December 17, 2020
File No. 96810.00

US Environmental Protection Agency
Office of Ecosystem Protection
5 Post Office Square – Suite 100 (OEP06-01)
Boston, MA 02109-3912

Attention: Ms. Shauna Little; EPA/OEP RGP Applications Coordinator

Subject: **Remediation General Permit Notice of Intent**
Temporary Construction Dewatering
University of Massachusetts Medical School
New Education and Research Building
Worcester, Massachusetts

Dear Ms. Little:

Nobis Engineering Inc. (Nobis) d/b/a Nobis Group® has prepared this submission to facilitate off-site discharge of temporary dewatering during building construction activities at the New Education and Research Building (NERB) at the University of Massachusetts Medical School (UMMS) at 55 Lake Avenue North in Worcester, Massachusetts (the site). A Site Locus Plan is included as **Figure 1**. The information presented herein has been prepared in general accordance with the requirements of the 2017 US Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Remediation General Permit (RGP). A copy of the completed Notice of Intent (NOI) form is enclosed as **Appendix A**.

EXISTING SITE CONDITIONS

The new medical research facility proposed at the site will be located between the existing Aaron Lazare Medical Research Building (Lazare Building) and Albert Sherman Center Building (Sherman Building) within a three- (3-) story portion of the existing First Road parking garage (garage), as depicted on **Figure 2**. The existing garage was constructed along a natural slope and consists of six (6) total levels and is comprised of four (4) discrete sections or bays which vary between three (3) and five (5) levels of parking with bottom finished floor elevations (FFEs) ranging from approximately Elevation (El.) 427 and El. 459 feet within the eastern and western portions of the garage, respectively.

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The proposed NERB will replace the eastern portion of the existing garage, which is currently bounded by the Sherman Building and associated landscaped areas and walkways to the north, First Road including a garage level one (1) entrance/exit to the east, the Lazare Building and driveways accessing garage levels one (1) through four (4) to the south, and a driveway parallel to Plantation Street connecting to garage level four (4) to the west. Existing covered pedestrian bridges connect the third level of the garage to the second levels of the Lazare and Sherman Buildings within the eastern portion of the existing garage. Nobis understands the existing multi-level garage footprint is approximately 248 feet by 425 feet and includes an elevator adjoining the existing north wall which will abut the northwest corner of the NERB. Based on a footing schedule for garage level one (1) provided on drawing S.1, prepared by Payette dated July 31, 1985, we understand the portion of the garage to be demolished to accommodate the NERB is supported by shallow spread (5'-8" wide) and square (3' to 10'-6") footings bearing on "firm, undisturbed material consisting of glacial till, ledge or lean concrete…" between at approximately El. 421 and El. 425.

Existing grade across the site typically sloped downward from west to east, with topographic relief ranging from approximately elevation (El.) 440 to El. 429, respectively, based on the survey drawing prepared by VHB. The site and its immediate vicinity contain several underground utilities which include, but may not be limited to, underground electric, sanitary sewer, stormwater drainage, and potable water.

PREVIOUS SITE USAGE AND REGULATORY BACKGROUND

The site is presently located in a mixed commercial/residential section of Worcester near Lake Quinsigamond. The property was formerly part of a farm.

On May 3, 2000, a release of oil associated with Release Tracking Number 2-13281 occurred at an active construction site at 55 Lake Avenue North in Worcester (the Site) at the Aaron Lazarre Research Building just south of the location of the proposed NERB. The presence of extractable petroleum hydrocarbons and polynuclear aromatic hydrocarbons were identified. Approximately 220 cubic yards of contaminated soils were removed, and a permanent solution was achieved.

Three additional Release Tracking Numbers are associated with the power plant on the UMMS campus. The power plant is located several hundred feet northeast of the proposed NERB and is

at a lower elevation. Therefore, in our opinion, these three releases are unlikely to have impacted the site of the proposed NERB.

In October 2020, Nobis performed explorations at the site to pre-characterize surface and subsurface soils for off-site disposal during construction activities. Laboratory analysis of surface and subsurface soils detected concentrations of Arsenic that exceed the Massachusetts Contingency Plan (MCP) RCS-1 Reportable Concentrations. MassDEP was notified of the release condition on December 14, 2020. MassDEP will assign a RTN to the site and Arsenic impacted soils will be managed under a forthcoming Release Abatement Measure (RAM) plan and the applicable provisions of the MCP.

PROPOSED CONSTRUCTION

The proposed NERB will be a nine-story, approximately 335,00 gross square-foot (gsf) building including a below-grade-level (Level A) FFE of approximately El. 407. An east-west oriented, approximately 663 square foot (sf) utility tunnel is proposed at the southeast corner of Level A to provide a connection to the UMMS campus underground utility network. The existing garage elevator is to remain in place and will also service the proposed NERB. The proposed limits of work will extend near the Sherman Building to the north, the Lazare Building to the south, and the quadrangle to the east. The NERB development includes new landscaped areas, paved walkways, retaining walls, a stairwell, and new Level 2 connections between the NERB and Lazare and Sherman Buildings.

CURRENT GROUNDWATER QUALITY INFORMATION

To evaluate groundwater quality at the site, groundwater samples were collected from two observation wells, NB-2(OW) and NB-4(OW) on November 24, 2020. The samples were submitted to Con-Test Analytical Laboratory (Con-Test) of East Longmeadow, Massachusetts for analysis of VOCs, Total Petroleum Hydrocarbons (TPH), total metals analysis, dissolved metals, PCBs, SVOCs, Total Cyanide, Total Ammonia, Total Chloride, Total Residual Chlorine, Total Phenols, Hardness, and Total Suspended Solids (TSS). Laboratory analytical results were compared with the RGP Technology Based Effluent Limitations (TBELs) and the Water Quality Based Effluent Limitations (WQBELs). Contaminants of concern (COCs) are analytes that exceeded the applicable effluent limitations. COCs are Arsenic, Cadmium, Copper, Iron, Lead, Nickel, Selenium, Silver, Zinc, Chromium Trivalent (Chromium+3), Total Residual Chlorine, Total Suspended Solids (TSS), and Ethanol.

The locations of the observation wells are shown on **Figure 2**. Laboratory analytical results are summarized in Table 1, with a complete copy of the laboratory analytical report in **Appendix B**.

RECEIVING WATERS SAMPLING AND DILUTION FACTOR

On November 25, 2020, one sample was collected near the proposed outfall location near North Street (Asset_ID: 47363 and wASSET_ID: DL14095, City of Worcester DPW) into Lake Quinsigamond and submitted to Con-Test to be analyzed for hardness, pH, ammonia, and total metals. The laboratory data report is enclosed in **Appendix B**. The results of this sampling program are provided in **Table 1**.

The pH value obtained from Con-Test and temperature readings collected in the field were used to calculate the site Water Quality Based Effluent Limitations (WQBELs). Since the receiving water is a freshwater body, salinity does not need to be analyzed on either the effluent water or receiving water.

The seven-day ten-year flow (7Q10) of the receiving water was established using the U.S. Geological Survey (USGS) StreamStats application and subsequently confirmed by Massachusetts Department of Environmental Protection (MassDEP) on December 8, 2020. We have additionally confirmed with the MassDEP that the dilution factor for the receiving waters is 8.96. The Stream Stats Report, Dilution Factor calculations, and confirmation from MassDEP are included in **Appendix C**.

EFFLUENT CRITERIA DETERMINATION

Groundwater and Receiving Water data were input into the WQBEL Calculation spreadsheet. Copies of the "EnterData" tab from the excel file provided as an additional resource by EPA will be transmitted concurrently with this application in **Appendix A**. The effluent limitations calculated are included for reference in **Table 1**.

DEWATERING SYSTEM AND OFF-SITE DISCHARGE

During construction of the building, it will be necessary to perform temporary dewatering to control water from groundwater seepage into the excavation and construction-generated water to enable construction in the-dry. Construction and construction dewatering activities are

currently anticipated to be required for a period of up to 18 months. On average, we estimate effluent discharge rates of about 30 gallons per minute (gpm) or less, with occasional peak flows of approximately 50 gpm during and after significant precipitation events. Temporary dewatering will be conducted from dewatering wells and sumps located in excavations.

Construction dewatering will include piping and discharging to storm drains located near the site that discharges into Lake Quinsigamond through the outfall near North Street. The proposed discharge routes are shown on **Figure 3**. Prior to discharge, collected water will be routed through a sedimentation tank and a minimum of two bag filters and other necessary treatment components, to remove suspended solids and undissolved chemical constituents, as shown on **Figure 4**. If required to meet discharge requirements, chemical treatments may be used on the project to meet discharge criteria. This may include granular activated carbon (GAC), oxygen, potassium permanganate, ion exchange, and/or reverse osmosis. A Notice of Change (NOC) will be submitted to EPA if additional treatment components need to be mobilized at the site.

DOCUMENTATION OF NATIONAL HISTORIC PRESERVATION ACT ELIGIBILITY REQUIREMENTS

Based on a review of the resources provided by the U.S. National Register of Historic Places and a review of the Massachusetts Cultural Resource Information System (MACRIS), no historic properties have been established to be present at the project site, and discharges and discharge-related activities are not considered to have the potential to affect historic properties. The discharge is considered to meet Criterion A. Documentation is included in **Appendix D**.

DETERMINATION OF ENDANGERED SPECIES ACT ELIGIBILITY

According to the guidelines outlined in Appendix I of the 2017 NPDES RGP, a preliminary determination for the action area associated with this project was established using the U.S. Fish and Wildlife Service (FWS) Information, Planning, and Conservation (IPAC) online system. There is one threatened, endangered, or candidate species within the geographic extent of the project boundaries. The species is the Northern Long-Eared Bat (*Myotis septentrionalis*). Since there are no critical habitats designed for this species by USFWS, Nobis reviewed a map of Long-Eared Bat locations and Hibernacula as provided by NHESP. According to this map there are no long-Eared Bats known within the Worcester area, and the closest Hibernacula is not located within the Site Boundaries, or within one mile of the outfall location. Based on the results of the determination, the project and action area are considered to meet FWS Criterion C: the operator has decided

based on the best scientific and commercial data available construction activities will have no effect on the Long-Eared Bat. A copy of the determination is attached in **Appendix E**.

OWNER AND OPERATOR INFORMATION

Owner: UMass Medical School
55 Lake Avenue North
Worcester, MA 01655
Attn: Brian Duffy, RA

Operator: Shawmut Design and Construction
560 Harrison Avenue
Boston, MA 02118
Attn: John Hartshorn

CLOSING

Thank you very much for your consideration. Please feel free to contact us should you wish to discuss the information contained herein or if you need additional information.

Sincerely,

NOBIS GROUP

Sarah A. Kurtzer
Staff Engineer

Alfred Jones
Director of Geotechnical Services

Attachments:

Table 1 – Summary of Groundwater and Receiving Water Quality Data
Figure 1 – Project Locus
Figure 2 – Site and Subsurface Exploration Location Plan
Figure 3 – Proposed Discharge Routes
Figure 4 – Proposed Treatment System Schematic
Appendix A – Notice of Intent (NOI)
Appendix B – Laboratory Data Reports
Appendix C – Dilution Factor and Effluent Limit Calculations
Appendix D – National Register of Historic Places Documentation
Appendix E – Endangered Species Act Documentation

TABLES

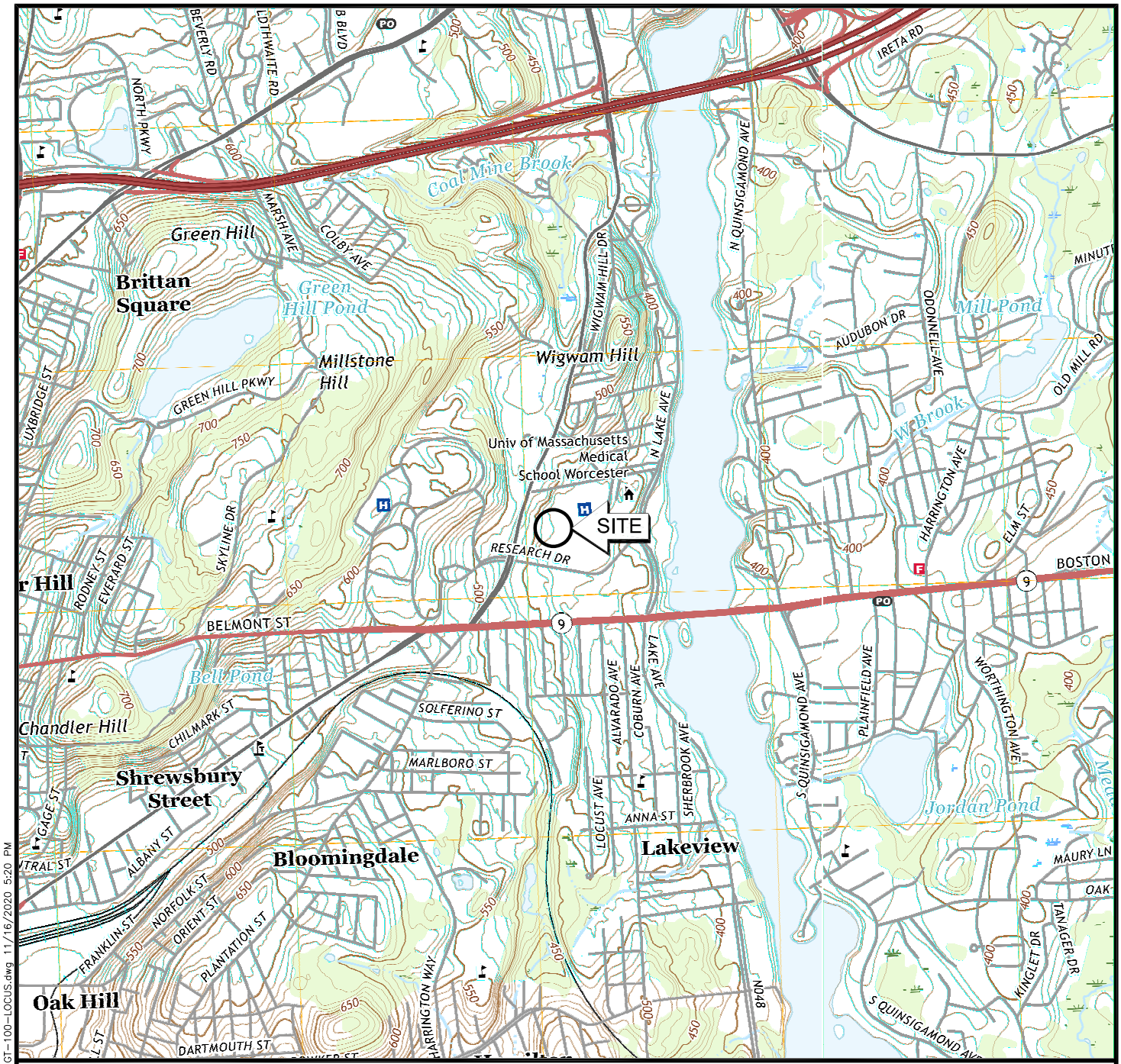
TABLE 1 - Groundwater and Surface Water Analytical Results
University of Massachusetts Medical School
New Education and Research Building
Worcester, Massachusetts

Sample ID	MCP Criteria	RGP Effluent Limits		NB-2 (OW)	NB-4 (OW)	Lake
Sample Date	RCGW-2	TBEL	WQBEL	11/24/2020 5:50-7:45PM	11/24/2020 4:30-5:30PM	11/24/2020 7:45AM
Lab Sample ID				20K1323-01	20K1323-02	20K1323-03
A. Inorganlcs						
Ammonia (mg/L)	-	Report	-	0.19	1.1	0.12
Chloride (mg/L)	-	Report	-	1200	710	-
Hardness (ug/L)	-	Report	-	260	360	74
Chlorine, Total Residual (ug/L)	-	200	11	95	360	-
Total Suspended Solids (mg/L)	-	30	-	1600	10000	-
pH @ 11.5°C	-	-	-	-	-	6.9
Total Metals (ug/L)						
Antimony	-	206	640	ND	1.2	ND
Arsenic	-	104	10	10	66	2
Cadmium	-	10.2	0.25	ND	3	ND
Chromium, hexavalent (Cr+6)	-	323	11	ND	ND	ND
Chromium, trivalent (Cr+3)	-	323	74	7.9	350	1.5
Copper	-	242	9	23	440	2.9
Iron	-	5000	1000	24000	210000	570
Lead	-	160	2.5	3.9	97	1.1
Mercury	-	0.739	0.77	ND	ND	ND
Nickel	-	1450	52	17	440	ND
Selenium	-	235.8	5	ND	5.9	ND
Silver	-	35.1	3.2	5.8	8.2	ND
Zinc	-	420	120	15	730	ND
Cyanide SW-846 9014 (mg/L)						
Total Cyanide	0.03	178	5.2	ND	ND	-
B. Non-Halogenated VOCs (ug/L)						
BTEX						
Benzene	1000	5	-	0.23	<0.18	-
Toluene	40000	-	-	<0.14	<0.14	-
Ethylbenzene	5000	-	-	<0.13	<0.13	-
Total Xylenes	-	-	-	<0.47	<0.47	-
Total BTEX	-	100	-	<0.97	<0.97	-
1,4 -Dioxane	6000	200	-	<22.5	<22.5	-
Acetone	50000	7790	-	9.37	<3.79	-
Phenol	-	1080	300	<10.0	<10.0	-
C. Halogenated VOCs (ug/L)						
Carbon Tetrachloride	-	4.4	1.6	<0.11	<0.11	-
1, 2-Dichlorobenzene	2000	600	-	<0.16	<0.16	-
1,3-Dichlorobenzene	6000	320	-	<0.12	<0.12	-
1,4-Dichlorobenzene	60	5	-	<0.13	<0.13	-
1,1-Dichloroethane	2000	70	-	<0.13	<0.13	-
1,2-Dichloroethane	5	5	-	<0.41	<0.41	-
1,1 -Dichloroethene	80	3.2	-	<0.16	<0.16	-
1,2-Dibromoethane (EDB)	2	0.05	-	<0.013	<0.013	-
Methylene chloride	2000	4.6	-	<0.34	<0.34	-
1,1,1-Trichloroethane	4000	200	-	<0.20	<0.20	-
1,1,2-Trichloroethane	900	5	-	<0.16	<0.16	-
Tetrachloroethylene	50	5	3.3	2.86	<0.18	-
Trichloroethene	5		-	<0.24	<0.24	-
cis- 1,2-Dichloroethene	20	70	-	<0.13	<0.13	-
Vinyl chloride	2	2	-	<0.45	<0.45	-

D. Non-Halogenated SVOCs						
Phthalates						
bis(2-Ethylhexyl)phthalate	50000	101	16. 1	<1.0	<1.0	-
Butylbenzylphthalate	10000	-	-	<10.0	<10.0	-
Di-N-Butylphthalate	5000	-	-	<10.0	<10.0	-
Diethylphthalate	9000	-	2.2	<10.0	<10.0	-
Dimethylphthalate	50000	-	-	<10.0	<10.0	-
Di-N-Octylphthalate	100000	-	-	<10.0	<10.0	-
Total Phthalates	-	190	-	<51.0	<51.0	-
Group I PAHs						
Benzo(a)anthracene	1000	1	0.0038	<0.05	<0.05	-
Benzo(a)pyrene	500	1	0.0038	<0.10	<0.10	-
Benzo(b)fluoranthene	400	1	0.0038	<0.05	<0.05	-
Benzo(k)fluoranthene	100	1	0.0038	<0.20	<0.20	-
Chrysene	70	1	0.0038	<0.20	<0.20	-
Dibenz(a,h)anthracene	40	1	0.0038	<0.10	<0.10	-
Indeno(1,2,3-cd)pyrene	100	1	0.0038	<0.10	<0.10	-
Total Group I PAHs	-	1	-	<0.80	<0.80	-
Group II PAHs						
Acenaphthene	6000	-	-	<0.30	<0.30	-
Acenaphthylene	40	-	-	<0.30	<0.30	-
Anthracene	30	-	-	<0.20	<0.20	-
Benzo(g,h,i)perylene	20	-	-	<0.50	<0.50	-
Fluoranthene	200	-	-	<0.50	<0.50	-
Fluorene	40	-	-	<1.0	<1.0	-
Phenanthrene	10000	-	-	<0.05	<0.05	-
Pyrene	20	-	-	<1.0	<1.0	-
Total Group II PAHs	-	100	-	<2.185	<2.185	-
Naphthalene	700	20	-	<1.0	<1.0	-
E. Halogenated SVOCs						
PCBs 608 .3 (ug/L)						
Aroc lor-1016	5	-	-	<0.0939	<0.0939	-
Aroclor-1221	5	-	-	<0.0821	<0.0821	-
Aroclor-1232	5	-	-	<0.102	<0.102	-
Aroclor-1242	5	-	-	<0.0883	<0.0883	-
Aroclor-1248	5	-	-	<0.0969	<0.0969	-
Aroclor-1254	5	-	-	<0.0536	<0.0536	-
Aroclor-1260	5	-	-	<0.10	<0.10	-
Total PCBs	-	0.000064	-	<0.6168	<0.6168	-
Pentachlorophenol	200	1	-	<0.33	<0.34	-
F. Fuel Parameters						
TPH (mg/L) (Silica Gel Treated HEM (SGT-HEM)	-	5	-	ND	ND	-
Ethanol (mg/L)	10	Report	-	81.7	<10.5	-
Methyl tert-butyl ether (ug/L)	5000	70	20	<0.25	<0.25	-
tert-Amyl Methyl Ether (TAME) (ug/L)	-	90	-	<0.14	<0.14	-
tert Butyl Alcohol (ug/L)	-	120	-	<4.17	<4.17	-

Notes:
1. TPH - Total Petroleum Hydrocarbons
2. PCBs - Polychlorinated Biphenyls
3. VOCs - Volitile Organic Compounds
4. SVOCs - Sem-Volitile Organic Compounds
5. < X.XX and/or ND indicates compound was not detected. Detection Limits are provided.
6. Boxed/Bolded values indicate exceedance of TBEL or WQBEL standard.
7. "-" means not established or not tested for.
8. TBEL - Technology Based Efluent Limit
9. WQBEL - Water Quality Based Effluent Limit
10. Final Effluent Limits to be specified in EPA Authorization.
11. RCGW-2 concentrations not shown for metals as the metals were unfiltered. Filtered analysis indicate all tested metal concentrations were below RCGW-2 levels.

FIGURES



NORTH

2018 USGS TOPOGRAPHIC MAPS

WORCESTER NORTH AND SHREWSBURY QUADRANGLES
WORCESTER, MASSACHUSETTS
CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

APPROXIMATE SCALE
1 INCH = 2,000 FEET

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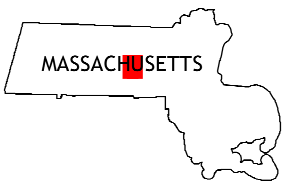

QUADRANGLE LOCATION

FIGURE 1

SITE LOCUS PLAN

UNIVERSITY OF MASSACHUSETTS MEDICAL SCHOOL
NEW EDUCATION AND RESEARCH BUILDING
WORCESTER, MASSACHUSETTS

PROJECT NO. 96950.00

DATE: DECEMBER 2020

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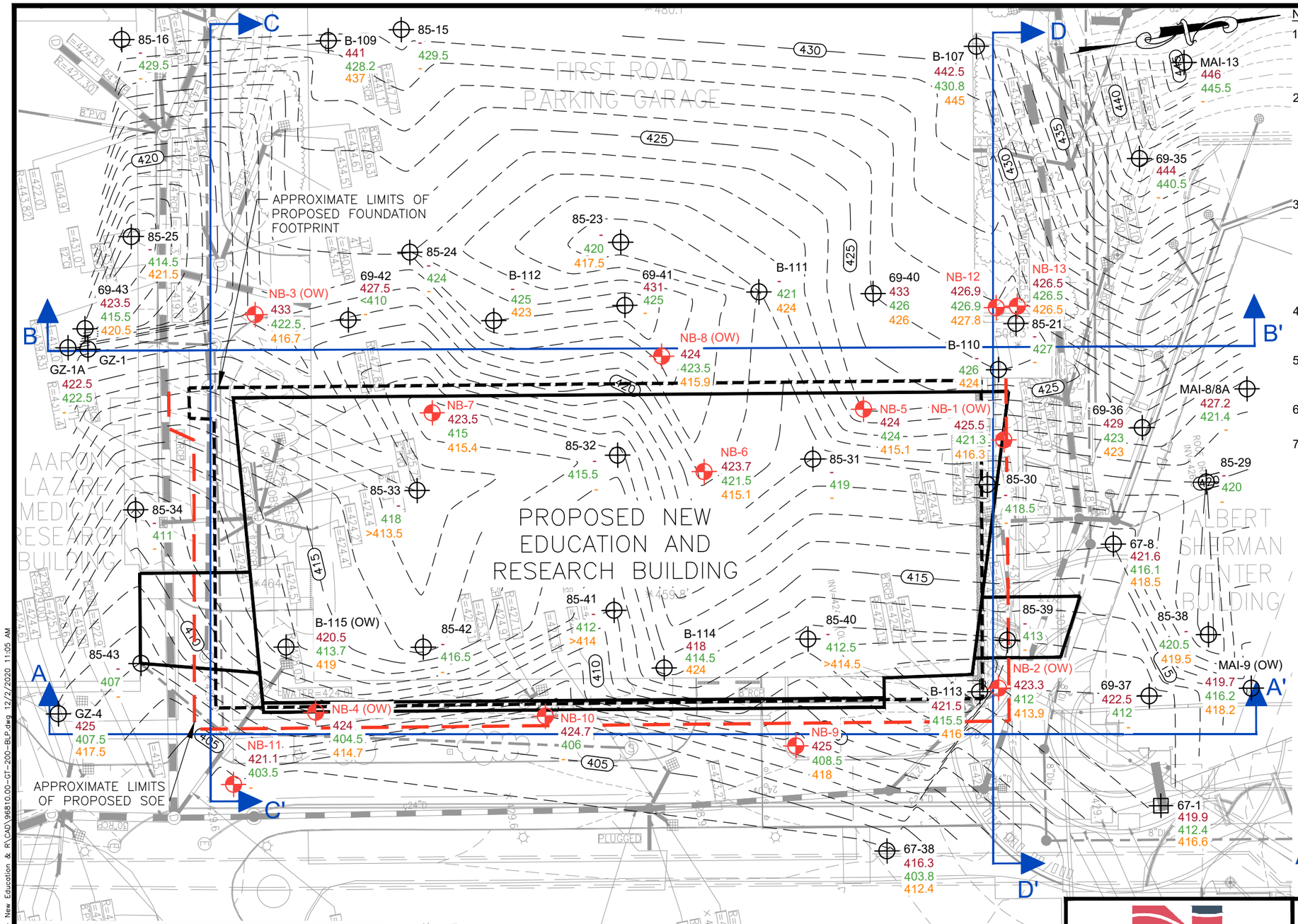

NOTES:

1. EXISTING CONDITIONS DEPICTED WERE DEVELOPED USING AN AUTOCAD DRAWING ENTITLED "EXISTING CONDITIONS PLAN OF LAND (AERIAL MAPPING)" PREPARED BY VHB AND DATED JUNE 29, 2009.
2. THE PROPOSED NEW EDUCATION AND RESEARCH BUILDING (NERB) DEPICTED WAS DEVELOPED USING THE LEVEL 1 AND LEVEL 2 PLANS INCLUDED IN THE FEASIBILITY REPORT ENTITLED "NEW EDUCATION AND RESEARCH BUILDING PROGRAMMING AND FEASIBILITY REPORT" PREPARED BY ARCHITECTURAL RESOURCES CAMBRIDGE (ARC), DATED JUNE 5, 2020.
3. SEE THE BORING LOCATION TABLE FOR THE APPROXIMATE COORDINATES AND ELEVATION OF EACH TEST BORING. EXISTING GROUND SURFACE ELEVATIONS FOR PROPOSED TEST BORINGS WITHIN THE PARKING GARAGE, NB-5 THROUGH NB-8 (OW), WERE OBTAINED FROM A DRAWING SET ENTITLED "UMMC PARKING FACILITY" PREPARED BY PAYETTE ASSOCIATES ARCHITECTS/PLANNERS, AND DATED JULY 31, 1985.
4. NOBIS BORINGS WERE PERFORMED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NEW HAMPSHIRE BETWEEN SEPTEMBER 16 AND NOVEMBER 10, 2020.
5. EXISTING BORING LOCATIONS ARE BASED ON HISTORICAL SUBSURFACE EXPLORATION LOCATION PLANS PREPARED BY OTHERS. LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
6. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
7. LOCATIONS AND SITE FEATURES DEPICTED ARE APPROXIMATE AND GIVEN FOR ILLUSTRATIVE PURPOSES.

LEGEND

- APPROXIMATE LOCATION OF NOBIS BORING; (OW) INDICATES OBSERVATION WELL WAS INSTALLED
- APPROXIMATE LOCATION OF TEST BORING BY OTHERS; 67-SERIES BORINGS PERFORMED IN OCTOBER 1967, 69-SERIES IN JUNE/JULY 1969, 85-SERIES IN JANUARY 1985, B-SERIES IN APRIL 1985, GZ-SERIES IN JUNE 1999, AND MAI-SERIES IN JUNE 2009
- APPROXIMATE LOCATION OF TEST PIT BY OTHERS IN OCTOBER 1967
- GZ-4 — BORING DESIGNATION
- 425 — APPROXIMATE ELEVATION OF BOTTOM OF FILL LAYER " - " INDICATES FILL NOT ENCOUNTERED (BORING) OR SAMPLED (PROBE)
- 407.5 — APPROXIMATE ELEVATION OF TOP OF BEDROCK BASED ON REFUSAL OR BEDROCK CORE SAMPLING
- 417.5 — APPROXIMATE ELEVATION OF GROUNDWATER TABLE " - " INDICATES GROUNDWATER NOT ENCOUNTERED OR MEASURED
- (425) — APPROXIMATE ELEVATION OF TOP OF BEDROCK BASED ON NOBIS BORINGS AND BORINGS BY OTHERS
- A A' — SUBSURFACE PROFILE LINE REFER TO FIGURES 3 THROUGH 6

BORING LOCATIONS (FEET)

BORING	NORTHING	EASTING	SURFACE EL.
NB-1 (OW)	2926363	584821	429
NB-2 (OW)	2926345	584911	429.5
NB-3 (OW)	2926097	584724	439.5
NB-4 (OW)	2926092	584874	430
NB-5	2926314	584800	428
NB-6	2926251	584812	428
NB-7	2926155	584772	428

BORING LOCATIONS (FEET)

BORING	NORTHING	EASTING	SURFACE EL.
NB-8 (OW)	2926243	584767	428
NB-9	2926266	584919	429
NB-10	2926176	584891	429
NB-11	2926057	584895	429.5
NB-12	2926369	584771	432
NB-13	2926377	584772	430.5

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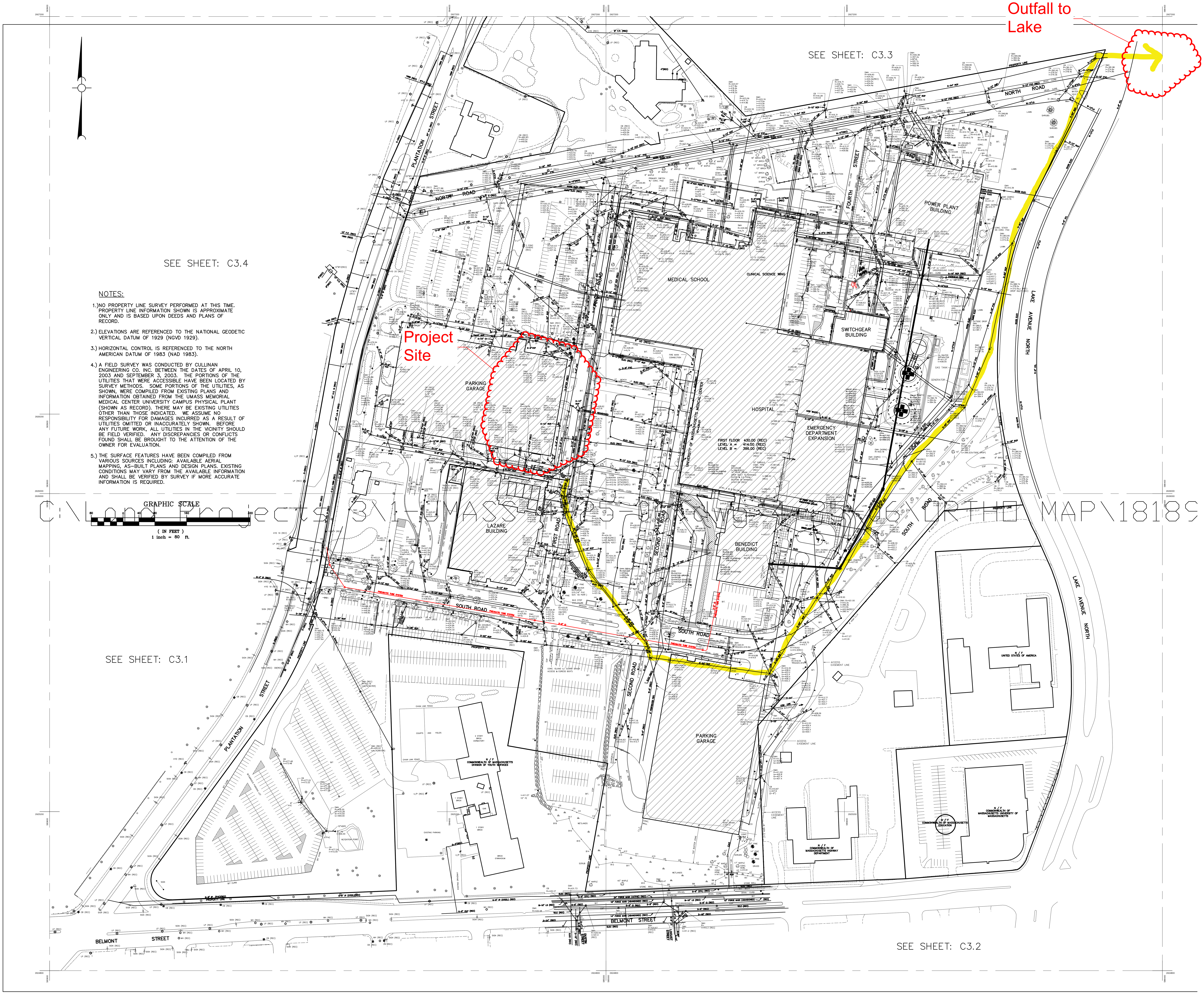
FIGURE 2

BORING LOCATION PLAN
UNIVERSITY OF MASSACHUSETTS MEDICAL SCHOOL
NEW EDUCATION AND RESEARCH BUILDING
WORCESTER, MASSACHUSETTS

DRAWN BY:	PC	CHECKED BY:	AJ
PROJECT NO.	96810.00	DATE:	DECEMBER 2020


Outfall to
Lake
Project
Site
SEE SHEET: C3.3
SEE SHEET: C3.4
SEE SHEET: C3.1
SEE SHEET: C3.2
NOTES:
1.) NO PROPERTY LINE SURVEY PERFORMED AT THIS TIME. PROPERTY LINE INFORMATION SHOWN IS APPROXIMATE ONLY AND IS BASED UPON DEEDS AND PLANS OF RECORD.
2.) ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929).
3.) HORIZONTAL CONTROL IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 1983).
4.) A FIELD SURVEY WAS CONDUCTED BY CULLINAN ENGINEERING CO. INC. BETWEEN THE DATES OF APRIL 10, 2003 AND SEPTEMBER 3, 2003. THE PORTIONS OF THE UTILITIES THAT WERE ACCESSIBLE HAVE BEEN LOCATED BY SURVEY METHODS. SOME PORTIONS OF THE UTILITIES, AS SHOWN, WERE COMPILED FROM EXISTING PLANS AND INFORMATION OBTAINED FROM THE UMASS MEMORIAL MEDICAL CENTER UNIVERSITY CAMPUS PHYSICAL PLANT (SHOWN AS RECORD). THERE MAY BE EXISTING UTILITIES OTHER THAN THOSE INDICATED. WE ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE ANY FUTURE WORK, ALL UTILITIES IN THE VICINITY SHOULD BE FIELD VERIFIED. ANY DISCREPANCIES OR CONFLICTS FOUND SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER FOR EVALUATION.
5.) THE SURFACE FEATURES HAVE BEEN COMPILED FROM VARIOUS SOURCES INCLUDING: AVAILABLE AERIAL MAPPING, AS-BUILT PLANS AND DESIGN PLANS. EXISTING CONDITIONS MAY VARY FROM THE AVAILABLE INFORMATION AND SHALL BE VERIFIED BY SURVEY IF MORE ACCURATE INFORMATION IS REQUIRED.
GRAPHIC SCALE
(IN FEET)
1 inch = 80 ft.
PLANTATION STREET
NORTH ROAD
FOURTH STREET
POWER PLANT BUILDING
MEDICAL SCHOOL
CLINICAL SCIENCE WING
SWITCHGEAR BUILDING
PARKING GARAGE
HOSPITAL
FIRST FLOOR 430.00 (REC)
LEVEL A = 414.00 (REC)
LEVEL B = 398.00 (REC)
EMERGENCY DEPARTMENT EXPANSION
LAKE AVENUE NORTH
LAZARE BUILDING
FIRST ROAD
SECOND ROAD
BENEDICT BUILDING
SOUTH ROAD
PARKING GARAGE
UNITED STATES OF AMERICA
COMMONWEALTH OF MASSACHUSETTS DIVISION OF YOUTH SERVICES
COMMONWEALTH OF MASSACHUSETTS HIGHWAY DEPARTMENT
COMMONWEALTH OF MASSACHUSETTS UNIVERSITY OF MASSACHUSETTS
BELMONT STREET

C 3.0

COMPILED FACILITIES PLAN - SHEET LAYOUT - SUBSURFACE FEATURES
PREPARED FOR:
WORCESTER CITY CAMPUS CORP.
UNIVERSITY OF MASSACHUSETTS
WORCESTER, MASSACHUSETTS

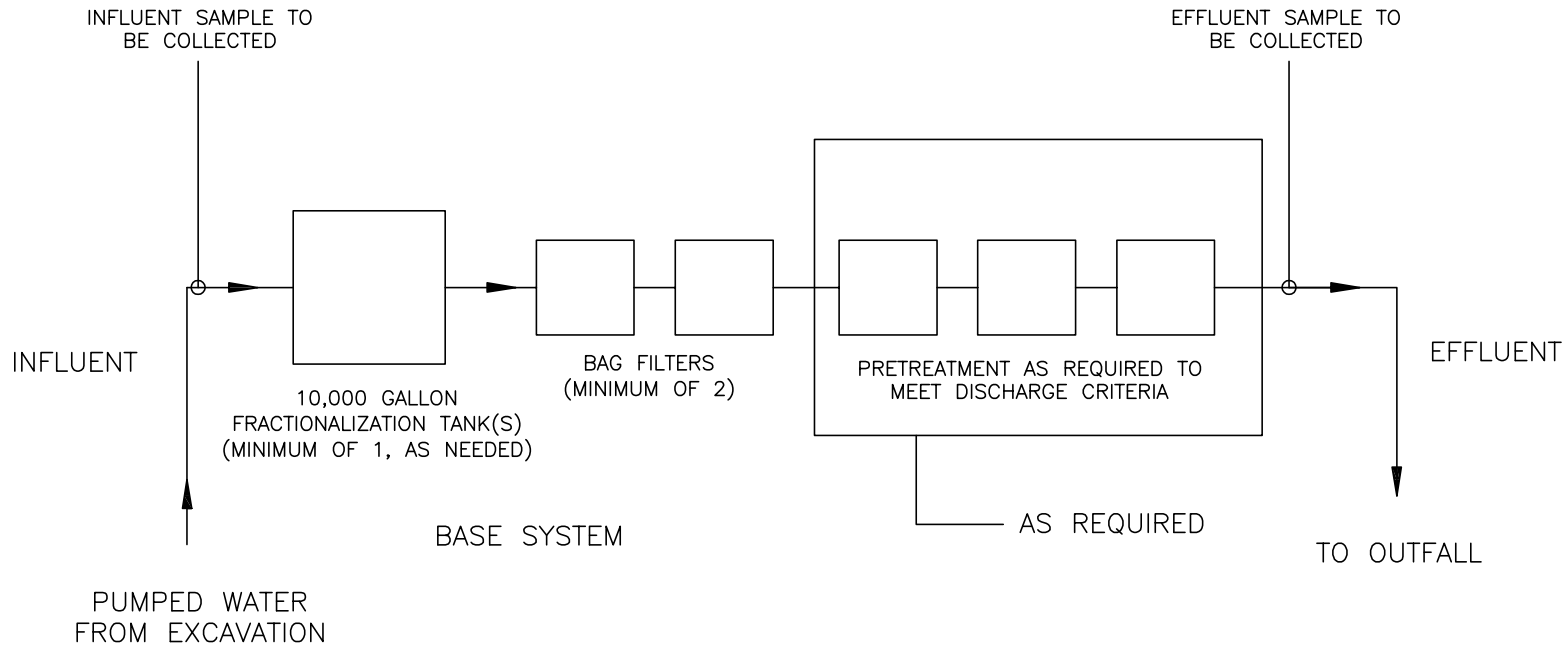
DATE	ISSUE	REVISION	DES.	DWN.	CHK.	APP.
DATE MAY 15, 2006		DESCRIPTION	DCR	PNG		DCR

SCALE AS NOTED
PLAN NUMBER 20400159 / C15 / 06

CULLINAN ENGINEERING

PROGRESS PRINT

PLAN FILE # 20400159 / C15 / 06
ELEC FILE # 20400159-SC-4-25-06.DWG



NOTES:
1. DETAILS OF TREATMENT SYSTEM MAY VARY FROM SYSTEM INDICATED SPECIFIC MEANS AND METHODS OF TREATMENT TO BE SELECTED BY CONTRACTOR. WATER WILL BE TREATED TO MEET REQUIRED EFFLUENT STANDARDS.
2. IF REQUIRED, POTENTIAL PRETREATMENT OPTIONS INCLUDE GRANULAR ACTIVATED CARBON (GAC) AND ION EXCHANGE.

LEGEND:

DIRECTION OF FLOW →

nobis
Nobis Group®
585 Middlesex Street
Lowell, MA 01851
T(978) 683-0891
www.nobis-group.com

FIGURE 4

WATER TREATMENT SCHEMATIC PLAN
UNIVERSITY OF MASSACHUSETTS MEDICAL SCHOOL
NEW EDUCATION AND RESEARCH BUILDING
WORCESTER, MASSACHUSETTS

DRAWN BY:	SAK	CHECKED BY:	AJ
PROJECT NO.	96810.00	DATE:	DECEMBER 2020

APPENDIX A – NOTICE OF INTENT (NOI)

II. Suggested Format for the Remediation General Permit Notice of Intent (NOI)

A. General site information:

<table>
<tr><td rowspan="2">1. Name of site:
University of Massachusetts Medical School (UMMS)
New Education and Research Building</td><td colspan="3">Site address: 55 Lake Avenue North
Street:</td></tr>
<tr><td>City: Worcester</td><td>State: MA</td><td>Zip: 01655</td></tr>
<tr><td rowspan="4">2. Site owner
University of Massachusetts Medical School

Owner is (check one): ☐ Federal ☐ State/Tribal ■ Private
☐ Other; if so, specify:</td><td colspan="3">Contact Person: Brian Duffy, RA</td></tr>
<tr><td colspan="2">Telephone: 508-856-9906</td><td>Email: brian.duffy@umassmed.edu</td></tr>
<tr><td colspan="3">Mailing address: 55 Lake Avenue North
Street:</td></tr>
<tr><td>City: Worcester</td><td>State: MA</td><td>Zip: 01655</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Shawmut Design and Construction</td><td colspan="3">Contact Person: John Hartshorn</td></tr>
<tr><td colspan="2">Telephone: 617-828-6936</td><td>Email: Jhartshorn@shawmut.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 560 Harrison Avenue</td></tr>
<tr><td>City: Boston</td><td>State: MA</td><td>Zip: 02118</td></tr>
<tr><td>4. NPDES permit number assigned by EPA:
N/A

NPDES permit is (check all that apply: ■ RGP ☐ DGP ☐ CGP
☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:</td><td colspan="3">5. Other regulatory program(s) that apply to the site (check all that apply):
■ MA Chapter 21e; list RTN(s):
RNF Submitted, RTN Pending
☐ NH Groundwater Management Permit or Groundwater Release Detection Permit:
☐ CERCLA
☐ UIC Program
☐ POTW Pretreatment
☐ CWA Section 404</td></tr>
</table>

B. Receiving water information:

1. Name of receiving water(s):	Waterbody identification of receiving water(s):	Classification of receiving water(s):
Lake Quinsigamond	MA51125	B

Receiving water is (check any that apply): ■ Outstanding Resource Water ☐ Ocean Sanctuary ☐ territorial sea ☐ Wild and Scenic River

2. Has the operator attached a location map in accordance with the instructions in B, above? (check one): ■ Yes ☐ No

Are sensitive receptors present near the site? (check one): ☐ Yes ■ No
If yes, specify:

3. Indicate if the receiving water(s) is listed in the State's Integrated List of Waters (i.e., CWA Section 303(d)). Include which designated uses are impaired, and any pollutants indicated. Also, indicate if a final TMDL is available for any of the indicated pollutants. For more information, contact the appropriate State as noted in Part 4.6 of the RGP. NA

4. Indicate the seven day-ten-year low flow (7Q10) of the receiving water determined in accordance with the instructions in Appendix V for sites located in Massachusetts and Appendix VI for sites located in New Hampshire.	0.554 MGD
5. Indicate the requested dilution factor for the calculation of water quality-based effluent limitations (WQBELs) determined in accordance with the instructions in Appendix V for sites in Massachusetts and Appendix VI for sites in New Hampshire.	8.69

6. Has the operator received confirmation from the appropriate State for the 7Q10and dilution factor indicated? (check one): ■ Yes ☐ No
If yes, indicate date confirmation received: 12/08/2020

7. Has the operator attached a summary of receiving water sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No

C. Source water information:

1. Source water(s) is (check any that apply):

■ Contaminated groundwater Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No	☐ Contaminated surface water Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☐ Yes ☐ No	☐ The receiving water ☐ A surface water other than the receiving water; if so, indicate waterbody:	☐ Potable water; if so, indicate municipality or origin: ☐ Other; if so, specify:

2. Source water contaminants: total residual chlorine, total suspended solids, various metals, ethanol	
a. For source waters that are contaminated groundwater or contaminated surface water, indicate are any contaminants present that are not included in the RGP? (check one): ☐ Yes ■ No If yes, indicate the contaminant(s) and the maximum concentration present in accordance with the instructions in Appendix VIII.	b. For a source water that is a surface water other than the receiving water, potable water or other, indicate any contaminants present at the maximum concentration in accordance with the instructions in Appendix VIII? (check one): ☐ Yes ☐ No
3. Has the source water been previously chlorinated or otherwise contains residual chlorine? (check one): ☐ Yes ■ No	

D. Discharge information

1.The discharge(s) is a(n) (check any that apply): ☐ Existing discharge ■ New discharge ☐ New source	
Outfall(s): Asset_ID: 47363 and wASSET_ID: DL14095 (Worcester DPW)	Outfall location(s): (Latitude, Longitude) 42°16'46.1"N 71°45'28.9"W
Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ☐ Indirect discharge, if so, specify: Discharge via catch basins located adjacent to the Site as par of the UMMS drainage system, and through the City of Worcester Drainage System, as sho ■ A private storm sewer system ■ A municipal storm sewer system If the discharge enters the receiving water via a private or municipal storm sewer system: Has notification been provided to the owner of this system? (check one): ■ Yes ☐ No Has the operator has received permission from the owner to use such system for discharges? (check one): ☐ Yes ■ No, if so, explain, with an estimated timeframe for obtaining permission: Permission will be obtained by the City of Worcester DPW prior to discharging through their system. Has the operator attached a summary of any additional requirements the owner of this system has specified? (check one): ☐ Yes ■ No	
Provide the expected start and end dates of discharge(s) (month/year): 01/2021 - 08/2022 Indicate if the discharge is expected to occur over a duration of: ☐ less than 12 months ■ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No	

<table>
<tr><td>2. Activity Category: (check all that apply)</td><td colspan="2">3. Contamination Type Category: (check all that apply)</td></tr>
<tr><td rowspan="4">☐ I – Petroleum-Related Site Remediation
☐ II – Non-Petroleum-Related Site Remediation
■ III – Contaminated Site Dewatering
☐ IV – Dewatering of Pipelines and Tanks
☐ V – Aquifer Pump Testing
☐ VI – Well Development/Rehabilitation
☐ VII – Collection Structure Dewatering/Remediation
☐ VIII – Dredge-Related Dewatering</td><td colspan="2">a. If Activity Category I or II: (check all that apply)

☐ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td></tr>
<tr><td colspan="2">b. If Activity Category III, IV, V, VI, VII or VIII: (check either G or H)</td></tr>
<tr><td>■ G. Sites with Known Contamination</td><td>☐ H. Sites with Unknown Contamination</td></tr>
<tr><td>c. If Category III-G, IV-G, V-G, VI-G, VII-G or VIII-G: (check all that apply)

■ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
■ F. Fuels Parameters</td><td>d. If Category III-H, IV-H, V-H, VI-H, VII-H or VIII-H Contamination Type Categories A through F apply</td></tr>
</table>

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		✔	2	EPA 350.1	0.1 mg/l	1.1 mg/L	.645 mg/L	Report mg/L	---
Chloride		✔	2	EPA 300.0	50	1200	955	Report µg/l	---
Total Residual Chlorine		✔	2	SM21-22	.02	0.36 mg/L	0.2275 mg/L	0.2 mg/L	11 µg/L
Total Suspended Solids		✔	2	SM21-22	17	10000 mg/L	5800 mg/L	30 mg/L	---
Antimony		✔	2	EPA 200.8	1.0	1.2	1.2	206 µg/L	640 µg/L
Arsenic		✔	2	EPA 200.8	0.80	66	38	104 µg/L	10 µg/L
Cadmium		✔	2	EPA 200.8	0.20	3.0	3.0	10.2 µg/L	0.25 µg/L
Chromium III		✔	2	EPA	1.0	350	178.95	323 µg/L	74 µg/L
Chromium VI	✔		2	SM21-22	4.0	<0.004	<0.004	323 µg/L	11 µg/L
Copper		✔	2	EPA 200.8	1.0	440	440	242 µg/L	9 µg/L
Iron		✔	2	EPA 200.7	50	210000	117000	5,000 µg/L	1,000 µg/L
Lead		✔	2	EPA 200.8	0.50	97	50.5	160 µg/L	2.5 µg/L
Mercury	✔		2	EPA 245.1	0.1	<0.1	<0.1	0.739 µg/L	0.77 µg/L
Nickel		✔	2	EPA 200.8	5.0	440	228.5	1,450 µg/L	52 µg/L
Selenium		✔	2	EPA 200.8	5.0	5.9	5.9	235.8 µg/L	5.0 µg/L
Silver		✔	2	EPA 200.8	0.2	8.2	7.0	35.1 µg/L	3.2 µg/L
Zinc		✔	2	EPA 200.8	10.0	730	372.5	420 µg/L	120 µg/L
Cyanide	✔		2	SM21-22	50	<50	<50	178 mg/L	5.2 µg/L
B. Non-Halogenated VOCs									
Total BTEX	✔		2	See Below		69.33	69.33	100 µg/L	---
Benzene		✔	2	624.1	0.180	0.23	0.23	5.0 µg/L	---
1,4 Dioxane	✔		2	624.1	22.5	<50	<50	200 µg/L	---
Acetone	✔		2	624.1	0.00379	0.00937 mg/L	0.00937 mg/L	7.97 mg/L	---
Phenol	✔		2	624.1	10.1	<10.1	<10.1	1,080 µg/L	300 µg/L

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
C. Halogenated VOCs									
Carbon Tetrachloride	✔		2	624.1	0.11	<0.11	<0.11	4.4 µg/L	1.6 µg/L
1,2 Dichlorobenzene	✔		2	624.1	0.16	<0.16	<0.16	600 µg/L	---
1,3 Dichlorobenzene	✔		2	624.1	0.12	<0.12	<0.12	320 µg/L	---
1,4 Dichlorobenzene	✔		2	624.1	0.13	<0.13	<0.13	5.0 µg/L	---
Total dichlorobenzene	✔		2	624.1		<0.5	<0.5	763 µg/L in NH	---
1,1 Dichloroethane	✔		2	624.1	0.16	<0.16	<0.16	70 µg/L	---
1,2 Dichloroethane	✔		2	624.1	0.41	<0.41	<0.41	5.0 µg/L	---
1,1 Dichloroethylene	✔		2	624.1	0.32	<0.32	<0.32	3.2 µg/L	---
Ethylene Dibromide			2	EPA 504.1	0.013	<0.013	<0.013	0.05 µg/L	---
Methylene Chloride	✔		2	624.1	0.34	<0.34	<0.34	4.6 µg/L	---
1,1,1 Trichloroethane	✔		2	624.1	0.2	<0.2	<0.2	200 µg/L	---
1,1,2 Trichloroethane	✔		2	624.1	0.16	<0.16	<0.16	5.0 µg/L	---
Trichloroethylene	✔		2	624.1	0.24	<0.24	<0.24	5.0 µg/L	---
Tetrachloroethylene		✔	2	624.1	0.18	2.86	2.86	5.0 µg/L	3.3 µg/L
cis-1,2 Dichloroethylene	✔		2	624.1	0.13	<0.13	<0.13	70 µg/L	---
Vinyl Chloride	✔		2	624.1	0.45	<0.45	<0.45	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✔		2	625.1	10.0	<10.0	<10.0	190 µg/L	NA
Diethylhexyl phthalate	✔		2	625.1	10.0	<10.0	<10.0	101 µg/L	2.2 µg/L
Total Group I PAHs	✔		2	625.1	1.0	<1.0	<1.0	1.0 µg/L	---
Benzo(a)anthracene	✔		2	625.1	0.051	<0.051	<0.051	As Total PAHs	0.0038 µg/L
Benzo(a)pyrene	✔		2	625.1	0.10	<0.10	<0.10		0.0038 µg/L
Benzo(b)fluoranthene	✔		2	625.1	0.051	<0.050	<0.050		0.0038 µg/L
Benzo(k)fluoranthene	✔		2	625.1	0.2	<0.20	<0.20		0.0038 µg/L
Chrysene	✔		2	625.1	0.2	<0.20	<0.20		0.0038 µg/L
Dibenzo(a,h)anthracene	✔		2	625.1	0.1	<0.10	<0.10		0.0038 µg/L
Indeno(1,2,3-cd)pyrene	✔		2	625.1	0.1	<0.10	<0.10		0.0038 µg/L

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
Total Group II PAHs	✔		2	625.1		<1.0	<1.0	100 µg/L	---
Naphthalene	✔		2	625.1	1.0	<1.0	<1.0	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs	✔		2	608.3	.11	<0.11	<0.11	0.000064 µg/L	---
Pentachlorophenol			2	625.1	0.34	<0.34	<0.34	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons	✔		2	EPA	14	<1.6	<14.0	5.0 mg/L	---
Ethanol		✔	2	624.1	0.0105	0.0817 mg/L	0.0817 mg/L	Report mg/L	---
Methyl-tert-Butyl Ether	✔		2	624.1	0.25	<2.0	<2.0	70 µg/L	20 µg/L
tert-Butyl Alcohol	✔		2	624.1	4.17	<20	<20	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		2	624.1	0.14	<0.5	<0.5	90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
Hardness	✔		2	EPA 200.7	1.4	360	310		

E. Treatment system information

1. Indicate the type(s) of treatment that will be applied to effluent prior to discharge: (check all that apply)

☐ Adsorption/Absorption ☐ Advanced Oxidation Processes ☐ Air Stripping ■ Granulated Activated Carbon ("GAC")/Liquid Phase Carbon Adsorption

■ Ion Exchange ☐ Precipitation/Coagulation/Flocculation ■ Separation/Filtration ☐ Other; if so, specify:

Carbon and Ion Exchange will be used if required.

2. Provide a written description of all treatment system(s) or processes that will be applied to the effluent prior to discharge.

Groundwater will be pumped from the excavation into a 10,000 gallon weir tank. From the weir tank, water will go into multiple bag filtration via 3" submersible pump. After bag filtration, and if necessary, water will flow through GAC and/or Ion Exchange treatment.. A flow meter will be used prior to being discharged into a catch basin for ultimate discharge to the City of Worcester's stormwater drainage system.

Identify each major treatment component (check any that apply):

■ Fractionation tanks☐ Equalization tank ☐ Oil/water separator ■ Mechanical filter ■ Media filter

☐ Chemical feed tank ☐ Air stripping unit ■ Bag filter ☐ Other; if so, specify:

Indicate if either of the following will occur (check any that apply):

☐ Chlorination ☐ De-chlorination

3. Provide the **design flow capacity** in gallons per minute (gpm) of the most limiting component. Indicate the most limiting component: Granular activated carbon and ion exchange vessels Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	50 gpm
Provide the proposed maximum effluent flow in gpm.	50 gpm
Provide the average effluent flow in gpm.	30 gpm
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:	

4. Has the operator attached a schematic of flow in accordance with the instructions in E, above? (check one): ■ Yes ☐ No

F. Chemical and additive information

1. Indicate the type(s) of chemical or additive that will be applied to effluent prior to discharge or that may otherwise be present in the discharge(s): (check all that apply)

☐ Algaecides/biocides ☐ Antifoams ☐ Coagulants ☐ Corrosion/scale inhibitors ☐ Disinfectants ☐ Flocculants ☐ Neutralizing agents ☐ Oxidants ☐ Oxygen ☐ scavengers ☐ pH conditioners ☐ Bioremedial agents, including microbes ☐ Chlorine or chemicals containing chlorine ☐ Other; if so, specify:
N/A

2. Provide the following information for each chemical/additive, using attachments, if necessary:
N/A
a. Product name, chemical formula, and manufacturer of the chemical/additive;
b. Purpose or use of the chemical/additive or remedial agent;
c. Material Safety Data Sheet (MSDS) and Chemical Abstracts Service (CAS) Registry number for each chemical/additive;
d. The frequency (hourly, daily, etc.), duration (hours, days), quantity (maximum and average), and method of application for the chemical/additive;
e. Any material compatibility risks for storage and/or use including the control measures used to minimize such risks; and
f. If available, the vendor's reported aquatic toxicity (NOAEL and/or LC50 in percent for aquatic organism(s)).

3. Has the operator attached an explanation which demonstrates that the addition of such chemicals/additives may be authorized under this general permit in accordance with the instructions in F, above? (check one): ■ Yes ■ No; if no, has the operator attached data that demonstrates each of the 126 priority pollutants in CWA Section 307(a) and 40 CFR Part 423.15(j)(1) are non-detect in discharges with the addition of the proposed chemical/additive?
(check one): ☐ Yes ☐ No

G. Endangered Species Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

☐ **FWS Criterion A**: No endangered or threatened species or critical habitat are in proximity to the discharges or related activities or come in contact with the "action area".

☐ **FWS Criterion B**: Formal or informal consultation with the FWS under section 7 of the ESA resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by FWS on a finding that the discharges and related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation). Has the operator completed consultation with FWS? (check one): ☐ Yes ☐ No; if no, is consultation underway? (check one): ☐ Yes ☐ No

■ **FWS Criterion C**: Using the best scientific and commercial data available, the effect of the discharges and related activities on listed species and critical habitat have been evaluated. Based on those evaluations, a determination is made by EPA, or by the operator and affirmed by EPA, that the discharges and related activities will have "no effect" on any federally threatened or endangered listed species or designated critical habitat under the jurisdiction of the FWS. This determination was made by: (check one) ■ the operator ☐ EPA ☐ Other; if so, specify:

☐ **NMFS Criterion**: A determination made by EPA is affirmed by the operator that the discharges and related activities will have "no effect" or are "not likely to adversely affect" any federally threatened or endangered listed species or critical habitat under the jurisdiction of NMFS and will not result in any take of listed species. Has the operator previously completed consultation with NMFS? (check one): ☐ Yes ■ No

2. Has the operator attached supporting documentation of ESA eligibility in accordance with the instructions in Appendix I, and G, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written concurrence or finding provided by the Services? (check one): ☐ Yes ■ No; if yes, attach.

H. National Historic Preservation Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

■ **Criterion A**: No historic properties are present. The discharges and discharge-related activities (e.g., BMPs) do not have the potential to cause effects on historic properties.

☐ **Criterion B**: Historic properties are present. Discharges and discharge related activities do not have the potential to cause effects on historic properties.

☐ **Criterion C**: Historic properties are present. The discharges and discharge-related activities have the potential to have an effect or will have an adverse effect on historic properties.

2. Has the operator attached supporting documentation of NHPA eligibility in accordance with the instructions in H, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written agreement with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (TPHO), or other tribal representative that outlines measures the operator will carry out to mitigate or prevent any adverse effects on historic properties? (check one): ☐ Yes ■ No

I. Supplemental information

Describe any supplemental information being provided with the NOI. Include attachments if required or otherwise necessary.

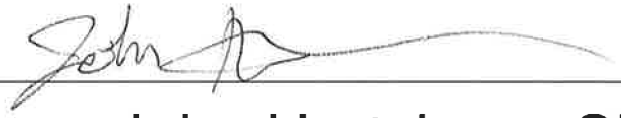
None

Has the operator attached data, including any laboratory case narrative and chain of custody used to support the application? (check one): ■ Yes ☐ No

Has the operator attached the certification requirement for the Best Management Practices Plan (BMPP)? (check one): ☐ Yes ■ No

J. Certification requirement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

BMPP certification statement: A BMPP meeting the requirement of this general permit will be developed and submitted to the MassDEP.	
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ■ No ☐
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐ NA ■
Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission.	Check one: Yes ☐ No ☐ NA ■
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	Check one: Yes ■ No ☐ NA ■
Signature: 	Date:
Print Name and Title: John Hartshorn, Site Superintendent	

Enter number values in green boxes based on the instructions to the right

Notes: Revised 1-24-20

Enter values in the units specified

↓	
0.554	Q_R = Enter upstream flow in **MGD**
0.072	Q_P = Enter discharge flow in **MGD**
0.554	Downstream 7Q10

Freshwater: leave 0 unless 7Q10 or alternate Q_R AND a dilution factor >1 approved by the State;
Saltwater (estuarine and marine): leave 0 unless QR approved by the State
Enter the design flow or 1 MGD, whichever is less (100 gpm design flow = 0.144 MGD and is entered by default)
Leave 0 unless Q_R approved by the State

Enter a dilution factor for saltwater receiving water (this box does not apply to freshwater receiving waters)

↓
0

Freshwater: leave 0
Saltwater (estuarine and marine): leave 0 unless DF approved by the State

Enter values in the units specified

↓	
360	C_d = Enter influent hardness in **mg/L** $CaCO_3$
74	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

Applies to freshwater receiving waters only

Enter **receiving water** concentrations in the units specified

pH, temperature, and ammonia required for all discharges
Hardness required for freshwater
Salinity required for saltwater (estuarine and marine)
Metals required for all discharges if detected in the influent and if dilution factor approved by State
Enter 0 if non-detect or testing not required
If receiving water is not listed as impaired for metals in State 303(d) List, change to "no" using dropdown

↓		Impaired for metals? ↓
6.9	pH in **Standard Units**	
10.3	Temperature in **°C**	
0.12	Ammonia in **mg/L**	
74	Hardness in **mg/L** $CaCO_3$	
0	Salinity in **ppt**	
0	Antimony in **µg/L**	no
2	Arsenic in **µg/L**	no
0	Cadmium in **µg/L**	yes
1.5	Chromium III in **µg/L**	yes
0	Chromium VI in **µg/L**	yes
2.9	Copper in **µg/L**	yes
570	Iron in **µg/L**	yes
1.1	Lead in **µg/L**	yes
0	Mercury in **µg/L**	yes
0	Nickel in **µg/L**	yes
0	Selenium in **µg/L**	yes
0	Silver in **µg/L**	yes
0	Zinc in **µg/L**	yes

Enter **influent** concentrations in the units specified

if >1 sample, enter maximum influent measurement
if >10 samples, may enter 95th percentile of influent measurements using
EPA's *Technical Support Document for Water Quality-based Toxics Control*
Enter 0 if non-detect or testing not required

↓	
0.36	TRC in **µg/L**
1.1	Ammonia in **mg/L**
1.2	Antimony in **µg/L**
66	Arsenic in **µg/L**
3	Cadmium in **µg/L**
350	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
440	Copper in **µg/L**
210000	Iron in **µg/L**
97	Lead in **µg/L**
0	Mercury in **µg/L**
440	Nickel in **µg/L**
5.9	Selenium in **µg/L**
8.2	Silver in **µg/L**
730	Zinc in **µg/L**
0	Cyanide in **µg/L**
<10.1	Phenol in **µg/L**
<0.110	Carbon Tetrachloride in **µg/L**
<0.180	Tetrachloroethylene in **µg/L**
<10	Total Phthalates in **µg/L**
<1.0	Diethylhexylphthalate in **µg/L**
<0.051	Benzo(a)anthracene in **µg/L**
<0.10	Benzo(a)pyrene in **µg/L**
<0.051	Benzo(b)fluoranthene in **µg/L**
<0.20	Benzo(k)fluoranthene in **µg/L**
<0.20	Chrysene in **µg/L**
<0.10	Dibenzo(a,h)anthracene in **µg/L**
<0.10	Indeno(1,2,3-cd)pyrene in **µg/L**
<0.250	Methyl-tert butyl ether in **µg/L**

APPENDIX B – LABORATORY DATA REPORTS

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

December 14, 2020

Adam Roy
Nobis Engineering
585 Middlesex Street
Lowell, MA 01851

Project Location: Worcester, MA
Client Job Number:
Project Number: [none]
Laboratory Work Order Number: 20K1323

Enclosed are results of analyses for samples received by the laboratory on November 25, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Michelle M. Koch
Project Manager

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con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Nobis Engineering
585 Middlesex Street
Lowell, MA 01851
ATTN: Adam Roy

REPORT DATE: 12/14/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20K1323

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Worcester, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
NB-2	20K1323-01	Ground Water		608.3	
				624.1	
				625.1	
				EPA 1664B	
				EPA 200.7	
				EPA 200.8	
				EPA 245.1	
				EPA 300.0	
				EPA 350.1	
				EPA 504.1	
				SM21-22 2540D	
				SM21-22 3500 Cr B	
				SM21-22 4500 CL G	
				SM21-22 4500 CN E	MA M-MA-086/CT PH-0574/NY11148
				Tri Chrome Calc.	
NB-4	20K1323-02	Ground Water		608.3	
				624.1	
				625.1	
				EPA 1664B	
				EPA 200.7	
				EPA 200.8	
				EPA 245.1	
				EPA 300.0	
				EPA 350.1	
				EPA 504.1	
				SM21-22 2540D	
				SM21-22 3500 Cr B	
				SM21-22 4500 CL G	
				SM21-22 4500 CN E	MA M-MA-086/CT PH-0574/NY11148
				Tri Chrome Calc.	
Lake	20K1323-03	Surface Water		EPA 200.7	
				EPA 200.8	
				EPA 245.1	
				EPA 350.1	
				SM21-22 3500 Cr B	
				SM21-22 4500 H B	
				Tri Chrome Calc.	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

REVISED REPORT -per client - report 504-EDB and pentachlorophenol for samples 01 and 02 12/9/2020

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

624.1

Qualifications:

L-01

Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.

Analyte & Samples(s) Qualified:

1,4-Dioxane
B271771-BS1

tert-Amyl Methyl Ether (TAME)
B271771-BS1

L-05

Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.

Analyte & Samples(s) Qualified:

Ethanol
20K1323-01[NB-2], B271771-BS1

625.1

Qualifications:

S-07

One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.

Analyte & Samples(s) Qualified:

2,4,6-Tribromophenol
B271854-BS1

p-Terphenyl-d14
20K1323-01[NB-2]

EPA 1664B

Qualifications:

DL-03

Elevated reporting limit due to matrix interference.

Analyte & Samples(s) Qualified:

Silica Gel Treated HEM (SGT-HEM
20K1323-02[NB-4]

EPA 200.8

Qualifications:

R-04

Duplicate relative percent difference (RPD) is a less useful indicator of sample precision for sample results that are <5 times the reporting limit (RL).

Analyte & Samples(s) Qualified:

Nickel
20K1323-01[NB-2], B271832-DUP1

EPA 300.0

Qualifications:

MS-07

Matrix spike recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery.Possibility of sample matrix effects that lead to low bias for reported result or non-homogeneous sample aliquot cannot be eliminated.

Analyte & Samples(s) Qualified:

Chloride
20K1323-01[NB-2], B271736-MS1

EPA 504.1

Qualifications:

con-test® ANALYTICAL LABORATORY
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H-10

Analysis was requested after the recommended holding time had passed.

Analyte & Samples(s) Qualified:

20K1323-01[NB-2], 20K1323-02[NB-4]

SM21-22 4500 H B

Qualifications:

H-05

Holding time was exceeded. pH analysis should be performed immediately at time of sampling. Nominal 15 minute holding time was exceeded.

Analyte & Samples(s) Qualified:

pH

20K1323-03[Lake], B271708-DUP1

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01 | Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 7:45:00PM

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	9.37	50.0	3.79	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
tert-Amyl Methyl Ether (TAME)	<0.140	0.500	0.140	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Benzene	0.230	1.00	0.180	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
tert-Butyl Alcohol (TBA)	<4.17	20.0	4.17	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Carbon Tetrachloride	<0.110	2.00	0.110	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,2-Dichlorobenzene	<0.160	2.00	0.160	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,3-Dichlorobenzene	<0.120	2.00	0.120	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,4-Dichlorobenzene	<0.130	2.00	0.130	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,2-Dichloroethane	<0.410	2.00	0.410	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
cis-1,2-Dichloroethylene	<0.130	1.00	0.130	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,1-Dichloroethane	<0.160	2.00	0.160	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,1-Dichloroethylene	<0.320	2.00	0.320	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,4-Dioxane	<22.5	50.0	22.5	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Ethanol	81.7	50.0	10.5	µg/L	1	L-05	624.1	11/30/20	11/30/20 22:11	EEH
Ethylbenzene	<0.130	2.00	0.130	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Methyl tert-Butyl Ether (MTBE)	<0.250	2.00	0.250	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Methylene Chloride	<0.340	5.00	0.340	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Tetrachloroethylene	2.86	2.00	0.180	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Toluene	<0.140	1.00	0.140	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,1,1-Trichloroethane	<0.200	2.00	0.200	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
1,1,2-Trichloroethane	<0.160	2.00	0.160	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Trichloroethylene	<0.240	2.00	0.240	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
Vinyl Chloride	<0.450	2.00	0.450	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
m+p Xylene	<0.300	2.00	0.300	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH
o-Xylene	<0.170	1.00	0.170	µg/L	1		624.1	11/30/20	11/30/20 22:11	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	100	70-130		11/30/20 22:11
Toluene-d8	103	70-130		11/30/20 22:11
4-Bromofluorobenzene	98.8	70-130		11/30/20 22:11

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01 | Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 7:45:00PM

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene (SIM)	<0.033	0.30	0.033	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Acenaphthylene (SIM)	<0.035	0.30	0.035	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Anthracene (SIM)	<0.032	0.20	0.032	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Benzo(a)anthracene (SIM)	<0.016	0.050	0.016	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Benzo(a)pyrene (SIM)	<0.012	0.10	0.012	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Benzo(b)fluoranthene (SIM)	<0.015	0.050	0.015	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Benzo(g,h,i)perylene (SIM)	<0.018	0.50	0.018	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Benzo(k)fluoranthene (SIM)	<0.012	0.20	0.012	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Bis(2-ethylhexyl)phthalate (SIM)	<0.43	1.0	0.43	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Chrysene (SIM)	<0.015	0.20	0.015	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Dibenz(a,h)anthracene (SIM)	<0.017	0.10	0.017	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Fluoranthene (SIM)	<0.025	0.50	0.025	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Fluorene (SIM)	<0.034	1.0	0.034	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Indeno(1,2,3-cd)pyrene (SIM)	<0.018	0.10	0.018	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Naphthalene (SIM)	<0.26	1.0	0.26	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Pentachlorophenol (SIM)	<0.33	1.0	0.33	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW
Phenanthrene (SIM)	0.049	0.050	0.030	µg/L	1	J	625.1	12/1/20	12/2/20 15:12	RMW
Pyrene (SIM)	<0.023	1.0	0.023	µg/L	1		625.1	12/1/20	12/2/20 15:12	RMW

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
2-Fluorophenol (SIM)	37.5		15-110		12/2/20 15:12
Phenol-d6 (SIM)	25.9		15-110		12/2/20 15:12
Nitrobenzene-d5	72.4		30-130		12/2/20 15:12
2-Fluorobiphenyl	66.3		30-130		12/2/20 15:12
2,4,6-Tribromophenol (SIM)	89.6		15-110		12/2/20 15:12
p-Terphenyl-d14	**131**	*	30-130	S-07	12/2/20 15:12

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01 | Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 7:45:00PM

Semivolatile Organic Compounds by - GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Butylbenzylphthalate	<0.295	10.0	0.295	µg/L	1		625.1	12/1/20	12/2/20 17:30	IMR
Di-n-butylphthalate	<0.458	10.0	0.458	µg/L	1		625.1	12/1/20	12/2/20 17:30	IMR
Diethylphthalate	0.260	10.0	0.225	µg/L	1	J	625.1	12/1/20	12/2/20 17:30	IMR
Dimethylphthalate	<0.307	10.0	0.307	µg/L	1		625.1	12/1/20	12/2/20 17:30	IMR
Di-n-octylphthalate	<0.522	10.0	0.522	µg/L	1		625.1	12/1/20	12/2/20 17:30	IMR
Phenol	<0.198	10.0	0.198	µg/L	1		625.1	12/1/20	12/2/20 17:30	IMR

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	40.9	15-110		12/2/20 17:30
Phenol-d6	30.1	15-110		12/2/20 17:30
Nitrobenzene-d5	64.5	30-130		12/2/20 17:30
2-Fluorobiphenyl	68.8	30-130		12/2/20 17:30
2,4,6-Tribromophenol	91.1	15-110		12/2/20 17:30
p-Terphenyl-d14	81.8	30-130		12/2/20 17:30

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA
Sample Description:
Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01
Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water
Stop Date/Time: 11/24/2020 7:45:00PM

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	<0.0939	0.102	0.0939	µg/L	1		608.3	12/1/20	12/3/20 13:35	SFM
Aroclor-1221 [1]	<0.0821	0.102	0.0821	µg/L	1		608.3	12/1/20	12/3/20 13:35	SFM
Aroclor-1232 [1]	<0.102	0.102	0.102	µg/L	1		608.3	12/1/20	12/3/20 13:35	SFM
Aroclor-1242 [1]	<0.0883	0.102	0.0883	µg/L	1		608.3	12/1/20	12/3/20 13:35	SFM
Aroclor-1248 [1]	<0.0969	0.102	0.0969	µg/L	1		608.3	12/1/20	12/3/20 13:35	SFM
Aroclor-1254 [1]	<0.0536	0.102	0.0536	µg/L	1		608.3	12/1/20	12/3/20 13:35	SFM
Aroclor-1260 [1]	<0.100	0.102	0.100	µg/L	1		608.3	12/1/20	12/3/20 13:35	SFM

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	63.1	30-150		12/3/20 13:35
Decachlorobiphenyl [2]	70.2	30-150		12/3/20 13:35
Tetrachloro-m-xylene [1]	78.6	30-150		12/3/20 13:35
Tetrachloro-m-xylene [2]	84.6	30-150		12/3/20 13:35

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA
Sample Description:
Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01
Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water
Stop Date/Time: 11/24/2020 7:45:00PM

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Arsenic	10	0.80		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Cadmium	ND	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Chromium	7.9	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Chromium, Trivalent	0.0079			mg/L	1		Tri Chrome Calc.	11/30/20	12/1/20 12:03	QNW
Copper	23	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Iron	24	0.050		mg/L	1		EPA 200.7	11/30/20	12/1/20 14:56	MJH
Lead	3.9	0.50		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Mercury	ND	0.00010		mg/L	1		EPA 245.1	11/30/20	12/1/20 12:00	ICP
Nickel	17	5.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Selenium	ND	5.0	1.6	µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Silver	5.8	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW
Zinc	15	10		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:03	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01 | Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 7:45:00PM

Metals Analyses (Dissolved)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW
Arsenic	3.7	0.80		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW
Cadmium	ND	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW
Copper	7.6	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW
Iron	19	0.050		mg/L	1		EPA 200.7	11/30/20	12/1/20 10:36	MJH
Lead	ND	0.50		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW
Mercury	ND	0.00010		mg/L	1		EPA 245.1	11/30/20	12/1/20 12:19	ICP
Nickel	11	5.0		µg/L	1	R-04	EPA 200.8	11/30/20	12/1/20 11:23	QNW
Selenium	ND	5.0	1.6	µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW
Silver	ND	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW
Zinc	ND	10		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:23	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01 | Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 7:45:00PM

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ammonia as N	0.19	0.10		mg/L	1		EPA 350.1	12/2/20	12/2/20 15:27	MMH
Chloride	1200	50		mg/L	50	MS-07	EPA 300.0	11/28/20	11/28/20 15:10	EC
Chlorine, Residual	0.095	0.020		mg/L	1		SM21-22 4500 CL G	11/25/20	11/25/20 14:45	DJM
Hexavalent Chromium	ND	0.0040		mg/L	1		SM21-22 3500 Cr B	11/25/20	11/25/20 16:00	DJM
Total Suspended Solids	1600	17		mg/L	1		SM21-22 2540D	11/30/20	11/30/20 11:55	LL
Silica Gel Treated HEM (SGT-HEM)	ND	1.6	0.79	mg/L	1		EPA 1664B	12/2/20	12/2/20 10:20	LL

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Project Location: Worcester, MA
Sample Description:
Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01
Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water
Stop Date/Time: 11/24/2020 7:45:00PM

Sample Flags: H-10

Drinking Water Organics EPA 504.1

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,2-Dibromoethane (EDB) (1)	ND	0.021	0.013	µg/L	1		EPA 504.1	12/11/20	12/11/20 20:11	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
1,3-Dibromopropane (1)	104	70-130		12/11/20	20:11

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Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-2

Sample ID: 20K1323-01 | Start Date/Time: 11/24/2020 5:50:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 7:45:00PM

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Cyanide	ND	0.05		mg/L	1		SM21-22 4500 CN E		12/3/20 18:03	AAL

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Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02 | Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 5:00:00PM

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	<3.79	50.0	3.79	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
tert-Amyl Methyl Ether (TAME)	<0.140	0.500	0.140	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Benzene	<0.180	1.00	0.180	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
tert-Butyl Alcohol (TBA)	<4.17	20.0	4.17	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Carbon Tetrachloride	<0.110	2.00	0.110	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,2-Dichlorobenzene	<0.160	2.00	0.160	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,3-Dichlorobenzene	<0.120	2.00	0.120	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,4-Dichlorobenzene	<0.130	2.00	0.130	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,2-Dichloroethane	<0.410	2.00	0.410	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
cis-1,2-Dichloroethylene	<0.130	1.00	0.130	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,1-Dichloroethane	<0.160	2.00	0.160	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,1-Dichloroethylene	<0.320	2.00	0.320	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,4-Dioxane	<22.5	50.0	22.5	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Ethanol	<10.5	50.0	10.5	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Ethylbenzene	<0.130	2.00	0.130	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Methyl tert-Butyl Ether (MTBE)	<0.250	2.00	0.250	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Methylene Chloride	<0.340	5.00	0.340	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Tetrachloroethylene	<0.180	2.00	0.180	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Toluene	<0.140	1.00	0.140	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,1,1-Trichloroethane	<0.200	2.00	0.200	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
1,1,2-Trichloroethane	<0.160	2.00	0.160	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Trichloroethylene	<0.240	2.00	0.240	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
Vinyl Chloride	<0.450	2.00	0.450	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
m+p Xylene	<0.300	2.00	0.300	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH
o-Xylene	<0.170	1.00	0.170	µg/L	1		624.1	11/30/20	11/30/20 22:39	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	102	70-130		11/30/20 22:39
Toluene-d8	104	70-130		11/30/20 22:39
4-Bromofluorobenzene	98.1	70-130		11/30/20 22:39

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Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02 | Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 5:00:00PM

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene (SIM)	<0.033	0.30	0.033	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Acenaphthylene (SIM)	<0.035	0.30	0.035	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Anthracene (SIM)	<0.032	0.20	0.032	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Benzo(a)anthracene (SIM)	<0.016	0.051	0.016	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Benzo(a)pyrene (SIM)	<0.012	0.10	0.012	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Benzo(b)fluoranthene (SIM)	<0.015	0.051	0.015	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Benzo(g,h,i)perylene (SIM)	<0.018	0.51	0.018	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Benzo(k)fluoranthene (SIM)	<0.012	0.20	0.012	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Bis(2-ethylhexyl)phthalate (SIM)	<0.43	1.0	0.43	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Chrysene (SIM)	<0.015	0.20	0.015	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Dibenz(a,h)anthracene (SIM)	<0.017	0.10	0.017	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Fluoranthene (SIM)	<0.025	0.51	0.025	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Fluorene (SIM)	<0.034	1.0	0.034	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Indeno(1,2,3-cd)pyrene (SIM)	<0.018	0.10	0.018	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Naphthalene (SIM)	<0.26	1.0	0.26	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Pentachlorophenol (SIM)	<0.34	1.0	0.34	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Phenanthrene (SIM)	<0.030	0.051	0.030	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW
Pyrene (SIM)	<0.023	1.0	0.023	µg/L	1		625.1	12/1/20	12/2/20 15:41	RMW

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol (SIM)	44.6	15-110		12/2/20 15:41
Phenol-d6 (SIM)	28.2	15-110		12/2/20 15:41
Nitrobenzene-d5	83.5	30-130		12/2/20 15:41
2-Fluorobiphenyl	83.9	30-130		12/2/20 15:41
2,4,6-Tribromophenol (SIM)	102	15-110		12/2/20 15:41
p-Terphenyl-d14	78.1	30-130		12/2/20 15:41

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Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02 | Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 5:00:00PM

Semivolatile Organic Compounds by - GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Butylbenzylphthalate	<0.298	10.1	0.298	µg/L	1		625.1	12/1/20	12/2/20 17:53	IMR
Di-n-butylphthalate	<0.463	10.1	0.463	µg/L	1		625.1	12/1/20	12/2/20 17:53	IMR
Diethylphthalate	<0.227	10.1	0.227	µg/L	1		625.1	12/1/20	12/2/20 17:53	IMR
Dimethylphthalate	<0.310	10.1	0.310	µg/L	1		625.1	12/1/20	12/2/20 17:53	IMR
Di-n-octylphthalate	<0.527	10.1	0.527	µg/L	1		625.1	12/1/20	12/2/20 17:53	IMR
Phenol	<0.200	10.1	0.200	µg/L	1		625.1	12/1/20	12/2/20 17:53	IMR

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	47.6	15-110		12/2/20 17:53
Phenol-d6	33.2	15-110		12/2/20 17:53
Nitrobenzene-d5	76.3	30-130		12/2/20 17:53
2-Fluorobiphenyl	80.0	30-130		12/2/20 17:53
2,4,6-Tribromophenol	99.8	15-110		12/2/20 17:53
p-Terphenyl-d14	92.5	30-130		12/2/20 17:53

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Project Location: Worcester, MA
Sample Description:
Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02
Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water
Stop Date/Time: 11/24/2020 5:00:00PM

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	<0.101	0.110	0.101	µg/L	1		608.3	12/1/20	12/3/20 13:53	SFM
Aroclor-1221 [1]	<0.0885	0.110	0.0885	µg/L	1		608.3	12/1/20	12/3/20 13:53	SFM
Aroclor-1232 [1]	<0.109	0.110	0.109	µg/L	1		608.3	12/1/20	12/3/20 13:53	SFM
Aroclor-1242 [1]	<0.0951	0.110	0.0951	µg/L	1		608.3	12/1/20	12/3/20 13:53	SFM
Aroclor-1248 [1]	<0.104	0.110	0.104	µg/L	1		608.3	12/1/20	12/3/20 13:53	SFM
Aroclor-1254 [1]	<0.0577	0.110	0.0577	µg/L	1		608.3	12/1/20	12/3/20 13:53	SFM
Aroclor-1260 [1]	<0.108	0.110	0.108	µg/L	1		608.3	12/1/20	12/3/20 13:53	SFM

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	85.7	30-150		12/3/20 13:53
Decachlorobiphenyl [2]	95.1	30-150		12/3/20 13:53
Tetrachloro-m-xylene [1]	83.5	30-150		12/3/20 13:53
Tetrachloro-m-xylene [2]	89.0	30-150		12/3/20 13:53

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Project Location: Worcester, MA
Sample Description:
Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02
Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water
Stop Date/Time: 11/24/2020 5:00:00PM

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	1.2	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Arsenic	66	0.80		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Cadmium	3.0	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Chromium	350	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Chromium, Trivalent	0.35			mg/L	1		Tri Chrome Calc.	11/30/20	12/1/20 12:06	QNW
Copper	440	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Iron	210	0.050		mg/L	1		EPA 200.7	11/30/20	12/1/20 15:03	MJH
Lead	97	0.50		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Mercury	ND	0.00010		mg/L	1		EPA 245.1	11/30/20	12/1/20 12:02	ICP
Nickel	440	5.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Selenium	5.9	5.0	1.6	µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Silver	8.2	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW
Zinc	730	10		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:06	QNW

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Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02 | Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 5:00:00PM

Metals Analyses (Dissolved)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Arsenic	0.92	0.80		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Cadmium	ND	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Copper	6.8	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Iron	3.5	0.050		mg/L	1		EPA 200.7	11/30/20	12/1/20 10:41	MJH
Lead	ND	0.50		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Mercury	ND	0.00010		mg/L	1		EPA 245.1	11/30/20	12/1/20 12:20	ICP
Nickel	19	5.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Selenium	ND	5.0	1.6	µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Silver	ND	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW
Zinc	ND	10		µg/L	1		EPA 200.8	11/30/20	12/1/20 11:26	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02 | Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water | Stop Date/Time: 11/24/2020 5:00:00PM

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ammonia as N	1.1	0.10		mg/L	1		EPA 350.1	12/2/20	12/2/20 15:27	MMH
Chloride	710	25		mg/L	25		EPA 300.0	11/28/20	11/28/20 16:17	EC
Chlorine, Residual	0.36	0.020		mg/L	1		SM21-22 4500 CL G	11/25/20	11/25/20 14:45	DJM
Hexavalent Chromium	ND	0.0040		mg/L	1		SM21-22 3500 Cr B	11/25/20	11/25/20 16:00	DJM
Total Suspended Solids	10000	50		mg/L	1		SM21-22 2540D	11/30/20	11/30/20 11:55	LL
Silica Gel Treated HEM (SGT-HEM)	ND	14	6.8	mg/L	1	DL-03	EPA 1664B	12/2/20	12/2/20 10:20	LL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA
Sample Description:
Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02
Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water
Stop Date/Time: 11/24/2020 5:00:00PM

Sample Flags: H-10

Drinking Water Organics EPA 504.1

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,2-Dibromoethane (EDB) (1)	ND	0.021	0.013	µg/L	1		EPA 504.1	12/11/20	12/11/20 20:33	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
1,3-Dibromopropane (1)	104	70-130		12/11/20	20:33

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Project Location: Worcester, MA
Sample Description:
Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: NB-4

Sample ID: 20K1323-02
Start Date/Time: 11/24/2020 4:30:00PM

Sample Matrix: Ground Water
Stop Date/Time: 11/24/2020 5:00:00PM

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Cyanide	ND	0.05		mg/L	1		SM21-22 4500 CN E		12/3/20 18:24	AAL

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Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: Lake | Sampled: 11/25/2020 07:45

Sample ID: 20K1323-03

Sample Matrix: Surface Water

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Arsenic	2.0	0.80		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Cadmium	ND	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Chromium	1.5	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Chromium, Trivalent	0.0015			mg/L	1		Tri Chrome Calc.	11/30/20	12/1/20 12:22	QNW
Copper	2.9	1.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Iron	0.57	0.050		mg/L	1		EPA 200.7	11/30/20	12/1/20 15:09	MJH
Lead	1.1	0.50		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Mercury	ND	0.00010		mg/L	1		EPA 245.1	11/30/20	12/1/20 12:03	ICP
Nickel	ND	5.0		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Selenium	ND	5.0	1.6	µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Silver	ND	0.20		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Zinc	ND	10		µg/L	1		EPA 200.8	11/30/20	12/1/20 12:22	QNW
Hardness	74	1.4		mg/L	1		EPA 200.7	11/30/20	12/3/20 13:55	AJL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester, MA | Sample Description: | Work Order: 20K1323

Date Received: 11/25/2020

Field Sample #: Lake | Sampled: 11/25/2020 07:45

Sample ID: 20K1323-03

Sample Matrix: Surface Water

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ammonia as N	0.12	0.10		mg/L	1		EPA 350.1	12/2/20	12/2/20 15:29	MMH
Hexavalent Chromium	ND	0.0040		mg/L	1		SM21-22 3500 Cr B	11/25/20	11/25/20 16:00	DJM
pH @11.5°C	6.9			pH Units	1	H-05	SM21-22 4500 H B	11/25/20	11/25/20 18:40	RAV

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Sample Extraction Data

Prep Method: SW-846 3510C **Analytical Method: 608.3**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271856	980	5.00	12/01/20
20K1323-02 [NB-4]	B271856	910	5.00	12/01/20

Prep Method: SW-846 5030B **Analytical Method: 624.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271771	5	5.00	11/30/20
20K1323-02 [NB-4]	B271771	5	5.00	11/30/20

Prep Method: SW-846 3510C **Analytical Method: 625.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271854	1000	1.00	12/01/20
20K1323-02 [NB-4]	B271854	990	1.00	12/01/20

Prep Method: SW-846 3510C **Analytical Method: 625.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271985	1000	1.00	12/01/20
20K1323-02 [NB-4]	B271985	990	1.00	12/01/20

EPA 1664B

Lab Number [Field ID]	Batch	Initial [mL]	Date
20K1323-01 [NB-2]	B271924	850	12/02/20
20K1323-02 [NB-4]	B271924	100	12/02/20

Prep Method: EPA 200.7 **Analytical Method: EPA 200.7**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271829	50.0	50.0	11/30/20
20K1323-02 [NB-4]	B271829	50.0	50.0	11/30/20
20K1323-03 [Lake]	B271829	50.0	50.0	11/30/20
20K1323-03 [Lake]	B271829	50.0		11/30/20

Prep Method: EPA 200.7 Dissolved **Analytical Method: EPA 200.7**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271831	50.0	50.0	11/30/20
20K1323-02 [NB-4]	B271831	50.0	50.0	11/30/20

Prep Method: EPA 200.8 **Analytical Method: EPA 200.8**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271830	50.0	50.0	11/30/20
20K1323-02 [NB-4]	B271830	50.0	50.0	11/30/20

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Sample Extraction Data

Prep Method: EPA 200.8 **Analytical Method: EPA 200.8**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-03 [Lake]	B271830	50.0	50.0	11/30/20

Prep Method: EPA 200.8 Dissolved **Analytical Method: EPA 200.8**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271832	50.0	50.0	11/30/20
20K1323-02 [NB-4]	B271832	50.0	50.0	11/30/20

Prep Method: EPA 245.1 **Analytical Method: EPA 245.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271793	6.00	6.00	11/30/20
20K1323-02 [NB-4]	B271793	6.00	6.00	11/30/20
20K1323-03 [Lake]	B271793	6.00	6.00	11/30/20

Prep Method: EPA 245.1 Dissolved **Analytical Method: EPA 245.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271794	6.00	6.00	11/30/20
20K1323-02 [NB-4]	B271794	6.00	6.00	11/30/20

Prep Method: EPA 300.0 **Analytical Method: EPA 300.0**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271736	10.0	10.0	11/28/20
20K1323-02 [NB-4]	B271736	10.0	10.0	11/28/20

EPA 350.1

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271859	100	100	12/02/20
20K1323-02 [NB-4]	B271859	100	100	12/02/20
20K1323-03 [Lake]	B271859	100	100	12/02/20

Prep Method: EPA 504 water **Analytical Method: EPA 504.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B272667	33.5	35.0	12/11/20
20K1323-02 [NB-4]	B272667	33.4	35.0	12/11/20

SM21-22 2540D

Lab Number [Field ID]	Batch	Initial [mL]	Date
20K1323-01 [NB-2]	B271754	30.0	11/30/20
20K1323-02 [NB-4]	B271754	10.0	11/30/20

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Sample Extraction Data

SM21-22 3500 Cr B

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271714	50.0	50.0	11/25/20
20K1323-02 [NB-4]	B271714	50.0	50.0	11/25/20
20K1323-03 [Lake]	B271714	50.0	50.0	11/25/20

SM21-22 4500 CL G

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K1323-01 [NB-2]	B271718	100	100	11/25/20
20K1323-02 [NB-4]	B271718	100	100	11/25/20

SM21-22 4500 H B

Lab Number [Field ID]	Batch	Initial [mL]	Date
20K1323-03 [Lake]	B271708	50.0	11/25/20

Prep Method: EPA 200.8 **Analytical Method: Tri Chrome Calc.**

Lab Number [Field ID]	Batch	Initial [mL]	Date
20K1323-01 [NB-2]	B271830	50.0	11/30/20
20K1323-02 [NB-4]	B271830	50.0	11/30/20
20K1323-03 [Lake]	B271830	50.0	11/30/20

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B271771 - SW-846 5030B												
Blank (B271771-BLK1)				Prepared & Analyzed: 11/30/20								
Acetone	ND	50.0	µg/L									
tert-Amyl Methyl Ether (TAME)	ND	0.500	µg/L									
Benzene	ND	1.00	µg/L									
tert-Butyl Alcohol (TBA)	ND	20.0	µg/L									
Carbon Tetrachloride	ND	2.00	µg/L									
1,2-Dichlorobenzene	ND	2.00	µg/L									
1,3-Dichlorobenzene	ND	2.00	µg/L									
1,4-Dichlorobenzene	ND	2.00	µg/L									
1,2-Dichloroethane	ND	2.00	µg/L									
cis-1,2-Dichloroethylene	ND	1.00	µg/L									
1,1-Dichloroethane	ND	2.00	µg/L									
1,1-Dichloroethylene	ND	2.00	µg/L									
1,4-Dioxane	ND	50.0	µg/L									
Ethanol	ND	50.0	µg/L									
Ethylbenzene	ND	2.00	µg/L									
Methyl tert-Butyl Ether (MTBE)	ND	2.00	µg/L									
Methylene Chloride	ND	5.00	µg/L									
Tetrachloroethylene	ND	2.00	µg/L									
Toluene	ND	1.00	µg/L									
1,1,1-Trichloroethane	ND	2.00	µg/L									
1,1,2-Trichloroethane	ND	2.00	µg/L									
Trichloroethylene	ND	2.00	µg/L									
Vinyl Chloride	ND	2.00	µg/L									
m+p Xylene	ND	2.00	µg/L									
o-Xylene	ND	1.00	µg/L									
Surrogate: 1,2-Dichloroethane-d4	*22.6*		µg/L	25.0		90.5		70-130				
Surrogate: Toluene-d8	*25.8*		µg/L	25.0		103		70-130				
Surrogate: 4-Bromofluorobenzene	*25.6*		µg/L	25.0		102		70-130				
LCS (B271771-BS1)				Prepared & Analyzed: 11/30/20								
Acetone	220	50.0	µg/L	200		109		70-160				†
tert-Amyl Methyl Ether (TAME)	26	0.500	µg/L	20.0		**131**	*	70-130			L-01	
Benzene	22	1.00	µg/L	20.0		110		65-135				
tert-Butyl Alcohol (TBA)	260	20.0	µg/L	200		131		40-160				†
Carbon Tetrachloride	18	2.00	µg/L	20.0		90.8		70-130				
1,2-Dichlorobenzene	17	2.00	µg/L	20.0		83.6		65-135				
1,3-Dichlorobenzene	17	2.00	µg/L	20.0		87.2		70-130				
1,4-Dichlorobenzene	16	2.00	µg/L	20.0		81.2		65-135				
1,2-Dichloroethane	18	2.00	µg/L	20.0		90.3		70-130				
cis-1,2-Dichloroethylene	23	1.00	µg/L	20.0		114		70-130				
1,1-Dichloroethane	23	2.00	µg/L	20.0		115		70-130				
1,1-Dichloroethylene	19	2.00	µg/L	20.0		95.6		50-150				
1,4-Dioxane	690	50.0	µg/L	200		**345**	*	40-130			L-01	†
Ethanol	350	50.0	µg/L	200		**173**	*	40-160			L-05	
Ethylbenzene	19	2.00	µg/L	20.0		94.0		60-140				
Methyl tert-Butyl Ether (MTBE)	25	2.00	µg/L	20.0		123		70-130				
Methylene Chloride	23	5.00	µg/L	20.0		117		60-140				
Tetrachloroethylene	19	2.00	µg/L	20.0		94.4		70-130				
Toluene	22	1.00	µg/L	20.0		108		70-130				
1,1,1-Trichloroethane	20	2.00	µg/L	20.0		99.4		70-130				
1,1,2-Trichloroethane	23	2.00	µg/L	20.0		113		70-130				
Trichloroethylene	21	2.00	µg/L	20.0		103		65-135				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271771 - SW-846 5030B										
LCS (B271771-BS1)				Prepared & Analyzed: 11/30/20						
Vinyl Chloride	15	2.00	µg/L	20.0		73.0	5-195			
m+p Xylene	37	2.00	µg/L	40.0		92.4	70-130			
o-Xylene	19	1.00	µg/L	20.0		93.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	*21.9*		µg/L	25.0		87.6	70-130			
Surrogate: Toluene-d8	*26.2*		µg/L	25.0		105	70-130			
Surrogate: 4-Bromofluorobenzene	*27.2*		µg/L	25.0		109	70-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271985 - SW-846 3510C										
Blank (B271985-BLK1)				Prepared: 12/01/20 Analyzed: 12/02/20						
Acenaphthene (SIM)	ND	0.30	µg/L							
Acenaphthylene (SIM)	ND	0.30	µg/L							
Anthracene (SIM)	ND	0.20	µg/L							
Benzo(a)anthracene (SIM)	ND	0.050	µg/L							
Benzo(a)pyrene (SIM)	ND	0.10	µg/L							
Benzo(b)fluoranthene (SIM)	ND	0.050	µg/L							
Benzo(g,h,i)perylene (SIM)	ND	0.50	µg/L							
Benzo(k)fluoranthene (SIM)	ND	0.20	µg/L							
Bis(2-ethylhexyl)phthalate (SIM)	ND	1.0	µg/L							
Chrysene (SIM)	ND	0.20	µg/L							
Dibenz(a,h)anthracene (SIM)	ND	0.10	µg/L							
Fluoranthene (SIM)	ND	0.50	µg/L							
Fluorene (SIM)	ND	1.0	µg/L							
Indeno(1,2,3-cd)pyrene (SIM)	ND	0.10	µg/L							
Naphthalene (SIM)	ND	1.0	µg/L							
Pentachlorophenol (SIM)	ND	1.0	µg/L							
Phenanthrene (SIM)	ND	0.050	µg/L							
Pyrene (SIM)	ND	1.0	µg/L							
Surrogate: 2-Fluorophenol (SIM)	*89.2*		µg/L	200		44.6	15-110			
Surrogate: Phenol-d6 (SIM)	*58.7*		µg/L	200		29.4	15-110			
Surrogate: Nitrobenzene-d5	*84.0*		µg/L	100		84.0	30-130			
Surrogate: 2-Fluorobiphenyl	*92.1*		µg/L	100		92.1	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*207*		µg/L	200		103	15-110			
Surrogate: p-Terphenyl-d14	*85.1*		µg/L	100		85.1	30-130			
LCS (B271985-BS1)				Prepared: 12/01/20 Analyzed: 12/02/20						
Acenaphthene (SIM)	42.4	6.0	µg/L	50.0		84.8	47-145			
Acenaphthylene (SIM)	42.7	6.0	µg/L	50.0		85.4	33-145			
Anthracene (SIM)	47.2	4.0	µg/L	50.0		94.4	27-133			
Benzo(a)anthracene (SIM)	44.7	1.0	µg/L	50.0		89.4	33-143			
Benzo(a)pyrene (SIM)	44.4	2.0	µg/L	50.0		88.8	17-163			
Benzo(b)fluoranthene (SIM)	49.4	1.0	µg/L	50.0		98.8	24-159			
Benzo(g,h,i)perylene (SIM)	45.3	10	µg/L	50.0		90.6	10-219			
Benzo(k)fluoranthene (SIM)	46.5	4.0	µg/L	50.0		93.1	11-162			
Bis(2-ethylhexyl)phthalate (SIM)	45.7	20	µg/L	50.0		91.5	8-158			
Chrysene (SIM)	44.8	4.0	µg/L	50.0		89.6	17-168			
Dibenz(a,h)anthracene (SIM)	47.9	2.0	µg/L	50.0		95.8	10-227			
Fluoranthene (SIM)	47.1	10	µg/L	50.0		94.2	26-137			
Fluorene (SIM)	43.3	20	µg/L	50.0		86.6	59-121			
Indeno(1,2,3-cd)pyrene (SIM)	47.7	2.0	µg/L	50.0		95.4	10-171			
Naphthalene (SIM)	34.9	20	µg/L	50.0		69.8	21-133			
Pentachlorophenol (SIM)	25.8	20	µg/L	50.0		51.6	14-176			
Phenanthrene (SIM)	44.2	1.0	µg/L	50.0		88.4	54-120			
Pyrene (SIM)	40.7	20	µg/L	50.0		81.4	52-120			
Surrogate: 2-Fluorophenol (SIM)	*92.7*		µg/L	200		46.4	15-110			
Surrogate: Phenol-d6 (SIM)	*58.4*		µg/L	200		29.2	15-110			
Surrogate: Nitrobenzene-d5	*76.4*		µg/L	100		76.4	30-130			
Surrogate: 2-Fluorobiphenyl	*88.4*		µg/L	100		88.4	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*193*		µg/L	200		96.6	15-110			
Surrogate: p-Terphenyl-d14	*74.1*		µg/L	100		74.1	30-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271985 - SW-846 3510C										
LCS Dup (B271985-BSD1)				Prepared: 12/01/20 Analyzed: 12/02/20						
Acenaphthene (SIM)	41.3	6.0	µg/L	50.0		82.5	47-145	2.73	48	
Acenaphthylene (SIM)	41.5	6.0	µg/L	50.0		83.1	33-145	2.75	74	
Anthracene (SIM)	46.0	4.0	µg/L	50.0		92.0	27-133	2.62	66	
Benzo(a)anthracene (SIM)	43.2	1.0	µg/L	50.0		86.4	33-143	3.32	53	
Benzo(a)pyrene (SIM)	43.5	2.0	µg/L	50.0		87.0	17-163	1.96	72	
Benzo(b)fluoranthene (SIM)	48.1	1.0	µg/L	50.0		96.1	24-159	2.71	71	
Benzo(g,h,i)perylene (SIM)	44.3	10	µg/L	50.0		88.5	10-219	2.37	97	
Benzo(k)fluoranthene (SIM)	45.3	4.0	µg/L	50.0		90.6	11-162	2.66	63	
Bis(2-ethylhexyl)phthalate (SIM)	45.4	20	µg/L	50.0		90.7	8-158	0.834	82	
Chrysene (SIM)	43.4	4.0	µg/L	50.0		86.7	17-168	3.31	87	
Dibenz(a,h)anthracene (SIM)	46.7	2.0	µg/L	50.0		93.4	10-227	2.58	126	
Fluoranthene (SIM)	45.8	10	µg/L	50.0		91.6	26-137	2.71	66	
Fluorene (SIM)	42.2	20	µg/L	50.0		84.5	59-121	2.43	38	
Indeno(1,2,3-cd)pyrene (SIM)	46.4	2.0	µg/L	50.0		92.8	10-171	2.76	99	
Naphthalene (SIM)	34.7	20	µg/L	50.0		69.3	21-133	0.747	65	
Pentachlorophenol (SIM)	25.2	20	µg/L	50.0		50.4	14-176	2.27	86	
Phenanthrene (SIM)	42.9	1.0	µg/L	50.0		85.8	54-120	2.99	39	
Pyrene (SIM)	38.1	20	µg/L	50.0		76.1	52-120	6.70	49	
Surrogate: 2-Fluorophenol (SIM)	*90.5*		µg/L	200		45.2	15-110			
Surrogate: Phenol-d6 (SIM)	*60.2*		µg/L	200		30.1	15-110			
Surrogate: Nitrobenzene-d5	*77.6*		µg/L	100		77.6	30-130			
Surrogate: 2-Fluorobiphenyl	*98.9*		µg/L	100		98.9	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*188*		µg/L	200		94.2	15-110			
Surrogate: p-Terphenyl-d14	*63.6*		µg/L	100		63.6	30-130			
Matrix Spike (B271985-MS1)		**Source: 20K1323-01**		Prepared: 12/01/20 Analyzed: 12/02/20						
Acenaphthene (SIM)	42.7	6.3	µg/L	52.6	ND	81.2	47-145			
Acenaphthylene (SIM)	42.4	6.3	µg/L	52.6	ND	80.6	33-145			
Anthracene (SIM)	47.9	4.2	µg/L	52.6	ND	91.0	27-133			
Benzo(a)anthracene (SIM)	44.8	1.1	µg/L	52.6	ND	85.0	33-143			
Benzo(a)pyrene (SIM)	44.8	2.1	µg/L	52.6	ND	85.0	17-163			
Benzo(b)fluoranthene (SIM)	49.1	1.1	µg/L	52.6	ND	93.3	24-159			
Benzo(g,h,i)perylene (SIM)	45.5	11	µg/L	52.6	ND	86.4	10-219			
Benzo(k)fluoranthene (SIM)	46.7	4.2	µg/L	52.6	ND	88.7	11-162			
Bis(2-ethylhexyl)phthalate (SIM)	48.0	21	µg/L	52.6	ND	91.2	8-158			
Chrysene (SIM)	45.1	4.2	µg/L	52.6	ND	85.7	17-168			
Dibenz(a,h)anthracene (SIM)	48.2	2.1	µg/L	52.6	ND	91.6	10-227			
Fluoranthene (SIM)	47.8	11	µg/L	52.6	ND	90.8	26-137			
Fluorene (SIM)	44.7	21	µg/L	52.6	ND	85.0	59-121			
Indeno(1,2,3-cd)pyrene (SIM)	47.8	2.1	µg/L	52.6	ND	90.9	10-171			
Naphthalene (SIM)	36.8	21	µg/L	52.6	ND	69.8	21-133			
Pentachlorophenol (SIM)	27.8	21	µg/L	52.6	ND	52.8	14-176			
Phenanthrene (SIM)	44.4	1.1	µg/L	52.6	ND	84.4	54-120			
Pyrene (SIM)	40.3	21	µg/L	52.6	ND	76.5	52-120			
Surrogate: 2-Fluorophenol (SIM)	*72.2*		µg/L	211		34.3	15-110			
Surrogate: Phenol-d6 (SIM)	*66.3*		µg/L	211		31.5	15-110			
Surrogate: Nitrobenzene-d5	*78.9*		µg/L	105		75.0	30-130			
Surrogate: 2-Fluorobiphenyl	*83.9*		µg/L	105		79.7	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*198*		µg/L	211		94.0	15-110			
Surrogate: p-Terphenyl-d14	*89.2*		µg/L	105		84.7	30-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271985 - SW-846 3510C										
Matrix Spike Dup (B271985-MSD1)	**Source: 20K1323-01**			Prepared: 12/01/20 Analyzed: 12/02/20						
Acenaphthene (SIM)	44.7	6.5	µg/L	54.3	ND	82.2	47-145	4.38	48	
Acenaphthylene (SIM)	44.8	6.5	µg/L	54.3	ND	82.5	33-145	5.61	74	
Anthracene (SIM)	50.6	4.3	µg/L	54.3	ND	93.0	27-133	5.38	66	
Benzo(a)anthracene (SIM)	47.0	1.1	µg/L	54.3	ND	86.6	33-143	4.98	53	
Benzo(a)pyrene (SIM)	46.4	2.2	µg/L	54.3	ND	85.4	17-163	3.63	72	
Benzo(b)fluoranthene (SIM)	50.9	1.1	µg/L	54.3	ND	93.7	24-159	3.64	71	
Benzo(g,h,i)perylene (SIM)	48.1	11	µg/L	54.3	ND	88.6	10-219	5.72	97	
Benzo(k)fluoranthene (SIM)	48.5	4.3	µg/L	54.3	ND	89.3	11-162	3.93	63	
Bis(2-ethylhexyl)phthalate (SIM)	50.0	22	µg/L	54.3	ND	92.0	8-158	4.08	82	
Chrysene (SIM)	47.2	4.3	µg/L	54.3	ND	86.8	17-168	4.51	87	
Dibenz(a,h)anthracene (SIM)	51.0	2.2	µg/L	54.3	ND	93.8	10-227	5.58	126	
Fluoranthene (SIM)	49.4	11	µg/L	54.3	ND	91.0	26-137	3.38	66	
Fluorene (SIM)	46.8	22	µg/L	54.3	ND	86.2	59-121	4.61	38	
Indeno(1,2,3-cd)pyrene (SIM)	50.6	2.2	µg/L	54.3	ND	93.1	10-171	5.64	99	
Naphthalene (SIM)	39.6	22	µg/L	54.3	ND	72.8	21-133	7.36	65	
Pentachlorophenol (SIM)	29.6	22	µg/L	54.3	ND	54.4	14-176	6.34	86	
Phenanthrene (SIM)	46.8	1.1	µg/L	54.3	ND	86.1	54-120	5.23	39	
Pyrene (SIM)	42.6	22	µg/L	54.3	ND	78.4	52-120	5.58	49	
Surrogate: 2-Fluorophenol (SIM)	*79.8*		µg/L	217		36.7	15-110			
Surrogate: Phenol-d6 (SIM)	*71.6*		µg/L	217		32.9	15-110			
Surrogate: Nitrobenzene-d5	*90.6*		µg/L	109		83.4	30-130			
Surrogate: 2-Fluorobiphenyl	*91.7*		µg/L	109		84.3	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*208*		µg/L	217		95.9	15-110			
Surrogate: p-Terphenyl-d14	*66.1*		µg/L	109		60.8	30-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by - GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B271854 - SW-846 3510C											
Blank (B271854-BLK1)				Prepared: 12/01/20 Analyzed: 12/02/20							
Butylbenzylphthalate	ND	10.0	µg/L								
Di-n-butylphthalate	ND	10.0	µg/L								
Diethylphthalate	ND	10.0	µg/L								
Dimethylphthalate	ND	10.0	µg/L								
Di-n-octylphthalate	ND	10.0	µg/L								
Phenol	ND	10.0	µg/L								
Surrogate: 2-Fluorophenol	*93.8*		µg/L	200		46.9		15-110			
Surrogate: Phenol-d6	*65.5*		µg/L	200		32.7		15-110			
Surrogate: Nitrobenzene-d5	*76.1*		µg/L	100		76.1		30-130			
Surrogate: 2-Fluorobiphenyl	*78.3*		µg/L	100		78.3		30-130			
Surrogate: 2,4,6-Tribromophenol	*193*		µg/L	200		96.6		15-110			
Surrogate: p-Terphenyl-d14	*90.6*		µg/L	100		90.6		30-130			
LCS (B271854-BS1)				Prepared: 12/01/20 Analyzed: 12/02/20							
Butylbenzylphthalate	40.3	10.0	µg/L	50.0		80.7		10-152			
Di-n-butylphthalate	41.0	10.0	µg/L	50.0		81.9		10-120			
Diethylphthalate	41.6	10.0	µg/L	50.0		83.1		10-120			
Dimethylphthalate	40.9	10.0	µg/L	50.0		81.8		10-120			
Di-n-octylphthalate	39.2	10.0	µg/L	50.0		78.3		4-146			
Phenol	15.1	10.0	µg/L	50.0		30.2		5-120			
Surrogate: 2-Fluorophenol	*90.5*		µg/L	200		45.2		15-110			
Surrogate: Phenol-d6	*65.7*		µg/L	200		32.8		15-110			
Surrogate: Nitrobenzene-d5	*71.8*		µg/L	100		71.8		30-130			
Surrogate: 2-Fluorobiphenyl	*86.1*		µg/L	100		86.1		30-130			
Surrogate: 2,4,6-Tribromophenol	*221*		µg/L	200		**111**	*	15-110			S-07
Surrogate: p-Terphenyl-d14	*95.6*		µg/L	100		95.6		30-130			
LCS Dup (B271854-BSD1)				Prepared: 12/01/20 Analyzed: 12/02/20							
Butylbenzylphthalate	40.6	10.0	µg/L	50.0		81.2		10-152	0.692	60	
Di-n-butylphthalate	40.3	10.0	µg/L	50.0		80.7		10-120	1.53	47	
Diethylphthalate	41.1	10.0	µg/L	50.0		82.2		10-120	1.09	100	
Dimethylphthalate	40.4	10.0	µg/L	50.0		80.9		10-120	1.16	183	
Di-n-octylphthalate	39.6	10.0	µg/L	50.0		79.1		4-146	1.04	69	
Phenol	16.4	10.0	µg/L	50.0		32.8		5-120	8.19	64	
Surrogate: 2-Fluorophenol	*97.8*		µg/L	200		48.9		15-110			
Surrogate: Phenol-d6	*70.0*		µg/L	200		35.0		15-110			
Surrogate: Nitrobenzene-d5	*75.6*		µg/L	100		75.6		30-130			
Surrogate: 2-Fluorobiphenyl	*84.9*		µg/L	100		84.9		30-130			
Surrogate: 2,4,6-Tribromophenol	*211*		µg/L	200		105		15-110			
Surrogate: p-Terphenyl-d14	*91.7*		µg/L	100		91.7		30-130			
Matrix Spike (B271854-MS1)	**Source: 20K1323-01**			Prepared: 12/01/20 Analyzed: 12/02/20							
Butylbenzylphthalate	42.2	10.5	µg/L	52.6	ND	80.1		10-152			
Di-n-butylphthalate	41.1	10.5	µg/L	52.6	ND	78.0		10-120			
Diethylphthalate	41.8	10.5	µg/L	52.6	0.260	78.8		10-120			
Dimethylphthalate	40.5	10.5	µg/L	52.6	ND	77.0		10-120			
Di-n-octylphthalate	41.9	10.5	µg/L	52.6	ND	79.6		4-146			
Phenol	19.4	10.5	µg/L	52.6	ND	36.8		5-120			
Surrogate: 2-Fluorophenol	*107*		µg/L	211		50.6		15-110			
Surrogate: Phenol-d6	*83.1*		µg/L	211		39.4		15-110			
Surrogate: Nitrobenzene-d5	*78.6*		µg/L	105		74.6		30-130			
Surrogate: 2-Fluorobiphenyl	*83.9*		µg/L	105		79.7		30-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by - GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271854 - SW-846 3510C										
Matrix Spike (B271854-MS1)	**Source: 20K1323-01**			Prepared: 12/01/20 Analyzed: 12/02/20						
Surrogate: 2,4,6-Tribromophenol	*210*		µg/L	211		99.6	15-110			
Surrogate: p-Terphenyl-d14	*90.9*		µg/L	105		86.3	30-130			
Matrix Spike Dup (B271854-MSD1)	**Source: 20K1323-01**			Prepared: 12/01/20 Analyzed: 12/02/20						
Butylbenzylphthalate	45.8	10.9	µg/L	54.3	ND	84.3	10-152	8.34	60	
Di-n-butylphthalate	44.6	10.9	µg/L	54.3	ND	82.0	10-120	8.20	47	
Diethylphthalate	45.4	10.9	µg/L	54.3	0.260	83.1	10-120	8.43	100	
Dimethylphthalate	44.2	10.9	µg/L	54.3	ND	81.2	10-120	8.59	183	
Di-n-octylphthalate	44.8	10.9	µg/L	54.3	ND	82.4	4-146	6.64	69	
Phenol	21.1	10.9	µg/L	54.3	ND	38.8	5-120	8.50	64	
Surrogate: 2-Fluorophenol	*122*		µg/L	217		55.9	15-110			
Surrogate: Phenol-d6	*91.1*		µg/L	217		41.9	15-110			
Surrogate: Nitrobenzene-d5	*89.4*		µg/L	109		82.2	30-130			
Surrogate: 2-Fluorobiphenyl	*91.7*		µg/L	109		84.3	30-130			
Surrogate: 2,4,6-Tribromophenol	*224*		µg/L	217		103	15-110			
Surrogate: p-Terphenyl-d14	*101*		µg/L	109		92.7	30-130			

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QUALITY CONTROL

Polychlorinated Biphenyls By GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271856 - SW-846 3510C										
Blank (B271856-BLK1)				Prepared: 12/01/20 Analyzed: 12/03/20						
Aroclor-1016	ND	0.100	µg/L							
Aroclor-1016 [2C]	ND	0.100	µg/L							
Aroclor-1221	ND	0.100	µg/L							
Aroclor-1221 [2C]	ND	0.100	µg/L							
Aroclor-1232	ND	0.100	µg/L							
Aroclor-1232 [2C]	ND	0.100	µg/L							
Aroclor-1242	ND	0.100	µg/L							
Aroclor-1242 [2C]	ND	0.100	µg/L							
Aroclor-1248	ND	0.100	µg/L							
Aroclor-1248 [2C]	ND	0.100	µg/L							
Aroclor-1254	ND	0.100	µg/L							
Aroclor-1254 [2C]	ND	0.100	µg/L							
Aroclor-1260	ND	0.100	µg/L							
Aroclor-1260 [2C]	ND	0.100	µg/L							
Surrogate: Decachlorobiphenyl	*0.424*		µg/L	1.00		42.4	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.471*		µg/L	1.00		47.1	30-150			
Surrogate: Tetrachloro-m-xylene	*0.650*		µg/L	1.00		65.0	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.692*		µg/L	1.00		69.2	30-150			
LCS (B271856-BS1)				Prepared: 12/01/20 Analyzed: 12/03/20						
Aroclor-1016	0.371	0.200	µg/L	0.500		74.2	50-140			
Aroclor-1016 [2C]	0.460	0.200	µg/L	0.500		92.0	50-140			
Aroclor-1260	0.409	0.200	µg/L	0.500		81.8	8-140			
Aroclor-1260 [2C]	0.444	0.200	µg/L	0.500		88.9	8-140			
Surrogate: Decachlorobiphenyl	*1.64*		µg/L	2.00		81.8	30-150			
Surrogate: Decachlorobiphenyl [2C]	*1.81*		µg/L	2.00		90.3	30-150			
Surrogate: Tetrachloro-m-xylene	*1.46*		µg/L	2.00		73.2	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*1.57*		µg/L	2.00		78.4	30-150			
LCS Dup (B271856-BSD1)				Prepared: 12/01/20 Analyzed: 12/03/20						
Aroclor-1016	0.387	0.200	µg/L	0.500		77.4	50-140	4.14		
Aroclor-1016 [2C]	0.478	0.200	µg/L	0.500		95.6	50-140	3.94		
Aroclor-1260	0.435	0.200	µg/L	0.500		86.9	8-140	6.12		
Aroclor-1260 [2C]	0.463	0.200	µg/L	0.500		92.6	8-140	4.14		
Surrogate: Decachlorobiphenyl	*1.81*		µg/L	2.00		90.7	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.02*		µg/L	2.00		101	30-150			
Surrogate: Tetrachloro-m-xylene	*1.57*		µg/L	2.00		78.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*1.68*		µg/L	2.00		84.1	30-150			
Matrix Spike (B271856-MS1)	**Source: 20K1323-02**			Prepared: 12/01/20 Analyzed: 12/03/20						
Aroclor-1016	0.199	0.100	µg/L	0.250	ND	79.7	50-140			
Aroclor-1016 [2C]	0.222	0.100	µg/L	0.250	ND	88.8	50-140			
Aroclor-1260	0.200	0.100	µg/L	0.250	ND	80.0	8-140			
Aroclor-1260 [2C]	0.215	0.100	µg/L	0.250	ND	85.9	8-140			
Surrogate: Decachlorobiphenyl	*0.782*		µg/L	1.00		78.2	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.872*		µg/L	1.00		87.2	30-150			
Surrogate: Tetrachloro-m-xylene	*0.743*		µg/L	1.00		74.3	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.790*		µg/L	1.00		79.0	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls By GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271856 - SW-846 3510C										
Matrix Spike Dup (B271856-MSD1)		**Source: 20K1323-02**		Prepared: 12/01/20 Analyzed: 12/03/20						
Aroclor-1016	0.181	0.0980	µg/L	0.245	ND	73.7	50-140	9.84	36	
Aroclor-1016 [2C]	0.200	0.0980	µg/L	0.245	ND	81.5	50-140	10.6	36	
Aroclor-1260	0.173	0.0980	µg/L	0.245	ND	70.7	8-140	14.3	38	
Aroclor-1260 [2C]	0.189	0.0980	µg/L	0.245	ND	77.1	8-140	12.8	38	
Surrogate: Decachlorobiphenyl	*0.657*		µg/L	0.980		67.0	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.731*		µg/L	0.980		74.6	30-150			
Surrogate: Tetrachloro-m-xylene	*0.651*		µg/L	0.980		66.4	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.698*		µg/L	0.980		71.1	30-150			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271793 - EPA 245.1										
Blank (B271793-BLK1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	ND	0.00010	mg/L							
LCS (B271793-BS1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	0.00412	0.00010	mg/L	0.00400		103	85-115			
LCS Dup (B271793-BSD1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	0.00411	0.00010	mg/L	0.00400		103	85-115	0.0453	20	
Duplicate (B271793-DUP1)	**Source: 20K1323-03**			Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	ND	0.00010	mg/L		ND			NC	30	
Matrix Spike (B271793-MS1)	**Source: 20K1323-03**			Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	0.00390	0.00010	mg/L	0.00400	ND	97.5	75-125			
Batch B271829 - EPA 200.7										
Blank (B271829-BLK1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	ND	0.050	mg/L							
Hardness	ND	1.4	mg/L							
LCS (B271829-BS1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	4.08	0.050	mg/L	4.00		102	85-115			
Hardness	26	1.4	mg/L	26.4		99.3	85-115			
LCS Dup (B271829-BSD1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	4.13	0.050	mg/L	4.00		103	85-115	1.34	20	
Hardness	27	1.4	mg/L	26.4		101	85-115	1.44	20	
Batch B271830 - EPA 200.8										
Blank (B271830-BLK1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Antimony	ND	1.0	µg/L							
Arsenic	ND	0.80	µg/L							
Cadmium	ND	0.20	µg/L							
Chromium	ND	1.0	µg/L							
Copper	ND	1.0	µg/L							
Lead	ND	0.50	µg/L							
Nickel	ND	5.0	µg/L							
Selenium	ND	5.0	µg/L							
Silver	ND	0.20	µg/L							
Zinc	ND	10	µg/L							

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271830 - EPA 200.8										
LCS (B271830-BS1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Antimony	494	10	µg/L	500		98.8	85-115			
Arsenic	504	8.0	µg/L	500		101	85-115			
Cadmium	508	2.0	µg/L	500		102	85-115			
Chromium	502	10	µg/L	500		100	85-115			
Copper	972	10	µg/L	1000		97.2	85-115			
Lead	500	5.0	µg/L	500		100	85-115			
Nickel	511	50	µg/L	500		102	85-115			
Selenium	490	50	µg/L	500		98.0	85-115			
Silver	498	2.0	µg/L	500		99.6	85-115			
Zinc	1040	100	µg/L	1000		104	85-115			
LCS Dup (B271830-BSD1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Antimony	498	10	µg/L	500		99.5	85-115	0.676	20	
Arsenic	505	8.0	µg/L	500		101	85-115	0.114	20	
Cadmium	513	2.0	µg/L	500		103	85-115	0.954	20	
Chromium	507	10	µg/L	500		101	85-115	1.03	20	
Copper	989	10	µg/L	1000		98.9	85-115	1.80	20	
Lead	509	5.0	µg/L	500		102	85-115	1.78	20	
Nickel	517	50	µg/L	500		103	85-115	1.13	20	
Selenium	494	50	µg/L	500		98.8	85-115	0.794	20	
Silver	503	2.0	µg/L	500		101	85-115	1.03	20	
Zinc	1050	100	µg/L	1000		105	85-115	1.23	20	

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QUALITY CONTROL

Metals Analyses (Dissolved) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271794 - EPA 245.1 Dissolved										
Blank (B271794-BLK1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	ND	0.00010	mg/L							
LCS (B271794-BS1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	0.00411	0.00010	mg/L	0.00400		103	85-115			
LCS Dup (B271794-BSD1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	0.00425	0.00010	mg/L	0.00400		106	85-115	3.25	20	
Duplicate (B271794-DUP1)		**Source: 20K1323-01**		Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	ND	0.00010	mg/L		ND			NC	30	
Matrix Spike (B271794-MS1)		**Source: 20K1323-01**		Prepared: 11/30/20 Analyzed: 12/01/20						
Mercury	0.00399	0.00010	mg/L	0.00400	ND	99.7	70-130			
Batch B271831 - EPA 200.7 Dissolved										
Blank (B271831-BLK1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	ND	0.050	mg/L							
LCS (B271831-BS1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	4.17	0.050	mg/L	4.00		104	85-115			
LCS Dup (B271831-BSD1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	4.12	0.050	mg/L	4.00		103	85-115	1.09	20	
Duplicate (B271831-DUP1)		**Source: 20K1323-01**		Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	19.4	0.050	mg/L		19.1			1.61	20	
Matrix Spike (B271831-MS1)		**Source: 20K1323-01**		Prepared: 11/30/20 Analyzed: 12/01/20						
Iron	23.7	0.050	mg/L	4.00	19.1	115	70-130			
Batch B271832 - EPA 200.8 Dissolved										
Blank (B271832-BLK1)				Prepared: 11/30/20 Analyzed: 12/01/20						
Antimony	ND	1.0	µg/L							
Arsenic	ND	0.80	µg/L							
Cadmium	ND	0.20	µg/L							
Copper	ND	1.0	µg/L							
Lead	ND	0.50	µg/L							
Nickel	ND	5.0	µg/L							
Selenium	ND	5.0	µg/L							
Silver	ND	0.20	µg/L							
Zinc	ND	10	µg/L							

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QUALITY CONTROL

Metals Analyses (Dissolved) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B271832 - EPA 200.8 Dissolved											
LCS (B271832-BS1)				Prepared: 11/30/20 Analyzed: 12/01/20							
Antimony	495	10	µg/L	500		98.9	85-115				
Arsenic	503	8.0	µg/L	500		101	85-115				
Cadmium	518	2.0	µg/L	500		104	85-115				
Copper	998	10	µg/L	1000		99.8	85-115				
Lead	512	5.0	µg/L	500		102	85-115				
Nickel	529	50	µg/L	500		106	85-115				
Selenium	491	50	µg/L	500		98.2	85-115				
Silver	506	2.0	µg/L	500		101	85-115				
Zinc	1040	100	µg/L	1000		104	85-115				
LCS Dup (B271832-BSD1)				Prepared: 11/30/20 Analyzed: 12/01/20							
Antimony	489	10	µg/L	500		97.8	85-115	1.17		20	
Arsenic	502	8.0	µg/L	500		100	85-115	0.0522		20	
Cadmium	512	2.0	µg/L	500		102	85-115	1.09		20	
Copper	998	10	µg/L	1000		99.8	85-115	0.0224		20	
Lead	510	5.0	µg/L	500		102	85-115	0.272		20	
Nickel	530	50	µg/L	500		106	85-115	0.225		20	
Selenium	496	50	µg/L	500		99.1	85-115	0.917		20	
Silver	505	2.0	µg/L	500		101	85-115	0.288		20	
Zinc	1040	100	µg/L	1000		104	85-115	0.341		20	
Duplicate (B271832-DUP1)	**Source: 20K1323-01**			Prepared: 11/30/20 Analyzed: 12/01/20							
Antimony	ND	1.0	µg/L		ND			NC		20	
Arsenic	3.95	0.80	µg/L		3.74			5.50		20	
Cadmium	ND	0.20	µg/L		ND			NC		20	
Copper	7.39	1.0	µg/L		7.62			3.08		20	
Lead	ND	0.50	µg/L		ND			NC		20	
Nickel	8.27	5.0	µg/L		11.1			**29.1**	*	20	R-04
Selenium	ND	5.0	µg/L		ND			NC		20	
Silver	ND	0.20	µg/L		ND			NC		20	
Zinc	ND	10	µg/L		ND			NC		20	
Matrix Spike (B271832-MS1)	**Source: 20K1323-01**			Prepared: 11/30/20 Analyzed: 12/01/20							
Antimony	500	10	µg/L	500	ND	100	70-130				
Arsenic	511	8.0	µg/L	500	ND	102	70-130				
Cadmium	507	2.0	µg/L	500	ND	101	70-130				
Copper	970	10	µg/L	1000	ND	97.0	70-130				
Lead	516	5.0	µg/L	500	ND	103	70-130				
Nickel	518	50	µg/L	500	11.1	101	70-130				
Selenium	496	50	µg/L	500	ND	99.3	70-130				
Silver	484	2.0	µg/L	500	ND	96.7	70-130				
Zinc	1040	100	µg/L	1000	ND	104	70-130				

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271708 - SM21-22 4500 H B										
LCS (B271708-BS1)				Prepared & Analyzed: 11/25/20						
pH	5.99		pH Units	6.00		99.9	90-110			
Duplicate (B271708-DUP1)	**Source: 20K1323-03**			Prepared & Analyzed: 11/25/20						
pH	6.9		pH Units		6.9			0.306	5.46	H-05
Batch B271714 - SM21-22 3500 Cr B										
Blank (B271714-BLK1)				Prepared & Analyzed: 11/25/20						
Hexavalent Chromium	ND	0.0040	mg/L							
LCS (B271714-BS1)				Prepared & Analyzed: 11/25/20						
Hexavalent Chromium	0.10	0.0040	mg/L	0.100		102	90-115			
LCS Dup (B271714-BSD1)				Prepared & Analyzed: 11/25/20						
Hexavalent Chromium	0.10	0.0040	mg/L	0.100		99.5	90-115	2.49	11	
Duplicate (B271714-DUP1)	**Source: 20K1323-02**			Prepared & Analyzed: 11/25/20						
Hexavalent Chromium	ND	0.0040	mg/L		ND			NC	23.3	
Matrix Spike (B271714-MS1)	**Source: 20K1323-02**			Prepared & Analyzed: 11/25/20						
Hexavalent Chromium	0.077	0.0040	mg/L	0.100	ND	76.9	34.7-148			
Matrix Spike Dup (B271714-MSD1)	**Source: 20K1323-02**			Prepared & Analyzed: 11/25/20						
Hexavalent Chromium	0.079	0.0040	mg/L	0.100	ND	79.5	34.7-148	3.20	13.2	
Batch B271718 - SM21-22 4500 CL G										
Blank (B271718-BLK1)				Prepared & Analyzed: 11/25/20						
Chlorine, Residual	ND	0.020	mg/L							
LCS (B271718-BS1)				Prepared & Analyzed: 11/25/20						
Chlorine, Residual	0.64	0.020	mg/L	0.641		99.5	85.3-130			
LCS Dup (B271718-BSD1)				Prepared & Analyzed: 11/25/20						
Chlorine, Residual	0.66	0.020	mg/L	0.641		103	85.3-130	3.29	13.6	
Duplicate (B271718-DUP1)	**Source: 20K1323-02**			Prepared & Analyzed: 11/25/20						
Chlorine, Residual	0.33	0.020	mg/L		0.36			8.28	29.4	
Matrix Spike (B271718-MS1)	**Source: 20K1323-02**			Prepared & Analyzed: 11/25/20						
Chlorine, Residual	0.63	0.020	mg/L	1.00	0.36	27.0	10-169			

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B271736 - EPA 300.0											
Blank (B271736-BLK1)				Prepared & Analyzed: 11/28/20							
Chloride	ND	1.0	mg/L								
LCS (B271736-BS1)				Prepared & Analyzed: 11/28/20							
Chloride	10		mg/L	10.0		105		90-110			
LCS Dup (B271736-BSD1)				Prepared & Analyzed: 11/28/20							
Chloride	10		mg/L	10.0		104		90-110	0.555	20	
Duplicate (B271736-DUP1)	**Source: 20K1323-01**			Prepared & Analyzed: 11/28/20							
Chloride	1100	50	mg/L		1200				9.90	20	
Matrix Spike (B271736-MS1)	**Source: 20K1323-01**			Prepared & Analyzed: 11/28/20							
Chloride	1600	50	mg/L	500	1200	**69.4**	*	80-120			MS-07
Batch B271754 - SM21-22 2540D											
Blank (B271754-BLK1)				Prepared & Analyzed: 11/30/20							
Total Suspended Solids	ND	2.5	mg/L								
LCS (B271754-BS1)				Prepared & Analyzed: 11/30/20							
Total Suspended Solids	166	10	mg/L	200		83.0		57.4-123			
Batch B271859 - EPA 350.1											
Blank (B271859-BLK1)				Prepared & Analyzed: 12/02/20							
Ammonia as N	ND	0.10	mg/L								
LCS (B271859-BS1)				Prepared & Analyzed: 12/02/20							
Ammonia as N	2.2	0.10	mg/L	2.00		110		90-110			
LCS Dup (B271859-BSD1)				Prepared & Analyzed: 12/02/20							
Ammonia as N	2.0	0.10	mg/L	2.00		100		90-110	9.48	20	
Duplicate (B271859-DUP1)	**Source: 20K1323-02**			Prepared & Analyzed: 12/02/20							
Ammonia as N	1.0	0.10	mg/L		1.1				2.45	20	
MRL Check (B271859-MRL1)				Prepared & Analyzed: 12/02/20							
Ammonia as N	0.0830	0.10	mg/L	0.100		83.0		0-200			
MRL Check (B271859-MRL2)				Prepared & Analyzed: 12/02/20							
Ammonia as N	0.0720	0.10	mg/L	0.100		72.0		0-200			

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B271859 - EPA 350.1										
Matrix Spike (B271859-MS1)	**Source: 20K1323-02**			Prepared & Analyzed: 12/02/20						
Ammonia as N	3.2	0.10	mg/L	2.00	1.1	104	90-110			
Batch B271924 - EPA 1664B										
Blank (B271924-BLK1)				Prepared & Analyzed: 12/02/20						
Silica Gel Treated HEM (SGT-HEM)	ND	1.4	mg/L							
LCS (B271924-BS1)				Prepared & Analyzed: 12/02/20						
Silica Gel Treated HEM (SGT-HEM)	9.3		mg/L	10.0		93.0	64-132			
Duplicate (B271924-DUP1)	**Source: 20K1323-02**			Prepared & Analyzed: 12/02/20						
Silica Gel Treated HEM (SGT-HEM)	ND	14	mg/L		ND			NC	18	

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QUALITY CONTROL

Drinking Water Organics EPA 504.1 - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B272667 - EPA 504 water										
Blank (B272667-BLK1)				Prepared & Analyzed: 12/11/20						
1,2-Dibromoethane (EDB)	ND	0.021	µg/L							
Surrogate: 1,3-Dibromopropane	*1.02*		µg/L	1.04		97.4	70-130			
LCS (B272667-BS1)				Prepared & Analyzed: 12/11/20						
1,2-Dibromoethane (EDB)	0.235	0.021	µg/L	0.262		89.6	70-130			
Surrogate: 1,3-Dibromopropane	*1.03*		µg/L	1.05		98.4	70-130			
LCS Dup (B272667-BSD1)				Prepared & Analyzed: 12/11/20						
1,2-Dibromoethane (EDB)	0.224	0.021	µg/L	0.257		87.2	70-130	4.94		
Surrogate: 1,3-Dibromopropane	*1.01*		µg/L	1.03		98.8	70-130			
MRL Check (B272667-MRL1)				Prepared & Analyzed: 12/11/20						
1,2-Dibromoethane (EDB)	0.0225	0.020	µg/L	0.0205		110	0-200			
Surrogate: 1,3-Dibromopropane	*1.03*		µg/L	1.02		100	70-130			
MRL Check (B272667-MRL2)				Prepared & Analyzed: 12/11/20						
1,2-Dibromoethane (EDB)	0.0243	0.021	µg/L	0.0211		115	0-200			
Surrogate: 1,3-Dibromopropane	*1.02*		µg/L	1.05		96.9	70-130			
Matrix Spike (B272667-MS1)	**Source: 20K1323-01**			Prepared & Analyzed: 12/11/20						
1,2-Dibromoethane (EDB)	0.225	0.019	µg/L	0.241	ND	93.2	65-135			
Surrogate: 1,3-Dibromopropane	*0.978*		µg/L	0.964		101	70-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
DL-03	Elevated reporting limit due to matrix interference.
H-05	Holding time was exceeded. pH analysis should be performed immediately at time of sampling. Nominal 15 minute holding time was exceeded.
H-10	Analysis was requested after the recommended holding time had passed.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
L-01	Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.
L-05	Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.
MS-07	Matrix spike recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery.Possibility of sample matrix effects that lead to low bias for reported result or non-homogeneous sample aliquot cannot be eliminated.
R-04	Duplicate relative percent difference (RPD) is a less useful indicator of sample precision for sample results that are <5 times the reporting limit (RL).
S-07	One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
608.3 in Water	
Aroclor-1016	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1016 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1221	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1221 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1232	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1232 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1242	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1242 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1248	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1248 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1254	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1254 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1260	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1260 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
624.1 in Water	
Acetone	CT,NY,MA,NH
tert-Amyl Methyl Ether (TAME)	MA
Benzene	CT,NY,MA,NH,RI,NC,ME,VA
tert-Butyl Alcohol (TBA)	NY,MA
Carbon Tetrachloride	CT,NY,MA,NH,RI,NC,ME,VA
1,2-Dichlorobenzene	CT,NY,MA,NH,RI,NC,ME,VA
1,3-Dichlorobenzene	CT,NY,MA,NH,RI,NC,ME,VA
1,4-Dichlorobenzene	CT,NY,MA,NH,RI,NC,ME,VA
1,2-Dichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
cis-1,2-Dichloroethylene	NY,MA
1,1-Dichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
1,1-Dichloroethylene	CT,NY,MA,NH,RI,NC,ME,VA
1,4-Dioxane	MA
Ethanol	NY,MA,NH
Ethylbenzene	CT,NY,MA,NH,RI,NC,ME,VA
Methyl tert-Butyl Ether (MTBE)	NY,MA,NH,NC
Methylene Chloride	CT,NY,MA,NH,RI,NC,ME,VA
Tetrachloroethylene	CT,NY,MA,NH,RI,NC,ME,VA
Toluene	CT,NY,MA,NH,RI,NC,ME,VA
1,1,1-Trichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
1,1,2-Trichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
Trichloroethylene	CT,NY,MA,NH,RI,NC,ME,VA
Vinyl Chloride	CT,NY,MA,NH,RI,NC,ME,VA
m+p Xylene	CT,NY,MA,NH,RI,NC
o-Xylene	CT,NY,MA,NH,RI,NC
625.1 in Water	
Butylbenzylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
Di-n-butylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
1,3-Dichlorobenzene	MA,NC
1,4-Dichlorobenzene	MA,NC
1,2-Dichlorobenzene	MA,NC

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
625.1 in Water	
Diethylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
Dimethylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
Di-n-octylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
Phenol	CT,MA,NH,NY,NC,RI,ME,VA
2-Fluorophenol	NC
2-Fluorophenol	NC,VA
Phenol-d6	VA
Nitrobenzene-d5	VA
EPA 200.7 in Water	
Iron	CT,MA,NH,NY,RI,NC,ME,VA
Iron	CT,MA,NH,NY,RI,NC,ME,VA
Hardness	CT,MA,NH,NY,RI,VA
EPA 200.8 in Water	
Antimony	CT,MA,NH,NY,RI,NC,ME,VA
Antimony	CT,MA,NH,NY,RI,NC,ME,VA
Arsenic	CT,MA,NH,NY,RI,NC,ME,VA
Arsenic	CT,MA,NH,NY,RI,NC,ME,VA
Cadmium	CT,MA,NH,NY,RI,NC,ME,VA
Cadmium	CT,MA,NH,NY,RI,NC,ME,VA
Chromium	CT,MA,NH,NY,RI,NC,ME,VA
Chromium	CT,MA,NH,NY,RI,NC,ME,VA
Copper	CT,MA,NH,NY,RI,NC,ME,VA
Copper	CT,MA,NH,NY,RI,NC,ME,VA
Lead	CT,MA,NH,NY,RI,NC,ME,VA
Lead	CT,MA,NH,NY,RI,NC,ME,VA
Nickel	CT,MA,NH,NY,RI,NC,ME,VA
Nickel	CT,MA,NH,NY,RI,NC,ME,VA
Selenium	CT,MA,NH,NY,RI,NC,ME,VA
Selenium	CT,MA,NH,NY,RI,NC,ME,VA
Silver	CT,MA,NH,NY,RI,NC,ME,VA
Silver	CT,MA,NH,NY,RI,NC,ME,VA
Zinc	CT,MA,NH,RI,NY,NC,ME,VA
Zinc	CT,MA,NH,NY,RI,NC,ME,VA
EPA 245.1 in Water	
Mercury	CT,MA,NH,RI,NY,NC,ME,VA
Mercury	CT,MA,NH,RI,NY,NC,ME,VA
EPA 300.0 in Water	
Chloride	NC,NY,MA,VA,ME,NH,CT,RI
EPA 350.1 in Water	
Ammonia as N	NC,NY,MA,NH,RI,ME,VA
SM21-22 2540D in Water	
Total Suspended Solids	CT,MA,NH,NY,RI,NC,ME,VA
SM21-22 3500 Cr B in Water	
Hexavalent Chromium	NY,CT,NH,RI,ME,VA,NC

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SM21-22 3500 Cr B in Water	
Hexavalent Chromium	NY,CT,NH,RI,ME,VA,NC
SM21-22 4500 CL G in Water	
Chlorine, Residual	CT,MA,RI,ME
SM21-22 4500 CN E in Water	
Cyanide	CT,MA,NH,NY,RI,NC,ME,VA
SM21-22 4500 H B in Water	
pH	CT,MA,RI

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2021
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2021
FL	Florida Department of Health	E871027 NELAP	06/30/2021
VT	Vermont Department of Health Lead Laboratory	LL720741	07/30/2021
ME	State of Maine	MA00100	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2021
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2021
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2021
NC-DW	North Carolina Department of Health	25703	07/31/2021
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2021
MI	Dept. of Env, Great Lakes, and Energy	9100	09/6/2021

20K1323

con-test® ANALYTICAL LABORATORY

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Company Name: Nobis Group
Address: 585 Middlesex St Lowell, MA
Phone: 978-703-6014
Project Name: UMMS - New Building
Project Location: Worcester, MA
Project Number: 96810.00
Project Manager: Adam Roy / Al Jones
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: Sarah Kurtzer

Requested Turnaround Time: 7-Day ☐ 10-Day ☐ PFAS 10-Day (std) ☐ Due Date:
Rush-Approval Required: 1-Day ☐ 3-Day ☐ 2-Day ☐ 4-Day ☑

Dissolved Metals Samples: ☒ Field Filtered ○ Lab to Filter
Orthophosphate Samples: ○ Field Filtered ○ Lab to Filter

Data Delivery
Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: ARoy@Nobis-group.com
Fax To #:

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	metals (total)	metals (dissolved)	oil/grease (HEM)	608 PCB, 625 SVOC, 625 SIM, Solids	624.1	Cl, TRC, Hex Cr	Solids total, dissolved	Ammonia-N	pH, Hardness
1	NB-2	11/24/2020		Grab	GW	V	3	8	5			X	X	X	X	X	X	X	X	
2	NB-4	11/24/2020		Grab	GW	V	3	8	5			X	X	X	X	X	X	X	X	
3	Lake	11/25/2020		Grab	O	V	2	6	3			X							X	X

Preservation Code (per column): H H H H H H H H H

Courier Use Only — Total Number Of: VIALS ___ GLASS ___ PLASTIC ___ BACTERIA ___ ENCORE ___

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N
*Contest is not responsible for missing samples from prepacked coolers

[1] **Matrix Codes:**
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define) Surface water

[2] **Preservation Codes:**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
[signature]	11/25/20 915
Received by: (signature) 2.4 3.5 5.6	Date/Time: 11.25.20 915
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments: Bottle order coordinated by Sarah K. (Nobis) and Jessica H. (Contest) call SK for questions/concerns. 617-314-3211

Detection Limit Requirements: MA / CT / Other

Special Requirements: ☐ MA MCP Required, MCP Certification Form Required, ☐ CT RCP Required, RCP Certification Form Required, ☐ MA State DW Required, PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above: H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity: Government ☐ Federal ☐ City ☐ Municipality ☐ 21 J ☐ Brownfield ☐ MWRA ☐ School ☐ MBTA ☐ WRTA ☐

Other: ☐ Chromatogram ☐ AIHA-LAP,LLC

PCB ONLY: ☐ Soxhlet ☐ Non Soxhlet

Comments:

Per KA - removed TriChrome Diss, same test as Total - client notified 12/4/2020 mmk

Added EDB to samples -01 and -02 per client and reporting pentachlorophenol as part of 625 low 12/9/2020 mmk - ok to run past hold

...abs is not responsible for any omitted information on the Chain of Custody. The ...gal document that must be complete and accurate and is used to determine what ... will perform. Any missing information is not the laboratory's responsibility. Con... ...hip on each project and will try to assist with missing information, but will not b... held accountable.

Table of Contents

CHAIN OF CUSTODY RECORD

con-test ANALYTICAL LABORATORY

204323

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Page 1 of 1

Company Name: Nobis Group
Address: 585 Middlesex St, Lowell, MA
Phone: 978-703-6014
Project Name: UMMS - New Research Building
Project Location: Worcester, MA
Project Number: 96810.00
Project Manager: Adam Roy / Al Jones
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: Sarah Kuntzee

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☐ Due Date:

Rush Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☑

Report Format/Options
Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: ARoy@Nobis-group.com
Fax To #:

Receive Water Samples
☑ Field Filtered
○ Lab to Filter

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS NOT Required Lasee note	[2] Preservation Code
1	NB-2	11/24	1200	Grab	GW	U	3	8	5			X	
2	NB-4	11/24	1220	Grab	GW	U	3	8	5			X	
3	Lake	11/25	1120	Grab	O	U	2	6	3			X	

Container Use Only
Total Number Of:
VIALS
GLASS
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N
*Contest is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define) Surface water

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:
① Lab order sent to Jessica Hoffman and coordinated w/ Sarah Kuntzee (Nobis) Call sk for questions 6173143211

Regulatory Limits/Requirements
MA
CT
Other

Special Requirements
☐ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State UW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Comments:

Disclaimer: Con-Test Labs is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Con Test values your partnership on each project and will try to assist with missing information, but will not b held accountable.

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples SK

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Nobis

Received By VR Date 11 25 20 Time 915

How were the samples received? In Cooler T No Cooler ____ On Ice T No Ice ____ Direct from Sampling ____ Ambient ____ Melted Ice ____

Were samples within Temperature? 2-6°C T By Gun # 3 Actual Temp - 2.4, 5.6, 3.5 By Blank # ____ Actual Temp - ____

Was Custody Seal Intact? NA Were Samples Tampered with? NA

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Project T Analysis T ID's T Sampler Name T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? ____

Are there Rushes? T Who was notified? Frank cote, riley

Are there Short Holds? T Who was notified? Frank

Is there enough Volume? T

Is there Headspace where applicable? ** MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? T On COC? F

Do all samples have the proper pH? Acid T Base ____

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.	24	1 Liter Plastic	5	16 oz Amb.	
HCL-	10	500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	8	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

* Sample times taken from containers

** Vials for sample NB-4 have headspace

APPENDIX C –DILUTION FACTOR AND EFFLUENT LIMIT CALCULATIONS

From: Vakalopoulos, Catherine (DEP)
To: Sarah Kurtzer
Subject: RGP coverage for discharge to Lake Quinsigamond, Worcester
Date: Tuesday, December 8, 2020 2:14:54 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png
image008.png
image009.png
image010.png
image011.png
image012.png
image013.png
image014.png
image015.png

Hi Sarah,

The 7Q10 of 0.857 cfs (0.554 MGD) and the dilution factor calculation of 8.69 using an estimated design flow of 50 gpm (0.072 MGD) for the proposed discharge from dewatering during the construction of a new Research Building at U Mass Medical in Worcester are correct. Please note that if the design flow changes for this proposed project, I will have to check your dilution factor calculation again.

Though it sounds like you have already found the following information, here is water quality information to assist you with filling out the NOI:

Waterbody and ID: Lake Quinsigamond MA51125, Blackstone River Watershed
Classification: B
Outstanding Resource Water?: no
State's most recent Integrated List is located here: https://www.epa.gov/sites/production/files/2020-01/documents/2016-ma-303d-list-report.pdf, search for "MA51125" to see the causes of impairments.
TMDLs: there is an approved phosphorus TMDL for this segment.

If this is not a *current* MCP site, then in addition to submitting the NOI to EPA, you need to apply with MassDEP and submit a $500 fee (unless fee exempt, e.g., municipality) using the ePLACE. The instructions are located here: https://www.mass.gov/how-to/wm-15-npdes-general-permit-notice-of-intent. Technical assistant information is available on the front page of the ePLACE application webpage.

Please let me know if you have any additional questions.

Cathy

From: Sarah Kurtzer <skurtzer@nobis-group.com>

Project No.:	96810.00	**Page:**	1 of 1
Project Title:	Umass Medical School - New Reseach Building		
Calculated by:	SAK	**Date**:	11/30/2020
Checked by:	MassDEP	**Date**:	12/8/2020

Dilution Factor Calculation

Objective: Calculate Dilution Factor (DF) based on 7 Day 10 Year (7Q10) Low Flow values for the dewatering to occur at the Umass Medical School New Research Building project located in Worcester, MA.

Approach: Calculate DF based on EPA formula ($Q_S = Q_D)/Q_D$, where Q_S is 7Q10 in million gallons per day (MGD) and Q_D is discharge flow in MGD.

Assumptions:
1. 7Q10 is 0.857 cubic feet per second (cfs) (from StreamStats 4.4.0).
2. A conversion of 7.48 is used to convert cubic feet to gallons.
3. A design discharge flowrate of 50 gallons per minute (gpm) is assumed.

Calculations:

7Q10 Low Flow Value (Q_S):

$$Q_S = \frac{0.857\ ft^3}{second} x \frac{7.48\ gallons}{ft^3} x \frac{86{,}400\ seconds}{day} x \frac{1\ MG}{1{,}000{,}000\ gallons}$$

$$Q_S = 0.554 \text{ MGD}$$

Discharge Flow Rate (Q_D):

$$Q_D = \frac{50\ gallons}{minute} x \frac{1{,}440\ minutes}{day} x \frac{1MG}{1{,}000{,}000\ gallons}$$

$$Q_D = 0.072\ MGD$$

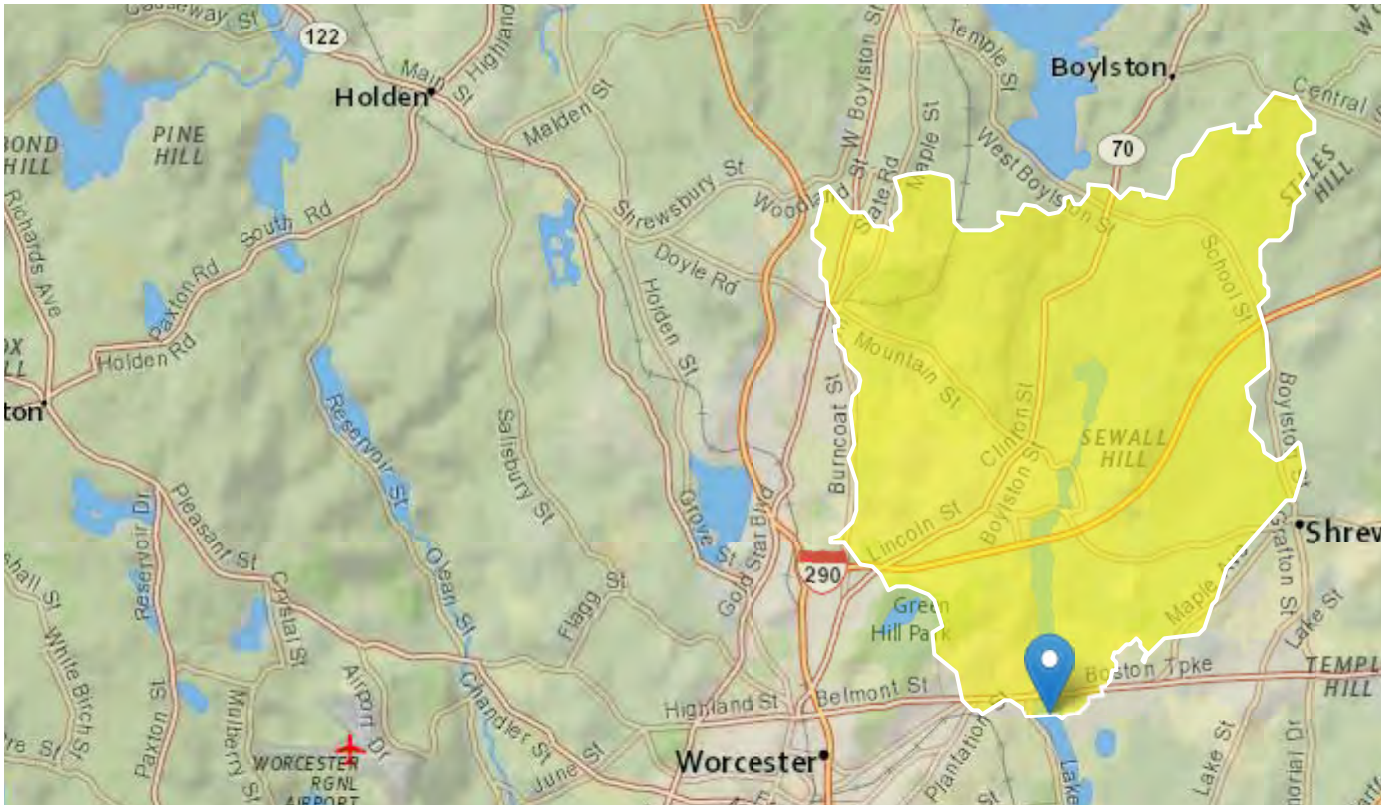
Dilution Factor (DF):

$$DF = \frac{Q_s + Q_D}{Q_D} = \frac{0.554\ MGD + 0.072\ MGD}{0.072\ MGD} = 8.69$$

Conclusion: **The dilution factor (DF) for this project is calculated to be 8.69 based on the provided 7Q10 low flow value and estimated design discharge flowrate.**

StreamStats Report - UMMS 11/30/2020

Region ID: MA
Workspace ID: MA20201130154556327000
Clicked Point (Latitude, Longitude): 42.27170, -71.75570
Time: 2020-11-30 10:46:12 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	15.3	square miles
BSLDEM250	Mean basin slope computed from 1:250K DEM	4.465	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	0.16	square mile per mile
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless

Low-Flow Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	15.3	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	4.465	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.16	square mile per mile	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

Low-Flow Statistics Flow Report[Statewide Low Flow WRIR00 4135]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SE	SEp
7 Day 2 Year Low Flow	1.78	ft^3/s	0.618	4.93	49.5	49.5
7 Day 10 Year Low Flow	0.857	ft^3/s	0.234	2.92	70.8	70.8

Low-Flow Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

Application Version: 4.4.0

Category 5 waters listed alphabetically by major watershed
The 303(d) List – "Waters requiring a TMDL"

Water Body	Segment ID	Description	Size	Units	Impairment	EPA TMDL No.
Kettle Brook	MA51-01	Outlet Kettle Brook Reservoir #1, Leicester to inlet Leesville Pond, Auburn (excluding the approximately 0.4 miles through Waite Pond segment MA51170) (through former segments: City Pond MA51021, Smiths Pond MA51156, and Stoneville Pond MA51160).	7.00	Miles	(Dewatering*)	
					(Non-Native Aquatic Plants*)	
					Benthic Macroinvertebrates	
					Escherichia Coli (E. Coli)	
					Fecal Coliform	
					Nutrient/Eutrophication Biological Indicators	
Lake Quinsigamond	MA51125	Shrewsbury/Worcester.	474.00	Acres	(Eurasian Water Milfoil, Myriophyllum spicatum*)	
					(Non-Native Aquatic Plants*)	
					Algae	644
					Dissolved Oxygen	644
					Enterococcus	
Lake Ripple	MA51135	Grafton.	47.00	Acres	(Non-Native Aquatic Plants*)	
					Aquatic Plants (Macrophytes)	
Manchaug Pond	MA51091	Douglas/Sutton.	364.00	Acres	(Non-Native Aquatic Plants*)	
					Dissolved Oxygen	
					Mercury in Fish Tissue	42392
Marble Pond	MA51093	Sutton.	8.00	Acres	(Non-Native Aquatic Plants*)	
					Aquatic Plants (Macrophytes)	
Middle River	MA51-02	Headwaters, outlet Coes Pond, Worcester to confluence with the unnamed tributary locally known as "Mill Brook" (downstream of the railroad spur bridge west of Tobias Boland Way), Worcester (through Middle River Pond formerly segment MA51101).	3.40	Miles	(Debris*)	
					(Physical substrate habitat alterations*)	
					(Trash*)	
					Benthic Macroinvertebrates	
					Escherichia Coli (E. Coli)	
					Metals	
					Nutrient/Eutrophication Biological Indicators	
					Turbidity	
Mill River	MA51-35	Headwaters, outlet North Pond, Milford/Upton to Mendon/Blackstone corporate boundary (through former segments Fiske Millpond MA51049, Mill Pond MA51102, Hopedale Pond MA51065 and Spindleville Pond MA51158) (formerly part of segment MA51-10).	11.80	Miles	(Non-Native Aquatic Plants*)	
					Aquatic Plants (Macrophytes)	
					Metals	
					PCBs In Fish Tissue	

APPENDIX D – NATIONAL REGISTER OF HISTORIC PLACES DOCUMENTATION

Massachusetts Cultural Resource Information System

MACRIS

MACRIS Search Results

Search Criteria: Town(s): Worcester; Street No: 55; Street Name: Lake Ave North; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year

APPENDIX E – ENDANGER SPECIES ACT DOCUMENTATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To: November 23, 2020
Consultation Code: 05E1NE00-2021-SLI-0522
Event Code: 05E1NE00-2021-E-01553
Project Name: UMMS

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2021-SLI-0522

Event Code: 05E1NE00-2021-E-01553

Project Name: UMMS

Project Type: DEVELOPMENT

Project Description: University of Massachusetts Medical School (UMMS) – New Research Building

The new medical research facility will be located at the University of Massachusetts Medical School in Worcester, Massachusetts. The proposed building will be positioned between the Sherman and Lazare buildings within the existing four-story parking garage. A portion of the existing parking garage will be demolished to make room for the research building. The new structure will have a below-grade space with a finish floor approximately 22 feet below the existing grade. The proposed research building will be eight stories and have a footprint of approximately 28,500 square feet.

Construction is set to begin in 2021.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/42.27784456574388N71.7622164130805W

Counties: Worcester, MA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.