
Relinquished by: (Signature)		Received for Laboratory by: (Signature)					Date		Time														

Distribution: Original Accompanies Shipment. Copy to Coordinator Field Files.

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