HALEY ALDRICH

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NPDES RGP APPLICATION FOR TEMPORARY CONSTRUCTION DEWATERING NORTH HARVARD ALLSTON STORM DRAIN EXTENSION PROJECT 140-156 WESTERN AVENUE HARVARD UNIVERSITY ALLSTON, MASSACHUSETTS

by Haley & Aldrich, Inc.
Boston, Massachusetts

for Environmental Protection Agency (EPA) Region 1
Boston, Massachusetts

File No. 130437-004
April 2020

HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

2 April 2020
File No. 130437-004

Environmental Protection Agency (EPA) Region 1
5 Post Office Square, Suite 100
Mail Code OEP06-4
Boston, Massachusetts 02109

Attention: Ms. Shelley Puleo
EPA/OEP RGP Applications Coordinator

Subject: NPDES RGP Application for Temporary Construction Dewatering
North Allston Storm Drain Extension Project
140-156 Western Avenue
Harvard University
Allston, Massachusetts

Dear Ms. Puleo:

On behalf of our client, President and Fellows of Harvard College acting by and through Harvard Campus Services Capital Projects (CSCP) (Harvard), Haley & Aldrich, Inc. (Haley & Aldrich) is submitting this application to request authorization under the National Pollutant Discharge Elimination System (NPDES) Remediation General Permit (RGP) for off-site discharge of temporary construction dewatering effluent during construction activities for a portion of the planned North Allston Storm Drain Extension Project (NASDEP). A copy of the Notice of Intent (NOI) is included in Appendix A.

A. GENERAL SITE DESCRIPTION

A.1 Site and Work Description

The NASDEP Project involves the construction of a new Boston Water and Sewer Commission (BWSC) drain line between Harvard's Science and Engineering Complex (SEC) at 140-156 Western Avenue to a new stormwater outfall to the Charles River in Allston, Massachusetts. Phase 1 of the project consists of installation of the drain line immediately south of the planned Science Drive roadway, a portion of Rotterdam Street, and approximately 30 feet to the east of Rotterdam street (herein referred to as the "Work Area"). Dewatering is anticipated to be required for construction of portions of the drain line located below the groundwater table. Additional dewatering effluent may also be generated from surface runoff due to precipitation, and construction-generated water (e.g., wheel washes, decontamination activities).

Temporary construction dewatering is anticipated to begin in June 2020 and is estimated to occur intermittently over a period of approximately 24 months. The Project Location is shown on Figure 1, Project Locus. The approximate area of Phase 1 work can be found on Figure 2 and approximate depths of planned excavation can be found on Figure 3.

A.2 MCP Regulatory Compliance Status in Work Zone Areas

The work described above will be located within the limits of a Massachusetts Contingency Plan (310 CMR 40.0000) (MCP) Disposal Site with Release Tracking Number (RTN) 3-26932 (140-156 Western Avenue). Approximate Disposal Site Boundaries are shown on Figure 2. RTN 3-26932 is associated with lead, cadmium, arsenic, petroleum hydrocarbons, and polycyclic aromatic hydrocarbons (PAHs) in soil. According to the Permanent Solution Statement for RTN 3-26932, groundwater at the Disposal Site was not impacted. In April 2015, an Activity and Use Limitation (AUL) was recorded for the Disposal Site to prevent potential exposure to historically impacted/urban fill soils. In May 2015, a Permanent Solution Statement with Conditions was submitted to the Massachusetts Department of Environmental Protection (MassDEP).

Work within the Disposal Sites associated with RTN 3-26932 will be performed under the SEC Peripheral Work Post-Permanent Solution Statement RAM Plan submitted to MassDEP on 3 June 2015 and RAM Modifications submitted on 31 March 2017, 28 September 2017, 23 July 2018, and 27 September 2018. Certain historically impacted soils within the Work Area also contain or are presumed to contain asbestos containing material (ACM) debris.

B. RECEIVING WATER INFORMATION

Receiving water quality data, collected by Haley & Aldrich on 11 October 2019 for Harvard's use was used in support of this NOI. The laboratory data results are summarized in Table II. Receiving water temperature was obtained in the field and is noted on the effluent limitations input calculation page in Appendix B. The sample was collected approximately 1,000 feet upstream of the outfall intended to be used for dewatering, BWSC outfall SDO 001. The laboratory data report is provided in Appendix G.

The seven-day-ten-year flow (7Q10) of the receiving water was established using the U.S. Geological Survey (USGS) StreamStats program and confirmed by Massachusetts Department of Environmental Protection (MassDEP) on 19 December 2019. The StreamStats report, Dilution Factor calculations, and MassDEP confirmation of the 7Q10 and DF are included in Appendix B.

Copies of the "EnterData" and "FreshwaterResults" tabs from the excel file provided as an additional resource by EPA are included in Appendix B and will be transmitted electronically with the NOI. The effluent limitations calculated are included for reference in Table I.

C. SOURCE WATER INFORMATION

To evaluate groundwater (source water) quality at the Work Area, a groundwater sample was obtained from observation well SEC-GP-51(OW) on 3 December 2019. The sample was submitted to Alpha Analytical, Inc. of Westborough, Massachusetts (Alpha Analytical) for analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total metals, pH, polychlorinated biphenyls (PCBs), chloride, total residual chlorine, total cyanide, ammonia nitrogen, total phenolics, total suspended solids (TSS), and total petroleum hydrocarbons (TPH). Source water quality data is summarized on Table I and its sampling location is shown on Figure 2. Laboratory data reports are included in Appendix G.

Phase 1 of the NASDEP alignment is located within the area where NPDES RGP Authorization MAG910794 (Science Drive/South of Science) for discharge have been previously approved. Historic groundwater quality data from this project can be found in Table III, which includes data from groundwater sampling of SEC-GP-51(OW) on 16 March 2018. The data was collected in support of the NOI for MAG910794 (Science Drive/South of Science) and is included herein as supplemental data in support of this application.

D. DISCHARGE INFORMATION

Construction dewatering is anticipated to be performed using a single dewatering system. The approximate location of the treatment system and the associated discharge location is shown on Figure 2, just west of the South of Rotterdam (SORO) parking lot and east of Rotterdam Street. The storm drain and discharge route proposed flows into the Charles River via an existing BWSC outfall (SDO 001) shown on Figure 2. We anticipate effluent discharge rates to be about 100 gallons per minute (gpm) or less, with occasional peak flows of about 200 gpm during significant precipitation events. The temporary dewatering will take place in excavations and will be conducted with sumps.

E. DEWATERING TREATMENT SYSTEM INFORMATION

The effluent treatment systems will be designed and implemented by the Contractor to meet the applicable 2017 RGP Discharge Effluent Criteria. Prior to discharge, collected water will be routed through a sedimentation tank and bag filters (5-micron bag filters are anticipated to be required by the MassDEP-approved Non-Traditional Asbestos Abatement Work Plan) to remove suspended solids and undissolved chemical constituents, as shown on Figure 4. Additional treatment may include granulated activated carbon (GAC), a chemically aided settling system, ion exchange, and pH adjustment. The location of the sedimentation tank and the drain location they will be discharging into are shown on Figure 2.

F. TREATMENT CHEMICALS AND ADDITIVES INFORMATION

If necessary, to meet the 2017 RGP Discharge Effluent Criteria, additional treatment including GAC, a chemically aided settling system, ion exchange, and pH adjustment may be added to the treatment system.

Product information for the proposed GAC and ion exchange systems, including Safety Data Sheets (SDSs), associated hazards, manufacturer, and proper system operation, are provided in Appendix C.

pH adjustment, if required, will be conducted using sulfuric acid or sodium hydroxide that will be dosed to reduce or increase pH using a metered system. Product information, including chemical formula, SDS, CAS registry number, manufacturer, and associated hazards, toxicological and ecological information, and manufacturer information, including dosing and metering, are provided in Appendix C. The sulfuric acid or sodium hydroxide will be stored in 55-gallon drums with secondary containment systems in place; a summary of control measures for proper handling and spill prevention is provided in Appendix C. The addition of sulfuric acid or sodium hydroxide control pH is a standard treatment for temporary construction dewatering; it is not expected to exceed applicable permit limitations and water quality standards or alter conditions in the receiving water. No additional testing is considered necessary for use of this product or to demonstrate that use of this product will not adversely affect the receiving water.

If necessary, a chemical aided settling system may be added to one or more of the treatment systems. The system would allow of the application of coagulant and nonionic dry polymer. The product information for the proposed coagulant and dry polymer, including product name, manufacturer, purpose and use, associated hazards and risks, reported aquatic toxicity (LC_{50}), and proper handling and storage measures, are included in the attached SDSs. The coagulant and dry polymer is considered a typical treatment for temporary construction dewatering; addition of these compounds is not expected to add pollutants in concentrations which exceed permit effluent limitations or applicable water quality standards or alter conditions in receiving water. No additional testing is considered to be necessary for use of these products or to demonstrate that use of these products will not adversely affect the receiving water.

The dosing concentration for both the coagulant and dry polymer typically ranges from 25-50 parts per million (ppm). The actual dosing concentration is based on visual observations in the field and will be adjusted and calibrated by the operator during startup of the additional components to achieve the appropriate set-point for the system. Dosing is continuous at the set concentration while the system is running.

It is important to note that although the dosing concentration is 25-50 ppm, the detected concentration in the carryover (post bag filter) is in the parts per trillion (ppt) range (about 6 orders of magnitude less than the dosing concentration). This is because nearly all the applied chemical becomes incorporated in the sludge and removed from the waste stream as a solid from the weir tank and as part of typical system operations and maintenance.

G. 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; a copy of the determination is

attached in Appendix D. Based on the results of the determination, the project and action area are considered to meet FWS Criterion A as no listed species or critical habitat have been established to be present within the project action area.

H. DOCUMENTATION OF NATIONAL HISTORIC PRESERVATION ACT 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 E.

I. SUPPLEMENTAL INFORMATION

Permits for temporary construction dewatering will also be required from the Department of Conservation and Recreation (DCR) and the Boston Water and Sewer Commission (BWSC). Permit applications are being submitted concurrently with this NOI. Permits are being submitted to DCR through the agency's electronic filing systems. A copy of the BWSC Permit Application is included in Appendix F.

Owner and operator information are provided below for reference:

Owner:
President and Fellows of Harvard College
c/o Campus Services Capital Projects
20 University Road, 3d Floor
Cambridge, MA 02138
Attn: Joe O'Farrell, Managing Director

Operator:
Skanska USA Civil
1365 Main Street
Waltham, MA 02451
Attn: Andrew Pramberger, Project Manager

The President and Fellows of Harvard College and Skanska are seeking coverage under the RGP as co-permittees.

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 yours,
HALEY & ALDRICH, INC.

Jack D. Bitney, EIT Environmental Engineer	Beck J. Straley Project Manager	Katherine L. Dilawari, PE, LSP (MA) Senior Associate

Enclosures:

- Table I – Summary of Source Groundwater Quality Data
- Table II – Summary of Receiving Water Quality Data
- Table III – Summary of Historic Source Groundwater Quality Data
- Figure 1 – Project Locus
- Figure 2 – Work Area and Proposed Discharge Route
- Figure 3 – Plans and Profile
- Figure 4 – Proposed Treatment System Schematic
- Appendix A – Notice of Intent (NOI)
- Appendix B – Effluent Limitations Documentation
- Appendix C – Chemicals and Additives Information
- Appendix D – Endangered Species Act Assessment
- Appendix E – National Historic Preservation Act Review
- Appendix F – Copies of Construction Dewatering Permit Applications
- Appendix G – Laboratory Data Reports

c: Harvard University CSCP; Joseph O'Farrell
Harvard Environmental Health & Safety; Kelly McQueeney
Skanska; Attn: Andrew Pramberger

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TABLES

TABLE I
SUMMARY OF GROUNDWATER QUALITY DATA
NORTH ALLSTON STORM DRAIN
ALLSTON, MA
FILE NO. 130437-004

Precharacterization Grid	Action Level		
Location Name	MCP Reportable Concentration RCGW-2 2014	2017 NPDES Criteria	SEC-GP-51(OW)
Sample Name			SEC-GP-51(OW)_20191203
Sample Date			12/03/2019
Sample Type			Primary
Lab Sample ID			L1957699-02
Volatile Organic Compounds (ug/L)			
1,1,1-Trichloroethane	4000	200	ND (2)
1,1,2-Trichloroethane	900	5	ND (1.5)
1,1-Dichloroethane	2000	70	ND (1.5)
1,1-Dichloroethene	80	3.2	ND (1)
1,2-Dibromoethane (Ethylene Dibromide)	2	0.05	ND (0.01)
1,2-Dichlorobenzene	2000	600	ND (5)
1,2-Dichloroethane	5	5	ND (1.5)
1,3-Dichlorobenzene	6000	320	ND (5)
1,4-Dichlorobenzene	60	5	ND (5)
Benzene	1000	5	ND (1)
Carbon tetrachloride	2	4.4	ND (1)
cis-1,2-Dichloroethene	20	70	ND (1)
Methyl Tert Butyl Ether	5000	70	ND (10)
Methylene chloride	2000	4.6	ND (1)
o-Xylene	NA	NA	ND (1)
Tert-Amyl Methyl Ether (TAME)	NA	90	ND (20)
Tert-Butyl Alcohol (tert-Butanol)	NA	120	ND (100)
Tetrachloroethene	50	5	ND (1)
Trichloroethene	5	5	ND (1)
Vinyl chloride	2	2	ND (1)
SUM of BTEX	NA	100	ND
Semi-Volatile Organic Compounds (ug/L)			
SUM of Phalates	NA	190	ND (4.9)
Total Petroleum Hydrocarbons (mg/L)			
Petroleum hydrocarbons	5	5	ND (4)
Inorganic Compounds (mg/L)			
Chromium VI (Hexavalent), Dissolved	0.3	0.323	ND (0.01)
Antimony, Total	8	0.206	ND (0.004)
Arsenic, Total	0.9	0.104	0.00243
Cadmium, Total	0.004	0.0102	ND (0.0002)
Chromium, Total	0.3	0.646	ND (0.001)
Copper, Total	100	0.242	0.00247
Cyanide, Total	0.03	0.178	ND (0.005)
Hardness, Total	NA	NA	219
Iron, Total	NA	5	0.979
Lead, Total	0.01	0.160	ND (0.001)
Mercury, Total	0.02	0.000739	ND (0.0002)
Nickel, Total	0.2	1.450	ND (0.002)
Selenium, Total	0.1	0.2358	ND (0.005)
Silver, Total	0.007	0.0351	ND (0.0004)
Zinc, Total	0.9	0.420	ND (0.01)
Other			
Ammonia, Total (mg/L)	NA	Report	0.265
Chloride, Total (mg/L)	NA	Report	161
Chromium III (Trivalent), Total (mg/L)	0.6	323	ND (0.01)
Total Phenols (mg/L)	NA	1080	ND (0.03)
Pesticides and PCBs (ug/L)			
Aroclor-1016 (PCB-1016)	5	NA	ND (0.25)
Aroclor-1221 (PCB-1221)	5	NA	ND (0.25)
Aroclor-1232 (PCB-1232)	5	NA	ND (0.25)
Aroclor-1242 (PCB-1242)	5	NA	ND (0.25)
Aroclor-1248 (PCB-1248)	5	NA	ND (0.25)
Aroclor-1254 (PCB-1254)	5	NA	ND (0.25)
Aroclor-1260 (PCB-1260)	5	NA	ND (0.2)
SUM Polychlorinated Biphenyls	5	0.000064	**ND(0.2)**
Semi-Volatile Organic Compounds (SIM) (ug/L)			
Acenaphthene	6000	NA	ND (0.1)
Benzo(a)anthracene	1000	1	ND (0.1)
Benzo(a)pyrene	500	1	ND (0.1)
Benzo(b)fluoranthene	400	1	ND (0.1)
Benzo(k)fluoranthene	100	1	ND (0.1)
Chrysene	70	1	ND (0.1)
Dibenz(a,h)anthracene	40	1	ND (0.1)
Indeno(1,2,3-cd)pyrene	100	1	ND (0.1)
Naphthalene	700	20	ND (0.1)
Pentachlorophenol	200	1	ND (0.98)
SUM of Group I PAHs	NA	1	ND
SUM of Group II PAHs	NA	100	ND
Volatile Organic Compounds SIM (ug/L)			
1,4-Dioxane	6000	200	ND (50)

ABBREVIATIONS AND NOTES:

-: Not Analyzed

µg/L: micrograms per liter

MCP: 310 CMR 40.0000 Massachusetts Contingency Plan effective 25 April 2014; revisions 23 May 2014.

mg/L: milligram per liter

NA: Not Applicable

ND (2.5): Not detected, number in parentheses is the laboratory detection limit

RC: MCP Reportable Concentration

- Bold blue values indicate an exceedance of the **RCGW-2**

- Bold red values indicate an exceedance of the **calculated TBEL** values from Appendix B

TABLE II
SUMMARY OF SURFACE WATER QUALITY
NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
ALLSTON, MA
FILE NO. 130437-004

Location Name	CHAR-SW
Sample Name	CHAR-SW-20191011
Sample Date	10/11/2019
Lab Sample ID	L1947882-01
Total Metals (mg/L)	
Antimony	ND (0.004)
Arsenic	ND (0.001)
Cadmium	ND (0.0002)
Chromium	ND (0.001)
Chromium III (Trivalent)	ND (0.01)
Copper	0.00317
Iron	0.748
Lead	0.0034
Mercury	ND (0.0002)
Nickel	ND (0.002)
Selenium	ND (0.005)
Silver	ND (0.0004)
Zinc	0.01324
Dissolved Metals (mg/L)	
Chromium VI (Hexavalent)	ND (0.01)
Other	
Ammonia (mg/L)	ND (0.075)
Temperature (C)	14.09
Hardness (mg/L)	131
pH (SU)	7.2

ABBREVIATIONS AND NOTES:

-: Not Analyzed

ND (2.5): Not detected, number in parentheses is the laboratory detection limit

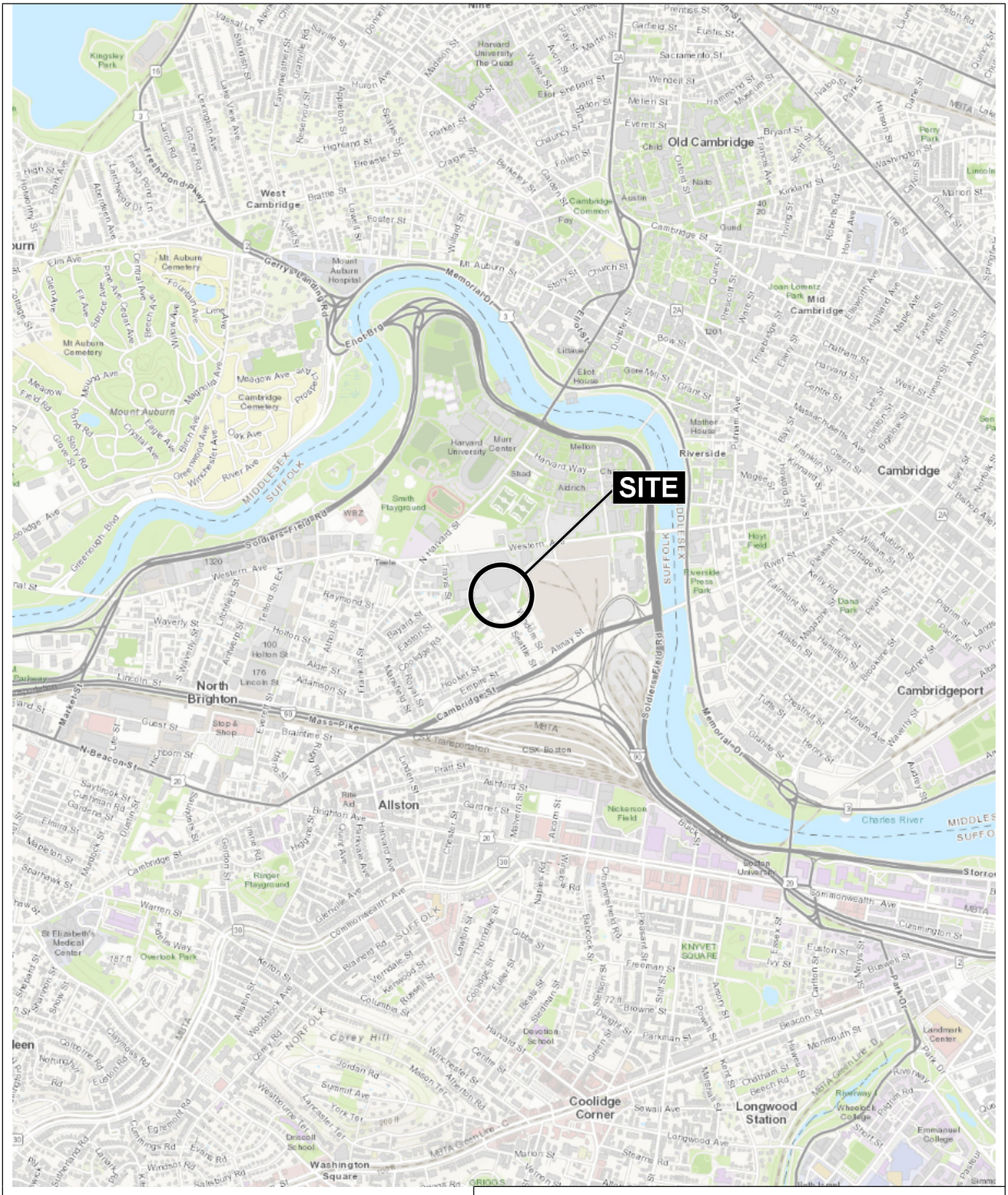
- Temperature sampled in field on 10/11/2019.

TABLE III
SUMMARY OF HISTORIC SOURCE GROUNDWATER QUALITY DATA
NORTH ALLSTON STORM DRAIN
ALLSTON, MA
FILE NO. 130437-004

LOCATION	RCGW-2 Reportable Concentrations	2017 NPDES Criteria	SEC-GP-51(OW)
SAMPLE NAME			HA18-SCIENCE-NPDES_03/16/2018
SAMPLING DATE			3/16/2018
LAB SAMPLE ID			L1809146-01
Volatile Organic Compounds (ug/L)			
1,1,1-Trichloroethane	4000	200	ND(0.5)
1,1,2-Trichloroethane	900	5	ND(0.75)
1,1-Dichloroethane	2000	70	ND(0.75)
1,1-Dichloroethene	80	3.2	ND(0.5)
1,2-Dibromoethane (Ethylene Dibromide)	2	0.05	**ND(2)**
1,2-Dichlorobenzene	2000	320	ND(2.5)
1,4-Dichlorobenzene	60	5	ND(2.5)
Benzene	1000	5	ND(0.5)
Carbon tetrachloride	2	4.4	ND(0.5)
Chlorobenzene	200	NA	2.1
cis-1,2-Dichloroethene	20	70	ND(0.5)
Methyl tert butyl ether	5000	70	ND(1)
Methylene chloride	2000	4.6	ND(3)
Tert-Butyl Alcohol	NA	120	ND(10)
tert-Butylbenzene	10000	NA	ND(2.5)
Tertiary-Amyl Methyl Ether	NA	90	ND(2)
Tetrachloroethene	50	5	ND(0.5)
Trichloroethene	5	5	ND(0.5)
Vinyl chloride	2	2	ND(1)
SUM of BTEX	NA	100	ND
SUM of Volatile Organic Compounds	NA	NA	2.1
Semi-Volatile Organic Compounds (ug/L)			
SUM of Phthalates	NA	190	ND
SUM of Semi-Volatile Organic Compounds	NA	NA	ND
Semi-Volatile Organic Compounds (SIM) (ug/L)			
Benzo(a)anthracene	1000	1	ND(0.1)
Benzo(a)pyrene	500	1	ND(0.1)
Benzo(b)fluoranthene	400	1	ND(0.1)
Benzo(k)fluoranthene	100	1	ND(0.1)
Chrysene	70	1	ND(0.1)
Dibenzo(a,h)anthracene	40	1	ND(0.1)
Indeno(1,2,3-cd)pyrene	100	1	ND(0.1)
Naphthalene	700	20	ND(0.1)
Pentachlorophenol	200	1	ND(0.8)
SUM of Group I PAHs	NA	1	ND
SUM of Group II PAHs	NA	100	ND
SUM of Semi-Volatile Organic Compounds (SIM)	NA	NA	ND
Total Petroleum Hydrocarbons (ug/L)			
Petroleum Hydrocarbons	5000	5000	ND(4000)
Ethanol (ug/L)			
Ethanol	NA	NA	-
Total Metals (ug/L)			
Antimony	8000	206	ND(4)
Arsenic	900	104	4.53
Cadmium	4	10.2	ND(0.2)
Chromium	300	646	1.1
Trivalent Chromium	600	323	ND(10)
Hexavalent Chromium	300	323	ND(10)
Copper	100000	242	2.45
Cyanide	30	178000	ND(5)
Iron	NA	5000	6090
Lead	10	160	ND(0.5)
Mercury	20	0.739	ND(0.2)
Nickel	200	1450	ND(2)
Selenium	100	235.8	ND(5)
Silver	7	35.1	ND(0.4)
Zinc	900	420	11.1
Pesticides (ug/L)			
1,2-Dibromo-3-chloropropane	1000	NA	ND(0.01)
1,2-Dibromoethane (Ethylene Dibromide)	2	NA	ND(0.01)
Polychlorinated Biphenyls (ug/L)			
Aroclor 1016	5	NA	ND(0.25)
Aroclor 1221	5	NA	ND(0.25)
Aroclor 1232	5	NA	ND(0.25)
Aroclor 1242	5	NA	ND(0.25)
Aroclor 1248	5	NA	ND(0.25)
Aroclor 1254	5	NA	ND(0.25)
Aroclor 1260	5	NA	ND(0.2)
SUM of Polychlorinated Biphenyls	NA	0.000064	ND
Other (ug/L)			
pH (SU)	NA	NA	6.74
Temperature (°C)	NA	NA	9.9
Ammonia Nitrogen	NA	Report	1850
Chloride	NA	Report	1770000
Hardness	NA	NA	634000
Total Residual Chlorine	NA	200	ND(20)
Total Phenolics	NA	1080	ND(30)
Total Suspended Solids (TSS)	NA	30000	9400

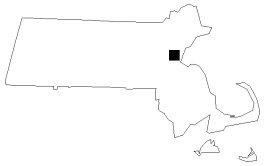
ABBREVIATIONS AND NOTES
-: Not Analyzed
µg/L: micrograms per liter
MCP: 310 CMR 40.0000 Massachusetts Contingency Plan effective 25 April 2014; revisions 23 May 2014.
mg/L: milligram per liter
NA: Not Applicable
ND (2.5): Not detected, number in parentheses is the laboratory detection limit
RC: MCP Reportable Concentration
- Bold blue values indicate an exceedance of the **RCGW-2**
- Bold red values indicate an exceedance of the **calculated TBEL** values from Appendix B

FIGURES



MAP SOURCE: ESRI

SITE COORDINATES: 42°21'42"N, 71°7'32"W



HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE
HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
MARCH 2020

FIGURE 1

129379-010_1_LOCUS.PDF

OUTFALL - SDO 001

PROPOSED DISCHARGE ROUTE

SEC-GP-51(OW)

PROPOSED PHASE 1 OF THE NASDEP ALLIGNMENT

RTN 3-26932 Disposal Site Boundary

SEC-GP-51(OW) Sampled on 3 December 2019 by Haley & Aldrich

HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE, HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

WORK AREA AND PROPOSED DISCHARGE ROUTE

SCALE: AS SHOWN
MARCH 2020

FIGURE 2

BOSTON WATER AND SEWER

N W E S

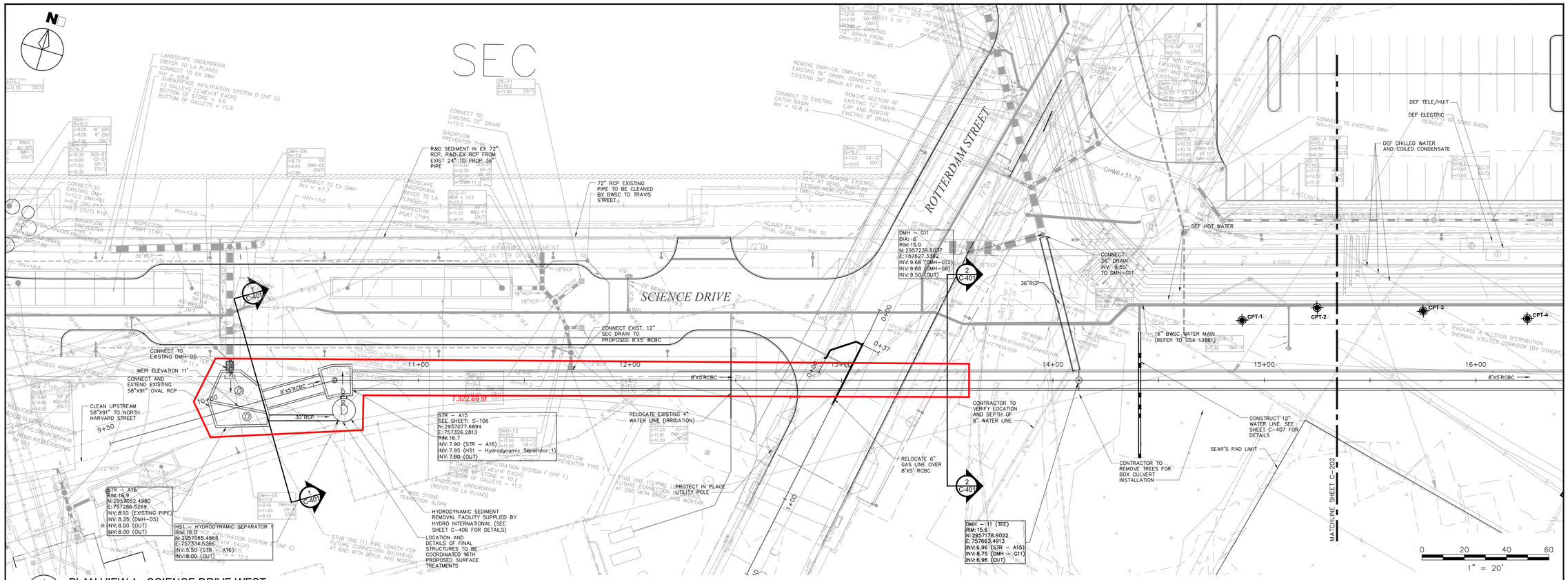
100 50 0 100 200 300 Feet

1 inch = 100 feet

PROPOSED DISCHARGE LOCATION

ANTICIPATED SEDIMENTATION TANK LOCATION

APPROXIMATE NASDEP ALLIGNMENT



1 / - PLAN VIEW 1 - SCIENCE DRIVE WEST

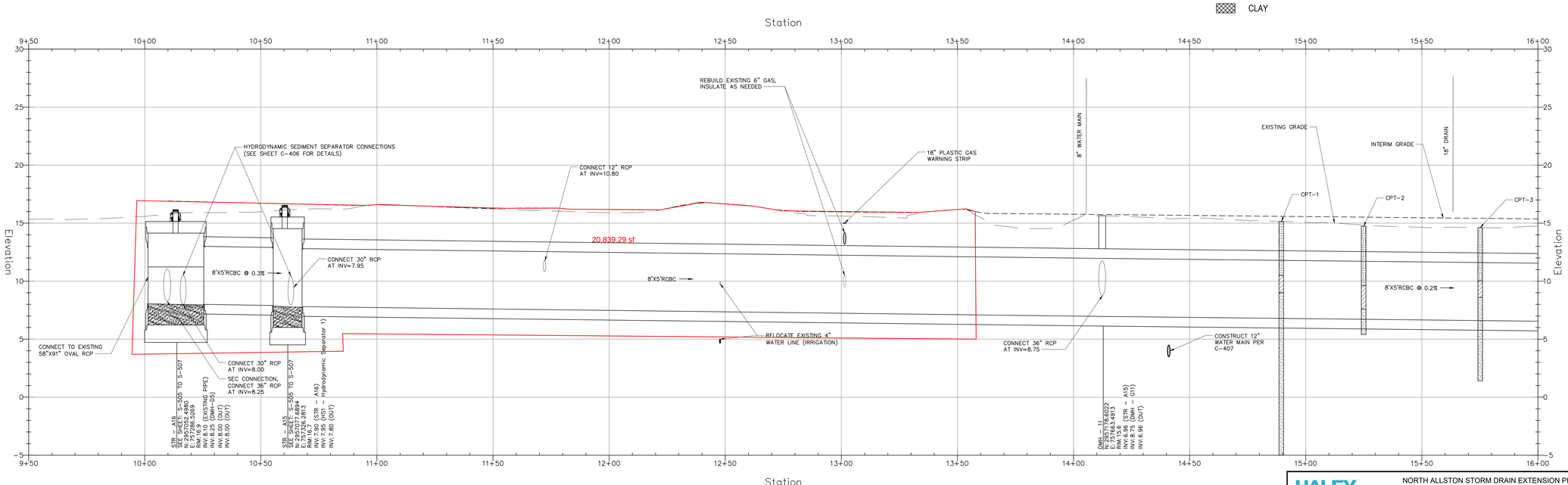
HORIZONTAL SCALE: 1"=20'

BORING LOG LEGEND:

- FILL
- ORGANIC DEPOSITS
- SAND
- CLAY

NOTES:

1. SEE SHEETS C-401 & C-402 FOR CROSS SECTIONS
2. SEE SHEETS C-403 FOR GENERAL DETAILS
3. ALL RCP TO BE CLASS V PIPING.
4. * INDICATES ORGANICS NOT ENCOUNTERED DUE TO PREVIOUS OVER EXCAVATION IN CSXT REMEDIATION AREA



1 / - PROFILE VIEW 1 - SCIENCE DRIVE WEST

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

OWNER:
HARVARD UNIVERSITY
SMITH CAMPUS CENTER, SUITE 901
1350 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02138
617.496.6688

PROJECT LOCATION:
100 WESTERN AVENUE
ALLSTON LANDING NORTH
BOSTON, MASSACHUSETTS

REGISTRATION STAMP:
ISSUED FOR BWSC DESIGN REVIEW

REVISIONS:

REV NO:	DATE:	DESCRIPTION:	BY:

PRIMARY:
wsp
75 ARLINGTON STREET
BOSTON, MA 02116
617.426.7330

PROJECT TITLE:
NORTH ALLSTON
STORM DRAIN
EXTENSION PROJECT

SHEET TITLE:
PLAN & PROFILE 1 OF 6
SCIENCE DRIVE WEST

100% CONSTRUCTION DOCUMENTS

DISCIPLINE:
CIVIL

DRAWN BY:	CHECKED BY:	APPROVED BY:
JPW	CJD	ABB

SCALE:	DATE:
AS NOTED	10/25/19

SHEET NUMBER:
C-201

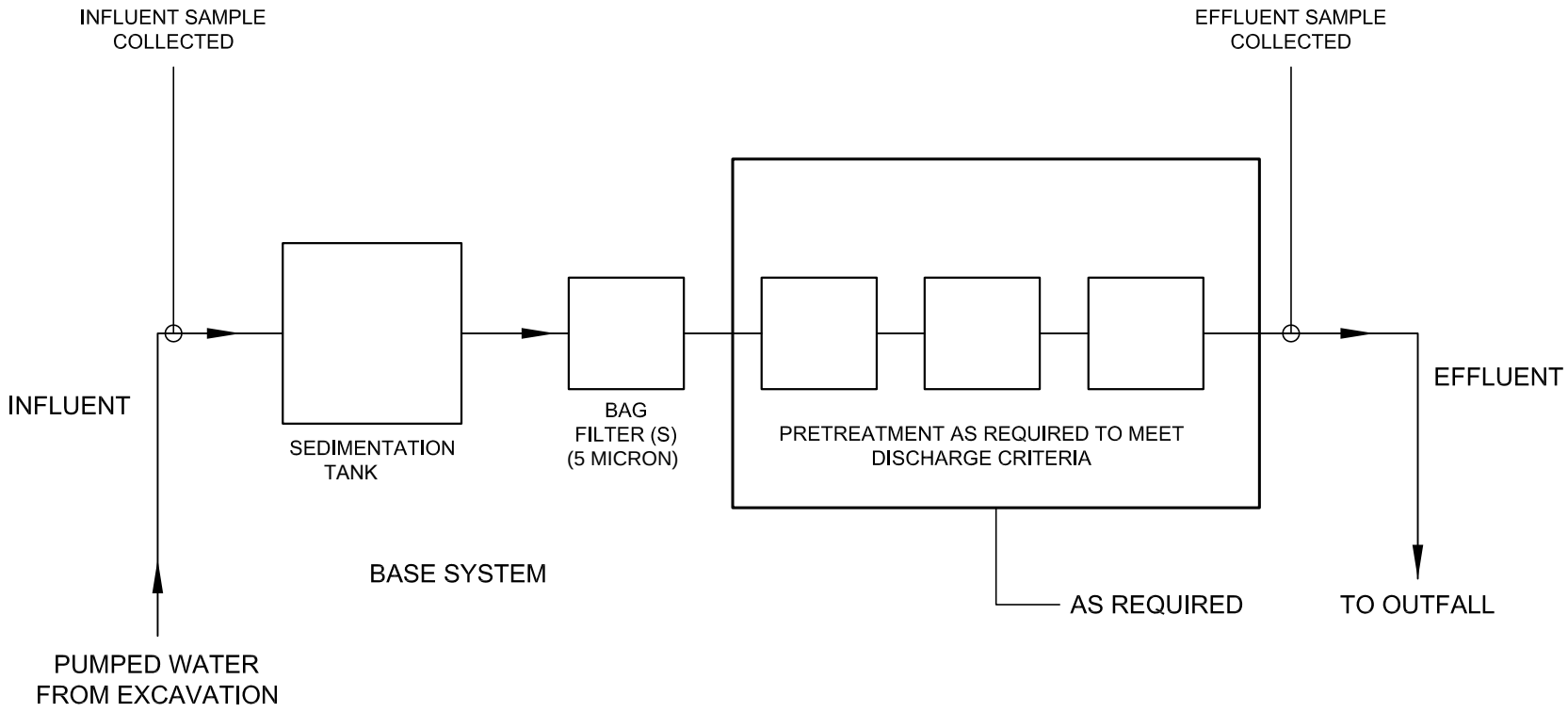
HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE, HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

PLAN AND PROFILE

SCALE: AS SHOWN
MARCH 2020

FIGURE 3



LEGEND:

DIRECTION OF FLOW

NOTE:

1. DETAILS OF TREATMENT SYSTEM MAY VARY FROM SYSTEM INDICATED ABOVE. SPECIFIC MEANS AND METHODS OF TREATMENT TO BE SELECTED BY CONTRACTOR. WATER WILL BE TREATED TO MEET REQUIRED EFFLUENT STANDARDS.

HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE, HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

PROPOSED TREATMENT SYSTEM SCHEMATIC

SCALE: NONE
MARCH 2020

FIGURE 4

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:
North Allston Storm Drain Extension Project</td><td colspan="3">Site address: 140-156 Western Avenue
Street:</td></tr>
<tr><td>City: Allston</td><td>State: MA</td><td>Zip: 02134</td></tr>
<tr><td rowspan="4">2. Site owner
President and Fellows of Harvard College acting by and through Harvard Campus Services Capital Projects

Owner is (check one): ☐ Federal ☐ State/Tribal ☐ Private
■ Other; if so, specify: Institution</td><td colspan="3">Contact Person: Joseph O'Farrell</td></tr>
<tr><td colspan="2">Telephone: 617-495-1659</td><td>Email: joseph_ofarrell@harvard.edu</td></tr>
<tr><td colspan="3">Mailing address: 20 University Road, Suite 340
Street:</td></tr>
<tr><td>City: Cambridge</td><td>State: MA</td><td>Zip: 02138</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Skanska USA Civil</td><td colspan="3">Contact Person: Andrew Pramberger</td></tr>
<tr><td colspan="2">Telephone: 917-417-8576</td><td>Email: andrew.pramberger@skanska.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 1365 Main Street</td></tr>
<tr><td>City: Waltham</td><td>State: MA</td><td>Zip: 02451</td></tr>
<tr><td>4. NPDES permit number assigned by EPA:
not applicable

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): 3-26932
☐ 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):
Charles River	MA72-36	Class 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. Impaired - aesthetic (P), fish consumption, fish, other aquatic life and wildlife (P), primary contact rec. (P, pathogens), and secondary contact rec (P)

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.	24.6 cfs
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.	56.2

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:

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: See Section D	
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): SDO 001 **Catch Basins** Proposed Discharge Location	Outfall location(s): (Latitude, Longitude) 42.366194, -71.117629 **Catch Basin Location** 42.362536, -71.123635

Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ■ Indirect discharge, if so, specify:

Catch basin shown on Figure 2 of the NPDES RGP application for temporary dewatering

■ 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: DCR and BWSC Permits in review, we anticipate approval in 4-6 weeks

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): 6/2020 through 12/2021

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="5">☐ 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		✔	1	4500NH3	75	265	265	Report mg/L	---
Chloride		✔	1	300.0	25000	161000	161000	Report µg/l	---
Total Residual Chlorine	✔		1	4500CL-D	20	0	0	0.2 mg/L	618 µg/L
Total Suspended Solids		✔	1	2540D	5000	0	0	30 mg/L	---
Antimony	✔		1	200.8	4	0	0	206 µg/L	35973 µg/L
Arsenic		✔	1	200.8	1	2.43	2.43	104 µg/L	562 µg/L
Cadmium		✔	1	200.8	0.2	0	0	10.2 µg/L	18.7538 µg/L
Chromium III		✔	1	200.8	10	0	0	323 µg/L	6105.4 µg/L
Chromium VI		✔	1	7196A	10	0	0	323 µg/L	642.7 µg/L
Copper		✔	1	200.8	1	2.47	2.47	242 µg/L	667.6 µg/L
Iron		✔	1	200.7	50	979	979	5,000 µg/L	56208 µg/L
Lead		✔	1	200.8	1	0	0	160 µg/L	256.25 µg/L
Mercury		✔	1	245.1	0.2	0	0	0.739 µg/L	50.92 µg/L
Nickel		✔	1	200.8	2	0	0	1,450 µg/L	3723.8 µg/L
Selenium	✔		1	200.8	5	0	0	235.8 µg/L	281.0 µg/L
Silver	✔		1	200.8	0.4	0	0	35.1 µg/L	345.8 µg/L
Zinc		✔	1	200.8	10	0	0	420 µg/L	8556.6 µg/L
Cyanide		✔	1	4500CN	5	0	0	178 mg/L	292.3 µg/L
B. Non-Halogenated VOCs									
Total BTEX		✔	1	624.1	NA	0	0	100 µg/L	---
Benzene	✔		1	624.1	1	0	0	5.0 µg/L	---
1,4 Dioxane	✔		1	624.1-SIM	50	0	0	200 µg/L	---
Acetone		✔	1	624.1	10	0	0	7.97 mg/L	---
Phenol	✔		1	420.1	30	0	0	1,080 µg/L	16863 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	✔		1	624.1	1	0	0	4.4 µg/L	89.9 ug/L
1,2 Dichlorobenzene		✔	1	624.1	5	0	0	600 µg/L	---
1,3 Dichlorobenzene	✔		1	624.1	5	0	0	320 µg/L	---
1,4 Dichlorobenzene	✔		1	624.1	5	0	0	5.0 µg/L	---
Total dichlorobenzene	✔		1	624.1	5	0	0	763 µg/L in NH	---
1,1 Dichloroethane	✔		1	624.1	1.5	0	0	70 µg/L	---
1,2 Dichloroethane	✔		1	624.1	1.5	0	0	5.0 µg/L	---
1,1 Dichloroethylene	✔		1	624.1	1.5	0	0	3.2 µg/L	---
Ethylene Dibromide	✔		1	624.1	0.01	0	0	0.05 µg/L	---
Methylene Chloride	✔		1	624.1	1	0	0	4.6 µg/L	---
1,1,1 Trichloroethane	✔		1	624.1	2	0	0	200 µg/L	---
1,1,2 Trichloroethane	✔		1	624.1	1.5	0	0	5.0 µg/L	---
Trichloroethylene		✔	1	624.1	1	0	0	5.0 µg/L	---
Tetrachloroethylene		✔	1	624.1	1	0	0	5.0 µg/L	185.5 ug/L
cis-1,2 Dichloroethylene		✔	1	624.1	1	0	0	70 µg/L	---
Vinyl Chloride	✔		1	624.1	1	0	0	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates		✔	1	625.1	4.9	0	0	190 µg/L	---
Diethylhexyl phthalate	✔		1	625.1	4.9	0	0	101 µg/L	123.7 ug/L
Total Group I PAHs		✔	1	624.1-SIM	0.1	0	0	1.0 µg/L	---
Benzo(a)anthracene		✔	1	624.1-SIM	0.1	0	0	As Total PAHs	0.2136 ug/L
Benzo(a)pyrene		✔	1	624.1-SIM	0.1	0	0		0.2136 ug/L
Benzo(b)fluoranthene		✔	1	624.1-SIM	0.1	0	0		0.2136 ug/L
Benzo(k)fluoranthene		✔	1	624.1-SIM	0.1	0	0		0.2136 ug/L
Chrysene		✔	1	624.1-SIM	0.1	0	0		0.2136 ug/L
Dibenzo(a,h)anthracene		✔	1	624.1-SIM	0.1	0	0		0.2136 ug/L
Indeno(1,2,3-cd)pyrene		✔	1	624.1-SIM	0.1	0	0		0.2136 ug/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		✔	1	624.1-SIM	0.1	0	0	100 µg/L	---
Naphthalene		✔	1	625.1-SIM	0.1	0	0	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs		✔	1	608.3	0.25	0	0	0.000064 µg/L	---
Pentachlorophenol	✔		1	625.1-SIM	0.98	0	0	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons		✔	1	1664A	4000	0	0	5.0 mg/L	---
Ethanol	✔		1	1671A	20 mg/L	0	0	Report mg/L	---
Methyl-tert-Butyl Ether	✔		1	624.1	10	0	0	70 µg/L	1124 µg/L
tert-Butyl Alcohol	✔		1	624.1	100	0	0	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		1	624.1	20	0	0	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		✔	1	200.7	660	219000	219000		
pH		✔	1	YSI Pro	N/A	7.05	7.05		
Asbestos		✔	0						

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:

Granulated Activated Carbon (GAC), Ion Exchange, and/or pH adjustment may be added to meet necessary effluent limits.

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

Prior to discharge, collected water is routed through a sedimentation tank and bag filters (5-micron bag filter will be required by the NTWPs) to remove suspended solids and undissolved chemical constituents. Additional treatment may include granulated activated carbon (GAC), ion exchange, and/or pH adjustment, as needed to meet necessary effluent limits.

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: Granulated Activated Carbon (GAC), Ion Exchange, and/or pH adjustment may be added to meet necessary effluent limits.

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: Flowmeter Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	200 gpm
Provide the proposed maximum effluent flow in gpm.	200 gpm
Provide the average effluent flow in gpm.	100 gpm
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:	N/A

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:
pH or iron treatment conditioners may be added to the treatment system if necessary to meet effluent limits.

2. Provide the following information for each chemical/additive, using attachments, if necessary:
Refer to attached Haley & Aldrich, Inc. letter
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.

Refer to attached Haley & Aldrich, Inc. letter

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.

A BMPP meeting the requirements of this general permit will be implemented at the site.

BMPP certification statement:

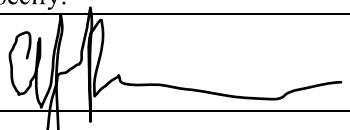
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ■ No ☐
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private 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: Joseph O'Farrell
Joseph O'Farrell (Mar 31, 2020)

Date: Mar 31, 2020

Print Name and Title: Joseph O'Farrell, Senior Project Manager

J. Certification requirement

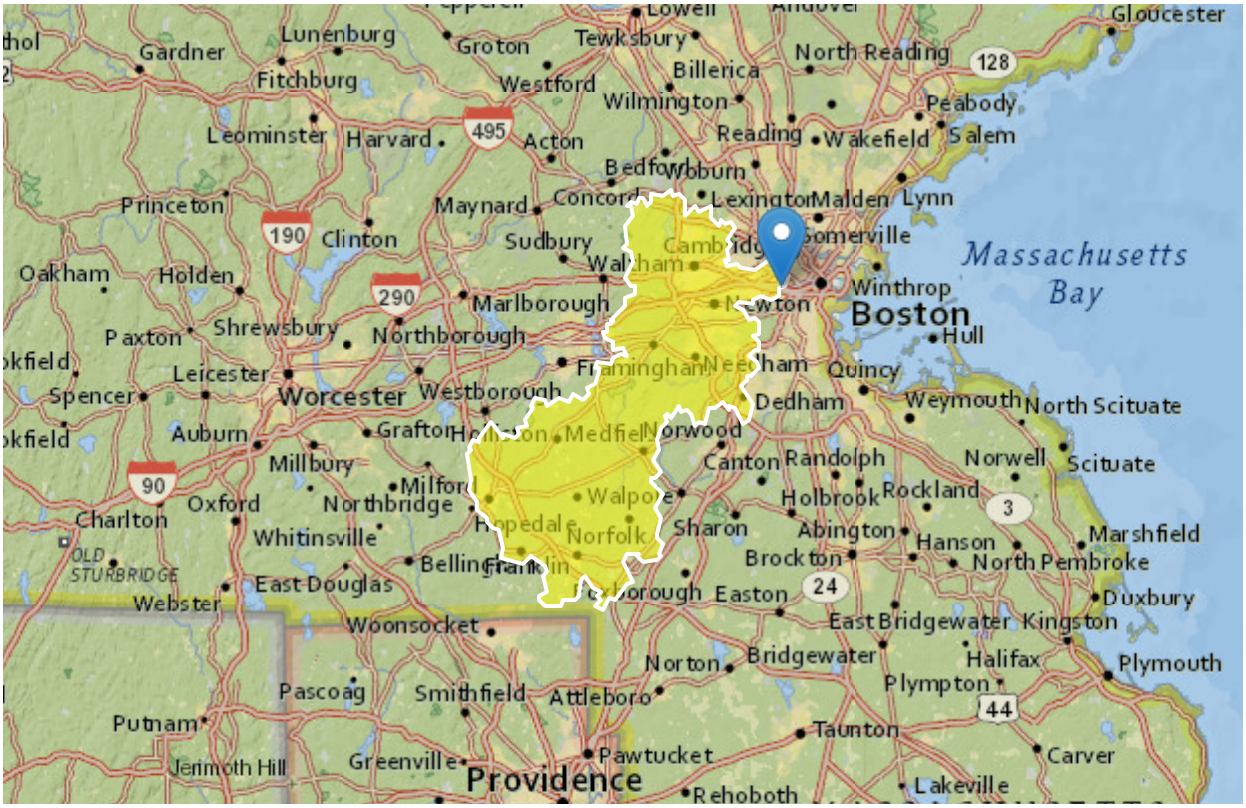
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage 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.
A BMPP meeting the requirements of this general permit will be implemented at the site. BMPP certification statement:
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: 3/27/2020
Print Name and Title: Andrew Pramberger, Project Manager

APPENDIX B

Effluent Limitations Documentation

North Allston Storm Drain Extension Project

Region ID: MA
Workspace ID: MA20191219142125853000
Clicked Point (Latitude, Longitude): 42.35504, -71.11648
Time: 2019-12-19 09:21:41 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	282	square miles
BSLDEM250	Mean basin slope computed from 1:250K DEM	2.331	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	0.23	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	282	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	2.331	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.23	square mile per mile	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

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

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

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

Statistic	Value	Unit
7 Day 2 Year Low Flow	49.4	ft^3/s
7 Day 10 Year Low Flow	24.6	ft^3/s

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/)

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Application Version: 4.3.11

HALEY & ALDRICH, INC.		**CALCULATIONS**	FILE NO.	130437-004	
			SHEET	1 of 1	
CLIENT	PRESIDENT AND FELLOWS OF HARVARD COLLEGE		DATE	6-Feb-20	
PROJECT	NORTH ALLSTON STORM DRAIN EXTENSION PROJECT		COMPUTED BY	JDB	
SUBJECT	DILUTION FACTOR CALCULATIONS				

PURPOSE: Calculate Dilution Factor (DF) for project based on 7 Day 10 Year (7Q10) Low Flow values.

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 24.6 cfs (from StreamStats 4.0)
2. A conversion of 7.48 is used to convert cubic feet to gallons
3. A discharge flowrate of 200 gpm is assumed

CALCULATIONS:

7Q10 Low Flow Value (Q_S)

$$Q_S = \frac{24.6\ ft^3}{sec} \times \frac{7.48\ gallons}{ft^3} \times \frac{86{,}400\ sec}{day} \times \frac{1\ MG}{1{,}000{,}000\ gallons}$$

Q_S = 15.90 MGD

Discharge Flowrate (Q_D)

$$Q_D = \frac{200\ gallons}{min} \times \frac{1{,}440\ min}{day} \times \frac{1\ MG}{1{,}000{,}000\ gallons}$$

Q_D = 0.288 MGD

Dilution Factor (DF)

$$DF = \frac{Q_S + Q_D}{QD} = \frac{15.90\ MGD + 0.288\ MGD}{0.288\ MGD} = 56.21$$

CONCLUSION The dilution factor for this project is calculated to be 56.21 based on the provided 7Q10 low flow value and discharge flowrate.

Bitney, Jack

From: Ruan, Xiaodan (DEP) <xiaodan.ruan@state.ma.us>
Sent: Thursday, December 19, 2019 4:03 PM
To: Bitney, Jack
Cc: Vakalopoulos, Catherine (DEP); Straley, Beck
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation - North Allston Storm Drain Extension Project

Hi Jake,

I meant to say that the 7Q10 and DF near the lat/long: 42.35504, -71.11648 are correct, which is the center of the channel of the Charles River.

Thanks,
Xiaodan

From: Ruan, Xiaodan (DEP)
Sent: Thursday, December 19, 2019 4:00 PM
To: 'Bitney, Jack' <JBitney@haleyaldrich.com>
Cc: Vakalopoulos, Catherine (DEP) <catherine.vakalopoulos@mass.gov>; Straley, Beck <BStraley@haleyaldrich.com>
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation - North Allston Storm Drain Extension Project

Hi Jake,

I can confirm that the 7Q10 value of 24.6 cfs and the dilution calculation of 74.6 for the proposed discharge from the North Allston Storm Drain Extension Project in Allston (with Lat/Long: 42.35504, -71.11648) at a maximum flow rate of 150 gpm are correct.

To assist you with filling out the NOI for coverage under the RGP, this segment of the Charles River is identified as MA72-36, classified as Class B, and is not listed as an Outstanding Resource Water. There are two approved TMDLs for pathogens and nutrients. To see the causes of impairments, go to: https://www.mass.gov/files/documents/2016/08/sa/14list2_0.pdf and search for "MA72-36".

In addition to submitting the EPA NOI for the RGP, if this is not a *current* MCP site, you will have to apply to MassDEP and submit a fee (unless fee exempt, e.g. a municipality). Instructions are located here: https://www.mass.gov/how-to/wm-15-npdes-general-permit-notice-of-intent.

Please let me know if you have any questions.

Thanks,
Xiaodan

From: Vakalopoulos, Catherine (DEP) <catherine.vakalopoulos@mass.gov>
Sent: Thursday, December 19, 2019 2:50 PM
To: Ruan, Xiaodan (DEP) <xiaodan.ruan@mass.gov>

Cc: Straley, Beck <BStraley@haleyaldrich.com>; 'Bitney, Jack' <JBitney@haleyaldrich.com>
Subject: FW: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation - North Allston Storm Drain Extension Project

Hi Xiaodan,
Do you have time to review this?
Thanks,
Cathy

Cathy Vakalopoulos, Massachusetts Department of Environmental Protection
1 Winter St., Boston, MA 02108, 617-348-4026

From: Bitney, Jack [mailto:JBitney@haleyaldrich.com]
Sent: Thursday, December 19, 2019 2:48 PM
To: Vakalopoulos, Catherine (DEP)
Cc: Straley, Beck
Subject: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation - North Allston Storm Drain Extension Project

Hi Catherine,

As required in Appendix V of the 2017 RGP, I've attached our StreamStats report with the 7 Day 10 Year (7Q10) low flow value for our project along with the dilution factor calculations for your review and confirmation.

Project:
North Allston Storm Drain Extension Project (NASDEP)
Harvard University
Western Avenue
Allston, MA

7 Day 10 Year Low Flow value (from attached StreamStats Report) = 24.6 ft^3/s

Dilution Factor (from attached calculations) 74.6

Latitude and longitude are slightly upstream from proposed outfall location.
Could you please confirm if these values are appropriate for use on our project?

Thank you!
Jack Bitney
Engineer

Haley & Aldrich, Inc.
465 Medford Street | Suite 2200
Charlestown, MA 02129

T: 781-825-7789
www.haleyaldrich.com

Bitney, Jack

From: Vakalopoulos, Catherine (DEP) <catherine.vakalopoulos@state.ma.us>
Sent: Thursday, February 6, 2020 6:34 PM
To: Bitney, Jack
Cc: Straley, Beck; Ruan, Xiaodan (DEP)
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation - North Allston Storm Drain Extension Project

CAUTION: External Email

Hi Jack,
Yes, I've confirmed that with the increase in design flow to 200 gpm (since you last contacted us), your dilution factor calculation of 56.21 is correct. I see that Xiaodan provided you additional information about the receiving water and fee payment in her email dated 12/19/19 so you are all set from MassDEP.
Cathy

Cathy Vakalopoulos, Massachusetts Department of Environmental Protection
1 Winter St., Boston, MA 02108, 617-348-4026

From: Bitney, Jack [mailto:JBitney@haleyaldrich.com]
Sent: Thursday, February 06, 2020 2:11 PM
To: Vakalopoulos, Catherine (DEP)
Cc: Straley, Beck
Subject: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation - North Allston Storm Drain Extension Project

Hi Catherine,

As required in Appendix V of the 2017 RGP, I've attached our StreamStats report with the 7 Day 10 Year (7Q10) low flow value for our project along with the dilution factor calculations for your review and confirmation.

Project:
North Allston Storm Drain Extension Project (NASDEP)
Harvard University
Western Avenue
Allston, MA

7 Day 10 Year Low Flow value (from attached StreamStats Report) = 24.6 ft^3/s

Dilution Factor (from attached calculations) = 56.21

Latitude and longitude are slightly upstream from proposed outfall location.
You may recall that we have requested this before, but the peak discharge flowrate (Qo) has changed from 150 gpm to 200 gmp. Could you please confirm if these newly calculated values are appropriate for use on our project?

Thank you!
Jack Bitney
Engineer

Haley & Aldrich, Inc.
465 Medford Street | Suite 2200
Charlestown, MA 02129

T: 781-825-7789
www.haleyaldrich.com

Enter number values in green boxes below

Notes:

Enter values in the units specified

15.9	Q_R = Enter upstream flow in **MGD**
0.288	Q_P = Enter discharge flow in **MGD**
0	Downstream 7Q10

Freshwater: Q_R equal to the 7Q10; enter alternate Q_R if approved by the State; enter 0 if no dilution factor approved
Saltwater (estuarine and marine): enter Q_R if approved by the State; enter 0 if no entry
Discharge flow is equal to the design flow or 1 MGD, whichever is less
Only if approved by State as the entry for Q_R; leave 0 if no entry

Enter a dilution factor, if other than zero

56.21

Saltwater (estuarine and marine): only if approved by the State
Leave 0 if no entry

Enter values in the units specified

224	C_d = Enter influent hardness in **mg/L** $CaCO_3$
131	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

Freshwater only

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

7.64	pH in **Standard Units**
14.09	Temperature in **°C**
0	Ammonia in **mg/L**
131	Hardness in **mg/L** $CaCO_3$
0	Salinity in **ppt**
0	Antimony in **µg/L**
0	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
0	Copper in **µg/L**
0	Iron in **µg/L**
0	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**

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 present and if dilution factor is > 1
Enter 0 if non-detect or testing not required

Enter **influent** concentrations in the units specified

0	TRC in **µg/L**
0.265	Ammonia in **mg/L**
0	Antimony in **µg/L**
2.43	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
2.47	Copper in **µg/L**
979	Iron in **µg/L**
0	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**
0	Cyanide in **µg/L**
0	Phenol in **µg/L**
0	Carbon Tetrachloride in **µg/L**
0	Tetrachloroethylene in **µg/L**
0	Total Phthalates in **µg/L**
0	Diethylhexylphthalate in **µg/L**
0	Benzo(a)anthracene in **µg/L**
0	Benzo(a)pyrene in **µg/L**
0	Benzo(b)fluoranthene in **µg/L**
0	Benzo(k)fluoranthene in **µg/L**
0	Chrysene in **µg/L**
0	Dibenzo(a,h)anthracene in **µg/L**
0	Indeno(1,2,3-cd)pyrene in **µg/L**
0	Methyl-tert butyl ether in **µg/L**

if >1 sample, enter maximum
if >10 samples, may enter 95th percentile
Enter 0 if non-detect or testing not required

Dilution Factor	56.2					
A. Inorganics	TBEL applies if bolded		WQBEL applies if bolded		Compliance Level applies if shown	
Ammonia	**Report**	mg/L	---			
Chloride	**Report**	µg/L	---			
Total Residual Chlorine	**0.2**	mg/L	618	µg/L	---	µg/L
Total Suspended Solids	**30**	mg/L	---			
Antimony	**206**	µg/L	35973	µg/L		
Arsenic	**104**	µg/L	562	µg/L		
Cadmium	**10.2**	µg/L	18.7538	µg/L		
Chromium III	**323**	µg/L	6105.4	µg/L		
Chromium VI	**323**	µg/L	642.7	µg/L		
Copper	**242**	µg/L	667.6	µg/L		
Iron	**5000**	µg/L	56208	µg/L		
Lead	**160**	µg/L	256.25	µg/L		
Mercury	**0.739**	µg/L	50.92	µg/L		
Nickel	**1450**	µg/L	3723.8	µg/L		
Selenium	**235.8**	µg/L	281.0	µg/L		
Silver	**35.1**	µg/L	345.8	µg/L		
Zinc	**420**	µg/L	8556.6	µg/L		
Cyanide	**178**	mg/L	292.3	µg/L	---	µg/L
B. Non-Halogenated VOCs						
Total BTEX	**100**	µg/L	---			
Benzene	**5.0**	µg/L	---			
1,4 Dioxane	**200**	µg/L	---			
Acetone	**7970**	µg/L	---			
Phenol	**1,080**	µg/L	16863	µg/L		
C. Halogenated VOCs						
Carbon Tetrachloride	**4.4**	µg/L	89.9	µg/L		
1,2 Dichlorobenzene	**600**	µg/L	---			
1,3 Dichlorobenzene	**320**	µg/L	---			
1,4 Dichlorobenzene	**5.0**	µg/L	---			
Total dichlorobenzene	**---**	µg/L	---			
1,1 Dichloroethane	**70**	µg/L	---			
1,2 Dichloroethane	**5.0**	µg/L	---			
1,1 Dichloroethylene	**3.2**	µg/L	---			
Ethylene Dibromide	**0.05**	µg/L	---			
Methylene Chloride	**4.6**	µg/L	---			
1,1,1 Trichloroethane	**200**	µg/L	---			
1,1,2 Trichloroethane	**5.0**	µg/L	---			
Trichloroethylene	**5.0**	µg/L	---			
Tetrachloroethylene	**5.0**	µg/L	185.5	µg/L		
cis-1,2 Dichloroethylene	**70**	µg/L	---			
Vinyl Chloride	**2.0**	µg/L	---			
D. Non-Halogenated SVOCs						
Total Phthalates	**190**	µg/L	---	µg/L		
Diethylhexyl phthalate	**101**	µg/L	123.7	µg/L		
Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---			
Benzo(a)anthracene	**1.0**	µg/L	0.2136	µg/L	---	µg/L
Benzo(a)pyrene	**1.0**	µg/L	0.2136	µg/L	---	µg/L
Benzo(b)fluoranthene	**1.0**	µg/L	0.2136	µg/L	---	µg/L
Benzo(k)fluoranthene	**1.0**	µg/L	0.2136	µg/L	---	µg/L
Chrysene	**1.0**	µg/L	0.2136	µg/L	---	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.2136	µg/L	---	µg/L
Indeno(1,2,3-cd)pyrene	**1.0**	µg/L	0.2136	µg/L	---	µg/L
Total Group II Polycyclic Aromatic Hydrocarbons	**100**	µg/L	---			
Naphthalene	**20**	µg/L	---			
E. Halogenated SVOCs						
Total Polychlorinated Biphenyls	**0.000064**	µg/L	---		0.5	µg/L
Pentachlorophenol	**1.0**	µg/L	---			
F. Fuels Parameters						
Total Petroleum Hydrocarbons	**5.0**	mg/L	---			
Ethanol	**Report**	mg/L	---			
Methyl-tert-Butyl Ether	**70**	µg/L	1124	µg/L		
tert-Butyl Alcohol	**120**	µg/L	---			
tert-Amyl Methyl Ether	**90**	µg/L	---			

APPENDIX C

Chemicals and Additives Information

Operating Pressures

When clean the bag filter houses will typically start with a 1 - 2psig differential pressure across them. When the differential pressure reaches 10psig between the inlet and outlet the bag is dirty and should be changed to prevent reduced flow. The bag filters are set up with isolation valves so that it is not necessary to stop operation while changing one bag at time.

The carbon vessels are equipped with inlet and outlet pressure gauges so that the condition of the carbon bed can be determined to be free of unwanted dirt and clogging. Typical pressure drop across a clean bed of carbon should be in the 3 – 5 psig range. If the inlet pressure goes up significantly the carbon bed has become fouled. It is possible to backflush with CLEAN water to get this dirt out, but if dirty water is used the problem will only be compounded.

O & M Contents

In the following pages there are diagrams of the piping arrangement for "SEQUENCE 1" and "SEQUENCE 2" operation. This is followed by a manual and parts list for the Rosedale bag filter, and AXIS Products trailer axles. An operation and maintenance manual from TIGG has been provided on similar type vessels to those found on the CFS 6150 Mobile Filtration unit. This is provided to further round out the many nuances of proper carbon vessel operation and maintenance.

CARBON FILTRATION SYSTEMS, Inc.

Model 6150 Mobile Treatment System

The Mobile Treatment System model 6150 is designed to for sustained flows of 150 gpm. Optimum contact time between influent and carbon media is obtained at this 150 gpm flow rate. Operation at higher flow rates will reduce effectiveness of carbon to remove contaminates allowing them to pass through the system to drain.

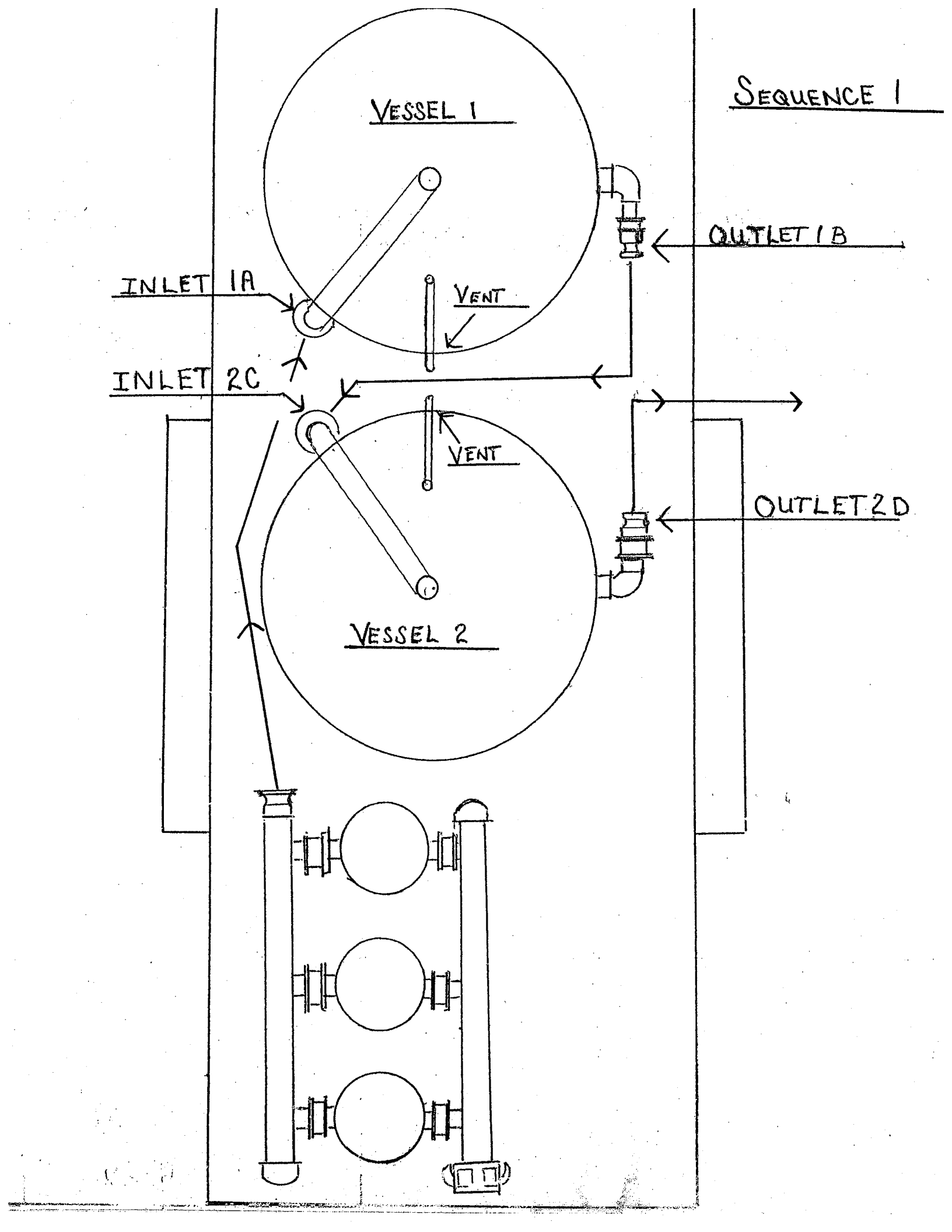
The system is mounted on a 12,230lb GVWR / 9600lb LC equipment hauler manufactured by Superior Trailers of Georgia. The main frame is 7" channel with two (2) 6000lb brake axles. There are four (4) 12000lb drop leg jackets with one mounted in each corner of the trailer. The combined dry weight of the two (2) 3000lb carbon adsorbers fully loaded with 3000lbs of granular carbon per vessel and the Tri-plex bag filter system is approximately 9,7750lbs. When fully loaded and saturated with water the combined loaded weight is nearly 21,100lbs. For this reason all four 12000lb drop leg jacks must be in the fully down position when systems is in operation to prevent main frame damage. In addition it is recommended that the system be fully drained before attempting to move trailer to a new location. Failing to do so could result in damage to the axles, as well as, other structural components.

Deaerating

Prior to start up of system the carbon vessels must be filled with "clean" water. Since hydrant water is not always available the cleanest water available will generally do. This step is necessary to allow the activated carbon to de-gas and become thoroughly wetted. The escaping gas must be vented off through the ¾" vent pipe coming off the top and running down between the two carbon vessels. The recommended time period for this is a full 24 hours to ensure all of the minute pores have been evacuated of air and the carbon completely wetted. This is often hard to do under actual field conditions, but the longer it is allowed to stand before start up the better the result will be.

Vessel SEQUENCE

The carbon vessels are set up in series in a lead / lag sequence. This allows the maximum time exposure to the carbon bed and when breakthrough does occur the second vessel in series will afford protection against dumping raw VOCs into the drain. Each vessel is set up with sample ports top and bottom allowing for influent samples to be drawn before and between the vessels, as well as, downstream of the second vessel. When break through does occur after the first vessel it is necessary to schedule a change out of spent media and replenish it with new. The sequence of the vessels is changed from "sequence 1" to "sequence 2" by moving the inlet hose from the first vessel (inlet 1A) to the inlet of the second vessel (inlet 2C). The corresponding outlet hose off the first vessel must also be moved from outlet 1B to outlet 2D. Vessel 2 now becomes the "lead" vessel. An additional piece of 3" x 12' hose has been provided to allow a smooth transition from the final outlet to a layflat hose that typically is used for longer hose runs to drains and other distant outfall locations.


SEQUENCE 1
VESSEL 1
OUTLET 1B
INLET 1A
VENT
INLET 2C
VENT
OUTLET 2D
VESSEL 2

TIGG® corporation

800 Old Pond Road, Suite 706
Bridgeville, PA 15017
(412)257-9580 ~ (412)257-8520 fax
www.tigg.com

Operation and Maintenance Manual for CANSORB and Econosorb-L Liquid Phase Units

CONTENTS PAGE

1.0 General 1
2.0 Installing the Cansorb & Econosorb-L Units 1
2.1 Unloading 1
2.2 Setup 1
3.0 Startup Procedures 1
3.1 Filling the Vessel with Carbon 2
3.2 Wetting and Deaerating 2
3.2.1 Backwashable System 2
3.2.2 Non-backwashable System 2
4.0 Operation 3
4.1 Post Startup Deaeration 3
4.2 Backwashing 3
4.3 Maintaining a Liquid Level in Carbon Bed 3
4.4 Prevention of Siphoning 3
4.5 Prevention of Over Pressuring 3
4.6 Effluent Sampling/Changeout Determination 3
4.7 Removing Spent Carbon 4
4.7.1 Carbon Units C35-C500 4
4.7.2 Econosorb-L 500, 1000, 2000 & 3000 4
4.7.1 Open Head Cansorb Drum Units 4
5.0. Maintenance 4
5.1 Regular Maintenance 4
5.2 Short-term Shutdown 4
5.3 Long-term Shutdown 5
6.0 Safety Considerations 4
7.0 Troubleshooting 5
7.1 High Pressure Drop 5
7.2 Carbon Loss 5
7.3 Premature Breakthrough of Organics 5
7.4 Effluent Concentration of an Organic Higher than Influent Concentration 6

1.0 GENERAL

The liquid flow through the CANSORB adsorbers is downflow. Aqueous and non-aqueous liquids can be treated using granular activated carbon. For most efficient utilization of the carbon two vessels should be used in series operation.

If media other than carbon is to be used, contact a TIGG representative for any procedural changes.

2.0 INSTALLING THE CANSORB AND ECONOSORB-L UNITS

2.1 Unloading

Following are the empty and loaded weights of the CANSORB units. This information will dictate what equipment should be used to lift and place the vessel.

UNIT	Empty Wt.	Filled Wt.
C35	750	1410
C50	1040	2040
C75	1470	3470
C100	1790	4750
C200	2440	8440
C500	6500	14500
EL-500	900	1400
EL-1000	1250	2250
EL-2000	1600	3600
EL-3000	2490	5490

If a forklift is used the fork tubes on the unit should be used. If a crane is used it is advisable to use a properly sized spreader beam and lifting cables. **Do not use the lifting lugs to lift a vessel containing wet carbon.** They are not designed for that weight.

2.2 Setup

The CANSORB unit should be placed on a level concrete pad or other support. Connect the piping or hoses to the inlet and outlet flanges or nozzles. Install any gages or other appurtenances that were shipped with the system.

See Sections 4.3 & 4.4 relating to the effluent piping.

3.0 STARTUP PROCEDURES

After the CANSORB unit (s) have been set in place and the piping is installed (See Section 4.0) they are ready to be filled with the media unless they were shipped with the media in place.

Filtration Trailer Equipment List

3) Rosedale simplex bag filter units Model # NCO8-30-2P-*-150-C-B-PB

2) TIGG 3000lb medium pressure carbon adsorbers.

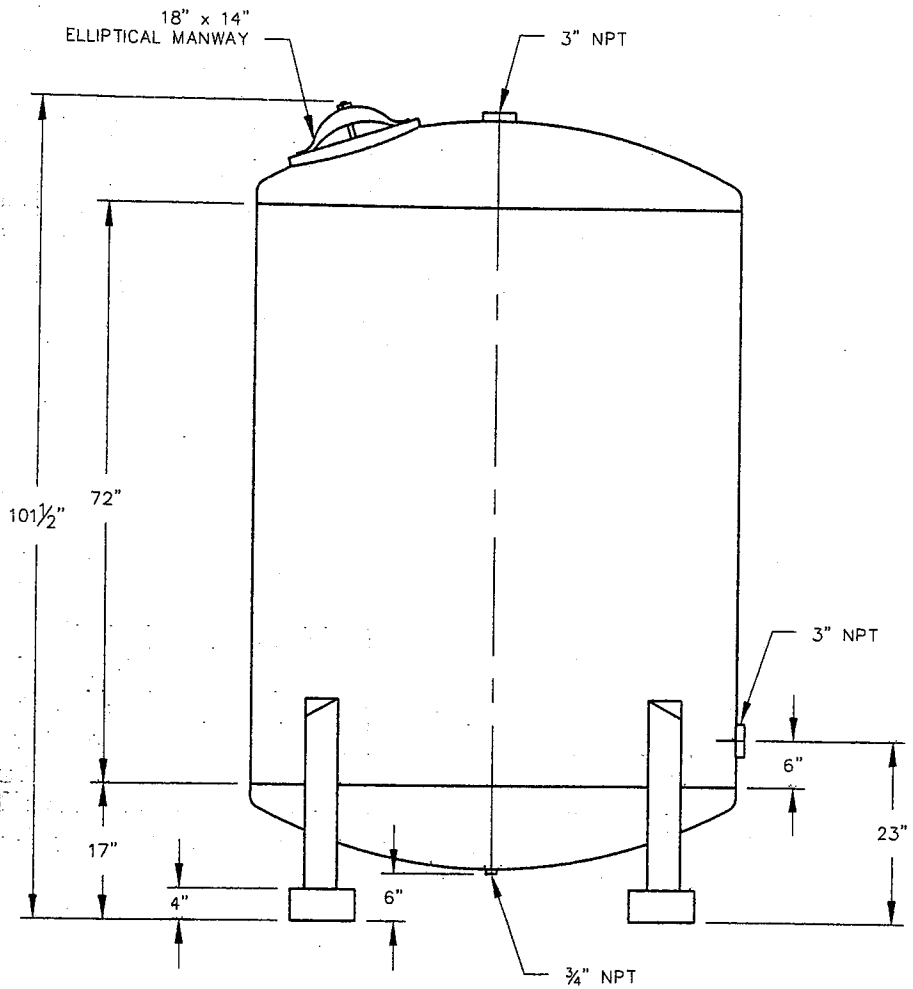
1) Superior Trailers 12,232lb GVWR trailer equipped with two (2) 6000lb AXIS Products brake axles.

4) Legend Mfg. 3" Butterfly valves model T-335AB with EPBM seat, Aluminum/Bronze construction

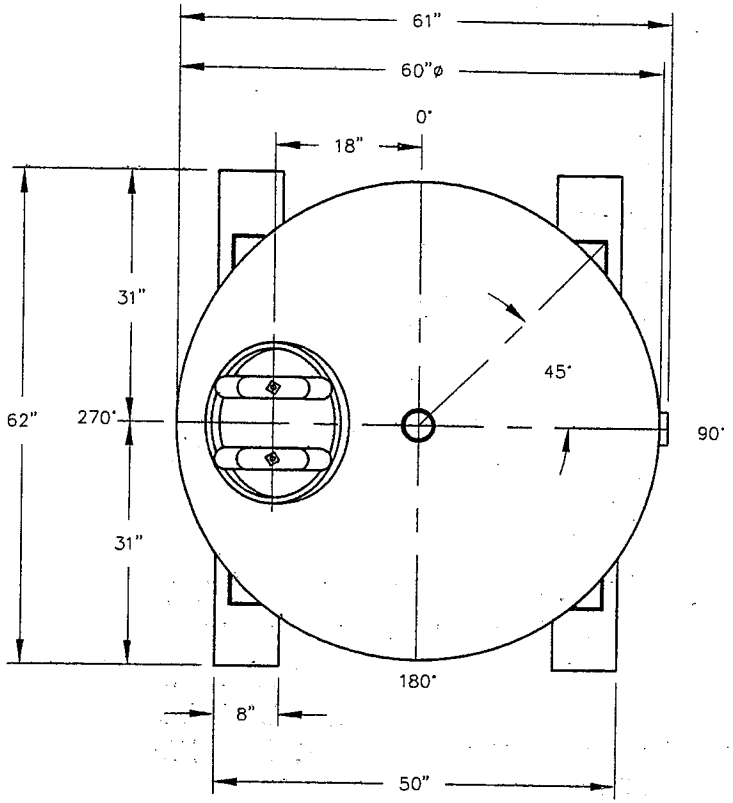
6) Legend Mfg. 2" Butterfly valves model T-335AB with EPDM seat, Aluminum/Bronze construction.

10) 0 – 60 psi, 2.5" pressure gauges

3) 3" x 12' EPDM rubber water hose with camlock fittings.



ELEVATION



PLAN

VESSEL STANDARDS

VESSEL MATERIALS : A-36 CARBON STEEL	LIQUID DRAIN ASSEMBLY : 3/4" NPT
LINING : EPOXY	VOLUME OF VESSEL : 109.1 FT^3
EXTERIOR PAINT : ENAMEL	STANDARD CARBON FILL : 3000 LBS
HEAD THICKNESS : 1/4"	SHIP WT. STD.FILL : 4700 LBS
SHELL THICKNESS : 1/4"	CARBON TYPE : N/A
INTERNALS : PVC	MAX. OPERATING PRESSURE : 75 PSI
ADSORBENT OUTLET ASSEMBLY : 18" x 14" ELL. MANWAY	MAX. OPERATING TEMP. : 125°F

NO.	REVISION	BY	DATE

PROJECT

PROJ. NO.	E07-045-AM
P.O. NO.	
DRAWN BY	JB
DESIGN BY	BB
CHKD. BY	BB
DATE	8/9/07
SCALE	NTS

TIGG corporation

3000#
PLAN & ELEVATION

DWG. NO. C07-1113 REV. 0

3.1 Filling the vessel with carbon

In order to protect the liquid underdrain (collector) system, **uncontaminated water (liquid) must be added to the vessel prior to adding the carbon.**

A sufficient amount of water should be added so that the water level is at least 2 feet above the underdrain.

The water can be added via the process piping or through the top manway or (handhole on the inlet in PHD models. When filling, the vent, manway or handhole must be open and the inlet on drum units must be open.

Fresh carbon generally will arrive in (1000-1100 pound) super sacks or (55 pound) bags. Each vessel may be filled by emptying the carbon container through the manway on top of the vessel. Drum units usually have the carbon prefilled at TIGG's production facilities.

After all of the carbon is in the vessel, fill the vessel with uncontaminated liquid. This can be done through the process piping (inlet or outlet) or through the manway. Filling from the bottom up is the preferred method. In the event uncontaminated water is not available, fill with contaminated water from the top down at a slow rate so that a depression is not made in the top of the carbon bed. If the process lines are used, the vent or manway should be open.

3.2 Wetting and Deaerating

For peak adsorption performance, as much air as possible should be removed before the adsorber is put onstream.

A bed of carbon consists of the following:

Void volume	-	40%
Pore volume	-	40%
Carbon skeleton	-	20%

Since 80% of the carbon bed volume is air, with 40% being in the pores of the carbon, **special prewetting steps must be taken.** If proper prewetting is not done, channeling will occur and high-pressure drop and/or premature breakthrough of the contaminant(s) will occur.

A relatively long time is required for water to enter the pores and displace the air since the pores in dry carbon are filled with air and some adsorbed oxygen.

Approximately 90% of the pores in dry carbon are filled with water after 24 hours at ambient temperature (70 degrees F.) and any liquid having the same viscosity. With more viscous liquids the time to wet will be longer. After 16 hours check the liquid level. If it is below the top of the carbon, add more liquid until it is above the carbon.

3.2.1 Backwashable System

If there is inadequate prefiltration, and/or there are suspended solids present, backwashing will be required. In this case the carbon must be backwashed for 30-45 minutes prior to treating contaminated water.

This is necessary so that the particles will be segregated (classified) and thereby subsequent backwashing operations won't change the relative position of the particles and destroy the mass transfer zone.

This backwash operation will also remove the air and carbon fines from the bed. If this procedure is not followed the carbon usage rate will be higher, there could be very early breakthrough and the pressure drop will be higher than desired.

The following backwash rates should be used for the various vessels:

	GPM	
Unit	**CANSORB**	**ECONOSORB L**
C25PHD	50-60	-------
C50 PHD	100-115	-------
C35 & EL 500	80-110	80-100
C50 & EL 1000	115-140	115-125
C75 & EL 2000	180-210	90-100
C100 & EL 3000	250-300	200-220
C200	400-475	-------
C500	500-600	-------

If the initial time for prewetting is less than 2 days, backwash the adsorber two days after startup.

3.2.2 Non-backwashable System

Option 1 – When time is available

After the vessel has been filled with the water as described in Section 2.2 use the following procedures to remove air from the carbon and vessel:

1. Allow the adsorber to stand filled with the water for three or more days. The longer the better. If the time can only be two days or less see Option 2.
2. Remove the water from the vessel. This can be done by (1) draining (make sure the adsorber is vented), (2) using air pressure to pressure the liquid out the outlet nozzle, **don't exceed the adsorber design pressure** or (3) siphoning out the outlet (inlet or vent must be open to the atmosphere).

3. When all of the water is out of the adsorber, the adsorber must be refilled with uncontaminated water. During this filling operation the adsorber must be vented. The water addition should continue until water exits the vent on the inlet nozzle. This step removes the air that is in the adsorber and it is now ready to be placed onstream.

Option 2 – When time is limited to less than two days

When time is not available to prewet the carbon for 2 days, do the following:

1. Add uncontaminated water to the adsorber as described in Section 2.1.
2. After the time that can be allowed to wet the carbon, follow the steps described in items 2 & 3 in Option 1.
3. At this point, there is still air in the carbon pores. Therefore, after days 2 and 3 repeat steps described in items 2 & 3 in Option 1.

In a process system where water cannot be tolerated follow the same filling and draining procedures. However, add the liquid into the top of the adsorber.

4.0 OPERATION

Operational flow rates, and thus contact time for a given volume of adsorbent, are a function of:

1. The liquid being treated
2. Temperature
3. Nature and concentration of the contaminants
4. Other system conditions
5. Removal (effluent) requirements

If conditions dictate a longer contact time than is possible in one unit, CANSORB units can be operated in parallel or series. Either one of these options will usually result in a lower adsorbent usage rate.

4.1 Post startup deaeration

After several days of operation it is advantageous, in many cases, to drain and refill the adsorber in order to get rid of air that may not have been removed in the pre-startup deaeration operation.

4.2 Backwashing

If there are suspended solids in the influent, these may be filtered by the carbon bed. If this occurs, they will usually collect on top of the bed and the pressure drop across the bed will increase. When the differential pressure drop across the bed is 8-10 psi greater than it was when the vessel was initially put onstream, the vessel should be backwashed. Use the flow rates listed in Section 3.2.1. For drum units the maximum pressure should not be exceeded.

This operation should remove the solids and the differential pressure should return to normal. If it doesn't repeat the backwash procedure at a higher rate. Have someone observe the backwash water effluent to make sure carbon isn't being removed and to know when the water is clear.

If the backwashing operation doesn't result in lowering the differential pressure, the top few inches of the adsorbent may be loosened by raking and/or removed and discarded per an environmentally acceptable procedure.

4.3 Maintaining a liquid level in the carbon bed

Since the pressure drop through a carbon bed is very low during operation at normal flow rates, it is possible to have the water level reach an equilibrium point low in the bed when the discharge is at a point lower than the top of the carbon bed. This is especially true for the Econosorb L units. Therefore, the discharge piping should be elevated so that there is a section above the top of the carbon bed or a backpressure control valve should be installed in the discharge line.

4.4 Prevention of siphoning

When the flow to the CANSORB vessel is stopped, there is the potential for siphoning to occur, unless provisions are made in the discharge piping to prevent it. This is especially the case when the liquid is being discharged at an elevation lower than the top of the carbon bed.

The siphoning can be prevented by installing (1) an anti-siphon device or a short vertical section of pipe, in a Tee in the effluent pipe open to the atmosphere above the top of the CANSORB unit or (2) discharging into a tank at a level higher than the top of the CANSORB unit.

4.5 Prevention of over pressuring

In addition to the filtering of suspended solids causing a pressure buildup across the carbon such things as bacteria growth, introduction of air into the bed via a pumping operation, and precipitation of metals, can cause the pressure across the carbon bed to increase.

If there is the possibility of any of these occurring and the design pressure of the vessel could be exceeded, a properly sized relief valve or rupture disc should be installed.

4.6 Effluent sampling / Changeout determination

The frequency for sampling will depend on whether the influent concentration of the contaminants is relatively constant or variable.

Sampling should be done on a routine basis until it can be determined what the carbon usage rate is. Then the sampling frequency can usually be reduced.

If there is only one CANSORB unit onstream the time to affect a carbon changeout will depend on the effluent criteria set by the discharge permit.

If there are two CANSORB units operating in series, it is normally possible to allow the concentration of the contaminants in the effluent from the lead vessel to equal that of the influent. This is an indication that the carbon is saturated and thus the carbon usage is the minimum

When this occurs the lead vessel is removed from the system, the spent carbon is removed and the vessel is filled with fresh carbon. This vessel is then put in the secondary (lag) position.

Since the change out, refilling and wetting of the carbon will take 2-3 days, the system will be sized so that during this time, breakthrough will not occur in the lag vessel.

4.7 Removing spent carbon

4.7.1 CANSORB units C35 – C500

Spent carbon can be removed either by vacuuming or in slurry form.

If vacuum is selected, a vac-truck or drum vacuum can be used. The CANSORB unit must be drained and the top manway removed. The carbon is subsequently removed via a non-metallic pipe or hose through the manway. **Extreme care must be exercised to avoid damaging the internals and/or lining.**

If the carbon is to be removed in the slurry form, it can be pressured, using air or water, out the bottom 2-inch outlet. The slurry line should be connected to a vented receiving container prior to carbon removal. The receiving container should have a drain for removing excess water from the carbon, prior to transportation.

The required pressure to move the slurry is generally less than 10 psig. This depends on the length of the slurry line and the elevation of the final point of discharge.

Note: After completing the slurry transfer, there is the possibility of a portion of spent carbon remaining in the bottom head. Therefore, open the manway to inspect the vessel. Depending on the quantity and location of the carbon, it may be necessary to use a hose to flush it into the bottom of the head and/or backwash to level carbon and then repressure the vessel.

When the vessel is empty it is ready to be refilled. The procedures outlined in Sections 3.0 should be followed.

4.7.2 Econosorb-L – 500,1000, 2000 & 3000

The spent carbon is removed from these units via vacuum only since there is no slurry outlet connection.

4.7.3 Open head CANSORB Drum units

In order to remove the spent carbon from the C5 and C15 drums, the bolt/ring closure is removed and the top is lifted or pivoted to one side.

Removing the top requires loosening the male adapter inside the top, immediately below the outlet bung.

For the C20 drum, a flex hose section of the outlet riser below the outlet bung is disconnected or used as a pivot.

The spent carbon is then dumped out and fresh carbon is put in.

The fresh carbon must be prewetted. After the carbon is wetted, the water can be removed by introducing air pressure through the inlet or siphoning through the outlet. **Do not exceed the drum operating pressure!**

5.0 MAINTENANCE

5.1 Regular maintenance

The CANSORB units are designed to require minimal maintenance. The following items should be inspected with regard to the carbon vessels, piping and gages:

1. Internal inspection of the vessel should be performed each time carbon is removed. This would include the lining and the collectors (underdrain).

2. Pressure gages should be checked periodically to insure proper operation

3. Piping and valving should be periodically inspected for signs of wear and/or leakage.

5.2 Short-term shutdown

The adsorption system is designed to operate continuously. A short-term shutdown is expected to last less than 72 hours. It is most likely to occur during a weekend shutdown or routine maintenance of the system. During a short-term shutdown, the adsorber may remain filled with water unless work is being performed on the adsorber itself. It may be necessary to close the inlet and outlet valves to prevent siphoning or drainage from the system.

5.3 Long-term shutdown

A long-term shutdown is most likely to occur during spent carbon change-out, changes in the system configuration, major maintenance, etc. During a long-term shutdown the adsorber should be completely drained to minimize the potential for biological growth and bed septicity.

6.0 SAFETY CONSIDERATIONS

The normal safety procedures that are practiced at the site should be followed.

Read the MSDS sheet for the carbon (media).

Understand the potential hazards of the stream being treated by the system. The media may contain higher concentrations of the contaminants being adsorbed than is in the influent stream. Also the media might be considered hazardous material and may require specific handling precautions.

In order to protect the vessel, a relief device such as a rupture disc or safety valve should be installed.

WARNING: Wet drained activated carbon preferentially removes oxygen from air. In closed or partially closed containers, the oxygen concentration can reach dangerously low levels. Therefore, OSHA procedures related to entering confined low-oxygen spaces should be followed by workers who must enter a vessel containing wet carbon.

7.0 TROUBLESHOOTING

There are a varied number of things that can cause poor performance of an activated carbon system. These are discussed below.

7.1 High pressure drop

Following are possible causes for having a high-pressure drop through the carbon. They are:

1.**Air in the bed. This is the most frequent cause of high-pressure drop.** This is mainly caused when the carbon is not properly prewetted. The other causes are incoming air due to a vortex in the tank feeding the pump and release of dissolved gases within the carbon bed.

Solution: Check for air by slowly closing a valve in the discharge line. Watch the pressure gage in the inlet line. If the pressure increases slowly there is air in the vessel. Drain/remove the liquid and refill the vessel while venting the air out the vent or inlet. If the problem occurs and the proper wetting procedure has been followed, check for a vortex in the feed tank and/or determine if there is the possibility for degassing.

2. **Excessive fines in the carbon.** This is not a frequent cause for a high-pressure drop.

Solution: Backwash the carbon, if possible, at a rate of 8-10 gpm/ft^2 until the water exiting the vessel is clear. If the vessel cannot be backwashed and the pressure is too high to maintain the desired flow it may be necessary to remove the carbon, partially fill the vessel with water and slowly reinstall the carbon so that the fines can float on the top of the water. Then overflow the water to remove the fines.

3. **Solids in the influent**
Suspended solids or sediment in the influent will be filtered out by the carbon.

Solution: Open the manway or remove the top lid in the case of drums and inspect the top of the carbon bed. If the vessel can be backwashed this should solve the problem unless the solids have created a mud like cake on top of the bed. In this case manually remove the cake. If the layer to be removed is more than several inches, it may be necessary to replace with equivalent fresh carbon or if it is expected that the carbon is near exhaustion then replace the entire bed of carbon.

If it is anticipated that the solids will always be in the feed, a filter should be installed in the influent line.

7.2 Carbon loss

In most carbon systems that treat water and wastewater, carbon losses are not usually excessive. They usually result from excessive backwash rates, broken underdrains or physical degradation of the carbon by strong oxidants such as chlorine.

Solution: Lower the backwash rate. It may be too high due to the viscosity being higher than the design value. A seasonal decrease in water temperature is usually the cause for losing carbon during backwash.

Check the effluent liquid for the presence of carbon. If granules are present then the underdrain is damaged or the piping of the inlet and outlet is reversed. Remove the carbon and repair the underdrain or repipe the inlet and outlet.

Chlorine reacts with the carbon skeleton. With prolonged contact the effluent will turn brown. The carbon must be replaced when this occurs.

7.3 Premature breakthrough of organics

This will occur for the following reasons:

1. Channeling in the carbon due to presence of air in the bed.
2. Insufficient contact time in the carbon bed.
3. A change in the influent concentrations of the contaminants.
4. Incomplete removal of spent carbon prior to refilling.

Solution: Check for air by slowly closing a valve in the discharge line. Watch the pressure gage in the inlet line. If the pressure increases slowly there is air in the vessel. Drain/remove the liquid and refill the vessel while venting the air out the vent or inlet.

Add more carbon, if possible. Otherwise reduce the flow rate or consider adding another vessel.

Remove carbon completely and refill vessel.

7.4 Effluent concentration of an organic higher than influent concentration

This is due to a phenomenon termed rollover. This occurs when components that are more strongly adsorbed displace compounds that are less strongly adsorbed.

Solution: If the contaminant is not one of the regulated organics continue to operate the system. If the eluting organic is part of the discharge permit and it is exceeding the permitted level then the carbon needs to be replaced. In order to better utilize carbon it may be desirable to add another vessel downstream so that the lead adsorber can become saturated prior to having to be removed.

For reorders, replacement adsorbents or further technical information please contact TIGG Corporation, 1-800-925-0011

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

ROSEDALE PRODUCTS, INC.

MODEL NCO-8

150 PSIG RATED FILTER UNIT

Table of Contents

I. Installation 2

II. Operation 3

III. Spare Parts List 4

IV. Spare Parts Diagram 5

I. Installation

Please remove all shipping and crating materials carefully. Be sure to remove the plugs from the inlet and outlet openings. Dispose of all crating materials safely.

The Model NCO-8 Filter unit is capable of having several different piping variations based upon the outlet style of your unit. The inlet service line should be connected to the inlet flange or NPT coupling located near the top of the unit (above the basket level).

The outlet service line should be connected to the outlet flange or coupling, located near the middle or bottom of the unit depending upon the style of your unit (below basket level).

There are two 1/4" NPT ports on the shell and one 1/4" NPT port on the cover of the Model NCO-8 Filter unit. These ports can remain plugged or used for pressure gauges or special fittings as your application requires.

Some installations require electrical grounding of all equipment, be sure to provide adequate grounding where necessary.

After completing installation be sure to double check connections for integrity. Your Model NCO-8 Filter unit has been factory pressure tested leak free, therefore, any seepage problems usually occur from improper installation connections.

You are now ready to install the filter basket and bag. Remove cover by loosening the cover eyenuts. The eyenuts in the slotted corners should be loosened sufficiently to swing free. Loosen the third eyenut sufficiently to allow the top cover and closure assembly to swing away from the top of the unit.

If your application requires a basket seal, insert the basket seal into the basket collar groove. Refer to Figure 1 or Figure 2 in the Spare Parts Diagram for installation position of your seal.

Place the basket into the filter housing, make sure the basket flange is firmly seated into the adapter.

Insert bag into the bag basket making sure filter bag ring is firmly seated on top of the basket flange. For best results, be sure filter bag is installed fully extended to the bottom of the basket.

Before replacing cover assembly, inspect cover seal gasket (replacing as necessary). Close cover and alternately tighten the three clamp assemblies evenly to ensure a leak proof seal between the cover and housing body. Torque closure assemblies to a maximum of 60-90$^{\text{foot-lbs}}$. Each installation may have different closure bolting torque requirements to effectively seal the filter vessel cover. Many installations require significantly lower closure bolting torque due to the variables explained below. The suggested torque values are for reference only. They are to be used as a guideline by maintenance personnel. These values are meant as a guideline for safe operation of the filter system at its maximum rated pressure. Many variables affect the torque required to operate the filter vessel without leaks. These variables include the diameter of the bolt, type and number of threads, material type and grade, condition of the nut bearing surface and lubrication of bolt threads and nut bearing surfaces. Other factors such as the condition of the o-ring, o-ring material, viscosity of the fluid being filtered, operating pressures, temperature, and the closure assembly tightening procedure must also be considered.

Your Rosedale Model NCO-8 is now ready for operation.

II. Operation

Filter System Start-Up Procedure:

Prior to turning on the flow to the inlet service, please make the following checks:

1. Check inside filter unit to be sure basket and filter bag (if applicable) are in housing and do not require cleaning or replacement. If necessary install a clean filter basket and bag (if applicable).

2. Check that filter unit cover is securely fastened to housing. You are now ready to open the flow to the inlet service line. Slowly open the inlet service line approximately 25% of normal operational flow (open slowly as not to displace filter bag inside the housing). After filter unit is pressurized and vented, slowly open outlet service line unit valve until completely open. Complete opening of inlet service line until desired flow rate is reached.

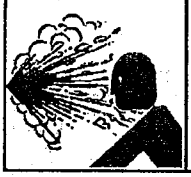
Once the desired service flow has been established, the filter will operate efficiently until dirty. However, under no circumstances should more than *15 PSI Differential Pressure* through the filter be obtained. Operating the filter unit with a high differential may cause filter bags to rupture and/or cause damage to filter system and downstream equipment.

To prevent excessive drop through the filter unit, regular inspection of the filter media is required. Monitoring of differential pressure through the housing can be utilized as a means of determining whether or not the filter media needs cleaning or replacement.

When it becomes necessary to clean or replace filter media, follow the procedure outlined below:

1. First close the flow from the inlet service line.
2. Close the flow to the outlet service line. (In some applications closing flow to outlet is not required.)
3. Relieve the pressure from the filter unit.

⚠ WARNING



CONTENTS UNDER PRESSURE
Relieve Pressure in accordance with Manufacturer's instructions before opening Filter Vessel.
FAILURE TO DO SO MAY RESULT IN SERIOUS BODILY INJURY.

4. Drain housing sufficiently to access filter basket.
5. Remove cover by loosening the cover eyenuts. The eyenuts in the slotted corners should be loosened sufficiently to swing free. Loosen the third eyenut sufficiently to allow the top cover and closure assembly to swing away from the top of the unit.
6. Remove filter basket and clean thoroughly, remove the filter bag (if applicable) and throw away. (Cleaning and reusing the filter bag is not recommended.)
7. Remove debris and sludge from inside the inlet portion of housing to avoid interference with cover seal or flow of fluid being filtered.
8. Remove basket seal and inspect, replace if necessary. Clean basket seal groove and replace

basket seal (see spare parts diagram for location of basket seal).

9. Install clean filter basket and filter bag (if applicable). Place the basket into the filter housing, make sure the basket flange is firmly seated into the adaptor. If applicable, insert bag on top of the bag basket flange making sure filter bag ring is firmly seated inside the adaptor. For best results, be sure filter bag is installed fully extended to the bottom of the basket
10. Inspect cover gasket for cuts or other signs of failure and make sure it is properly seated.
11. Move cover back into position, and alternately tighten the three clamp assemblies evenly to ensure a leak proof seal between cover and housing body. Torque closure assemblies to a maximum of 60-90$^{foot\text{-}lbs}$. Many installations require significantly lower closure bolting torque due to the variables previously explained in Section I.

Your Rosedale Model NCO-8 Filter unit is now ready for operation. Refer to filter system start-up procedure.

III. Spare Parts List

Your Rosedale Model NCO-8 Filter unit will give you many years of reliable service provided periodic inspections are made of various components and replacement of worn parts are made promptly. The following is meant to be a recommended spare parts list, these parts are illustrated on the following page.

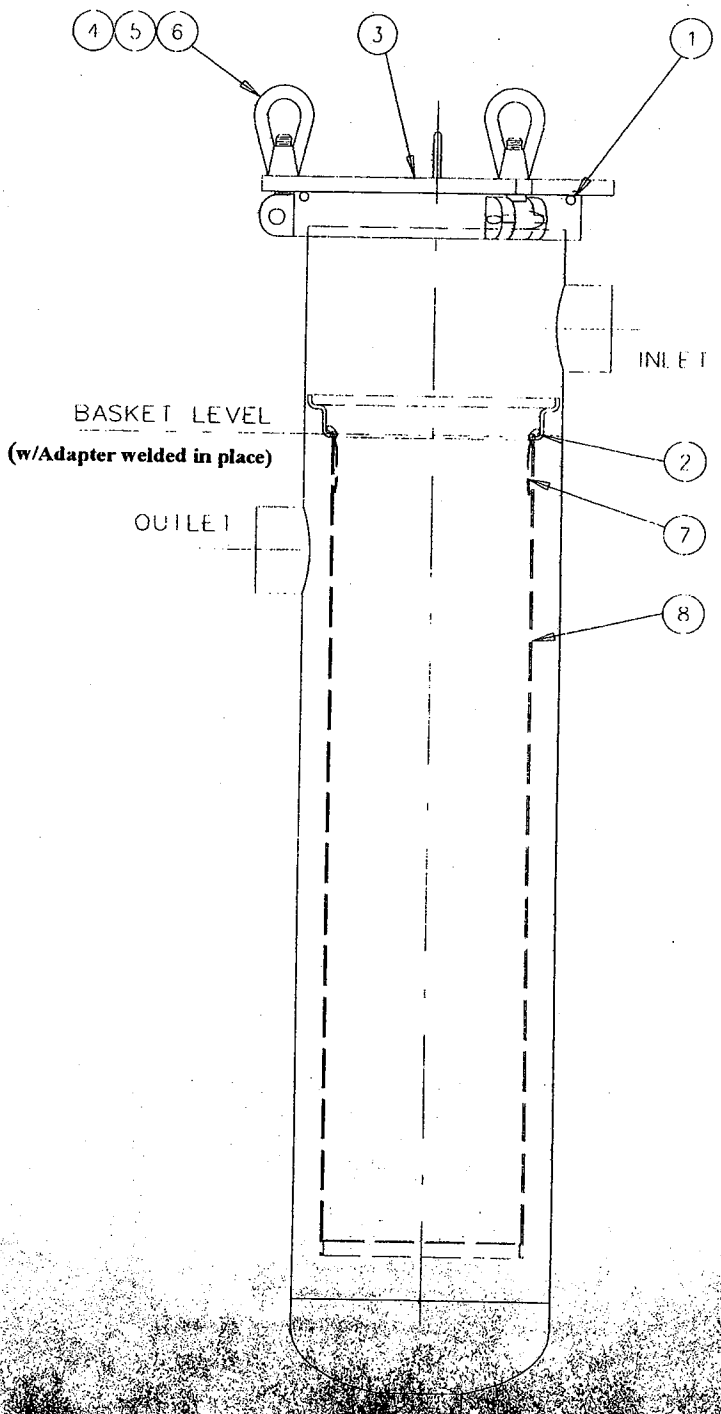
SPARE PARTS LIST			
Balloon	Description	Part Number	Time-Frame
1	Cover Seal	8150CG-*	as needed
2	Basket Seal	9BG-*	as needed
3	Cover	RCO8	as needed
4	Eye Nut	4ENNI	as needed
5	Rod End	4RENI	as needed
6	Clevis Pin Assembly	4CPNI	as needed
7	Filter Bag	(See Order)	as needed
8	Filter Basket	(See Order)	as needed
9	Tripod Legs	8T22*S	as needed

* Select Material Designation:

C=Carbon Steel
S=304 Stainless Steel
S316=316 Stainless Steel

B=Buna N
E=Ethylene Propylene
V=Viton
TEV=Teflon Encapsulated Viton
TSW=Teflon Solid White

IV. Spare Parts Diagram



Important Notice

Warranty: In the event any Rosedale Products, Inc. filtration product is found to be defective in material, workmanship, or not in conformance with any express warranty for a specific purpose, Rosedale's only obligation and your exclusive remedy, shall be to repair, replace or refund the purchase price of such parts or products upon timely notification thereof and substantiation that the product has been stored, maintained and used in accordance with Rosedale's written instructions.

EXCLUSIONS TO WARRANTY: THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTY OF QUALITY, EXCEPT OF TITLE AND AGAINST PATENT INFRINGEMENT.

LIMITATION OF LIABILITY: Except as provided above, Rosedale shall not be liable or responsible for any loss or damage, whether direct, indirect, incidental, special or consequential, arising out of sale, use or misuse of Rosedale filtration products, or the user's inability to use such products.

THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE.

Rosedale Products, Inc.
3730 West Liberty Road
Ann Arbor, MI 48103 USA
734-665-8201
800-821-5373
Fax. 734-665-2214
filters@rosedaleproducts.com
http://www.rosedaleproducts.com

89 Crawford Street
Leominster, Massachusetts 01453
Tel: 774.450.7177
Fax: 888.835.0617
www.lrt-llc.net

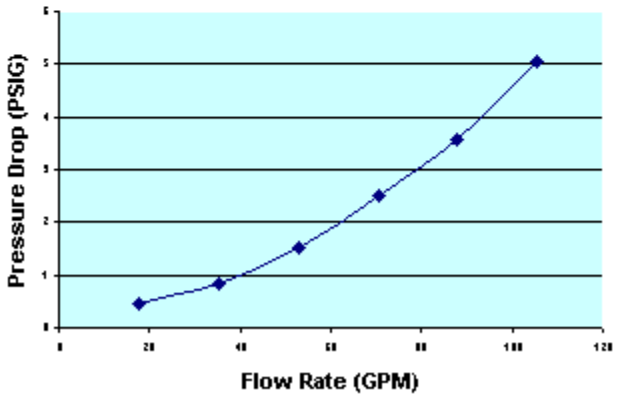
HPAF SERIES FILTERS
MODEL HPAF-2000

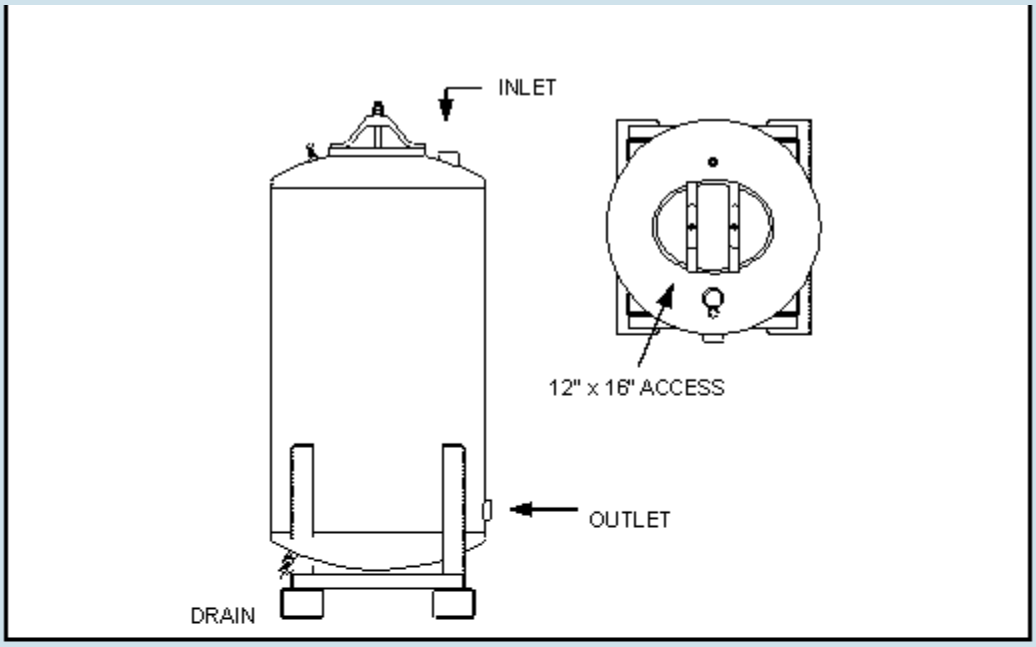
The HPAF-2000 filter is a media filter vessel designed to treat liquid streams. While the typical design application is a activated carbon adsorbtion unit, the filter can easily accommodate many medias. Some applications include:

- Dissolved Organic Removal (Activated Carbon)
- Suspended Solids Removal (Sand Filter)
- Dissolved Minerals (Softener Resin)
- Oil and Grease Removal (Organo-Clays)
- Dissolved and Precipitated Metals Removal
- Special Organics (Resin/Carbon Blend)
- Catalytic Reactor (Chlorine and Peroxide Removal)
- Bio-Remediation Contactor Unit

PRESSURE DROP GRAPH

*(As Filled - 8*30 GAC)*





HPAF-2000 SPECIFICATIONS			
Overall Height	8'6"	Vessel/Internal Piping Materials	CS (SA-36) / SCH 40 PVC
Diameter	48"	Internal Coating	Polyamide Epoxy Resin
Inlet / Outlet (FNPT)	3"	External Coating	Epoxy Mastic
Drain / Vent (FNPT)	3/4" / 1/2"	Maximum Pressure / Temp	75 PSIG / 140° F
GAC Fill (lbs)	2,000	Cross Sectional Bed Area	12.5 FT^2
Shipping / Operational Weight (lbs)	3,020/6,775	Bed Depth/Volume	5.5 FT / 68.7 FT^3

89 Crawford Street
Leominster, Massachusetts 01453
Tel: 774.450.7177
Fax: 888.835.0617
www.lrt-llc.net

FILTRATION MEDIA :
8x30 RE-ACTIVATED CARBON
4x10 RE-ACTIVATED CARBON

GENERAL DESCRIPTION

Select Re-Activated carbon from domestic sources is quality screened during our purchasing process for activity, density and fines. The use of re-activated carbon is recommended as a lower cost alternative for most sites where drinking water quality is not necessary. In many cases our re-activated carbon meets and exceeds imported virgin carbon. In addition all carbon either sold by itself or installed in our filtration units traced by lot number to the installation or sale.

8x30 (Liquid Phase) Standard Specifications:	Standard	Value
Iodine Number	ASTM D-4607	800 Minimum
Moisture Content	ASTM D-2867	5% Maximum (as packed)
Particle Size	ASTM D-2862	8x30 US Mesh
Ash		10% Maximum
Total Surface Area (N2BET)		1050 Minimum
Pore Volume (cc/g)		0.75

4*10 (Vapor Phase) Standard Specifications:	Standard	Value
Carbon Tetrachloride Activity Level	ASTM D-3467	40 Minimum
Moisture Content	ASTM D-2867	5% Maximum (as packed)
Particle Size	ASTM D-2862	4x10 US Mesh
Ash		10% Maximum
Total Surface Area (N2BET)		1050 Minimum
Pore Volume (cc/g)		0.75

Charcoal, Activated Carbon

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Charcoal, Activated Carbon**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: **S25246**

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Irritant
Eye irritation, category 2A
Specific target organ toxicity following single exposure, category 3

Flammable
Flammable solids, category 1

Eye Irrit. 2
STOT SE 3
Hazards Not Otherwise Classified - Combustible Dust
Flam. Sol. 2

Signal word :Danger

Hazard statements:
Flammable solid
Causes serious eye irritation
May cause respiratory irritation
Precautionary statements:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Keep away from heat/sparks/open flames/hot surfaces. No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/light/equipment
Avoid breathing dust/fume/gas/mist/vapours/spray
Wash skin thoroughly after handling
Use only outdoors or in a well-ventilated area

Wear protective gloves/protective clothing/eye protection/face protection
Do not eat, drink or smoke when using this product
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
In case of fire: Use agents recommended in section 5 for extinction
If eye irritation persists get medical advice/attention
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing
Store locked up
Store in a well ventilated place. Keep container tightly closed
Dispose of contents and container to an approved waste disposal plant

Combustible Dust Hazard: :
May form combustible dust concentrations in air (during processing).

Other Non-GHS Classification:

WHMIS

D2B 

B6 

NFPA/HMIS

NFPA SCALE (0-4)

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7440-44-0	Carbon	100 %
		Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Loosen clothing as necessary and position individual in a comfortable position.Move exposed to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen.Get medical assistance if cough or other symptoms appear.

After skin contact: Rinse/flush exposed skin gently using soap and water for 15-20 minutes.Seek medical advice if discomfort or irritation persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if

concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea,Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition. Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents: None identified.

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.Thermal decomposition can lead to release of irritating gases and vapors.

Advice for firefighters:

Protective equipment: Use NIOSH-approved respiratory protection/breathing apparatus.

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.Use spark-proof tools and explosion-proof equipment.Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.Avoid inhaling gases, fumes, dust, mist, vapor, and aerosols.Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Use spark-proof tools and explosion-proof equipment.Ensure that air-handling systems are operational.Ensure adequate ventilation.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13. Should not be released into environment.

Methods and material for containment and cleaning up:

Keep in suitable closed containers for disposal.Wear protective eyeware, gloves, and clothing. Refer to Section 8.Always obey local regulations.Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Collect solids in powder form using vacuum with (HEPA filter). Evacuate personnel to safe areas.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Minimize dust generation and accumulation. Follow good hygiene procedures when handling chemical materials. Refer to Section 8.Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Store away from incompatible materials.Protect from freezing and physical damage.Keep away from food and beverages.Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame.

Store in cool, dry conditions in well sealed containers. Store with like hazards

SECTION 8 : Exposure controls/personal protection



Control Parameters: , , OSHA PEL TWA (Total Dust) 15 mg/m3 (50 mppcf*)
, , ACGIH TLV TWA (inhalable particles) 10 mg/m3

Appropriate Engineering controls: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).

Respiratory protection: When necessary use NIOSH approved breathing equipment.

Protection of skin: Select glove material impermeable and resistant to the substance.Select glove material based on rates of diffusion and degradation.Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.Wear protective clothing.

Eye protection: Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).Safety glasses or goggles are appropriate eye protection.

General hygienic measures: Perform routine housekeeping.Wash hands before breaks and at the end of work.Avoid contact with skin, eyes, and clothing.Before wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Black solid	**Explosion limit lower**: **Explosion limit upper**:	Not Determined Not Determined
Odor:	Odorless	**Vapor pressure**:	1 mm Hg @ 3586C
Odor threshold:	Not Determined	**Vapor density**:	Not Determined
pH-value:	6.0 – 9.0	**Relative density**:	1.8 - 2.1
Melting/Freezing point:	3652 - 3697°C / 6606 - 6687°F	**Solubilities**:	Insoluble in water.
Boiling point/Boiling range:	Decomposes	**Partition coefficient (n-octanol/water)**:	Not Determined
Flash point (closed cup):	Not Determined	**Auto/Self-ignition temperature**:	Not Determined
Evaporation rate:	Not Determined	**Decomposition temperature**:	1 mm Hg @ 3586C

Flammability (solid,gaseous):	Not Determined	**Viscosity**:	a. Kinematic:Not Determined b. Dynamic: Not Determined
Density: Not Determined			

SECTION 10 : Stability and reactivity

Reactivity: Nonreactive under normal conditions.
Chemical stability: Stable under normal conditions.
Possible hazardous reactions: None under normal processing
Conditions to avoid: Incompatible Materials.Ignition sources, dust generation, moisture, excess heat.
Incompatible materials: May react vigorously or violently when mixed with strong oxidizing agents such as chlorates, bromates and nitrates, especially when heated. Incompatible with chlorinated paraffins, Lead oxide, manganese oxide, iron oxide, liquid oxygen, oils, and moisture.
Hazardous decomposition products: Oxides of carbon.

SECTION 11 : Toxicological information

Acute Toxicity:		
Oral:	Effect level > 8000 mg/kg bw	LD50 rat
Inhalation:	Effect level > 4.6 mg/m³ air Exp. duration 4 h	rat
Chronic Toxicity: No additional information.		
Corrosion Irritation: No additional information.		
Sensitization:		No additional information.
Single Target Organ (STOT):		No additional information.
Numerical Measures:		No additional information.
Carcinogenicity:		No additional information.
Mutagenicity:		No additional information.
Reproductive Toxicity:		No additional information.

SECTION 12 : Ecological information

Ecotoxicity

Brachydanio rerio (new name: Danio rerio) Duration 96 h Endpoint LC0 : Effect conc. 1000 mg/L

Daphnia magna 24 h Endpoint EC100: Effect conc. 10000 mg/L

Persistence and degradability:
Bioaccumulative potential:
Mobility in soil:
Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Contact a licensed professional waste disposal service to dispose of this material.Dispose of empty containers as unused product.Product or containers must not be disposed with household garbage.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11).Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

1362

UN proper shipping name

Carbon Activated

Transport hazard class(es)

Class:
4.2 Substances liable to spontaneous combustion

Packing group:III
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

Fire

SARA Section 313 (Specific toxic chemical listings):

None of the ingredients is listed

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

None of the ingredients is listed

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

None of the ingredients is listed

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:
IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

Effective date : 03.02.2015
Last updated : 03.19.2015

CGS

CATION EXCHANGE RESIN
SOFTENING GRADE
Na FORM

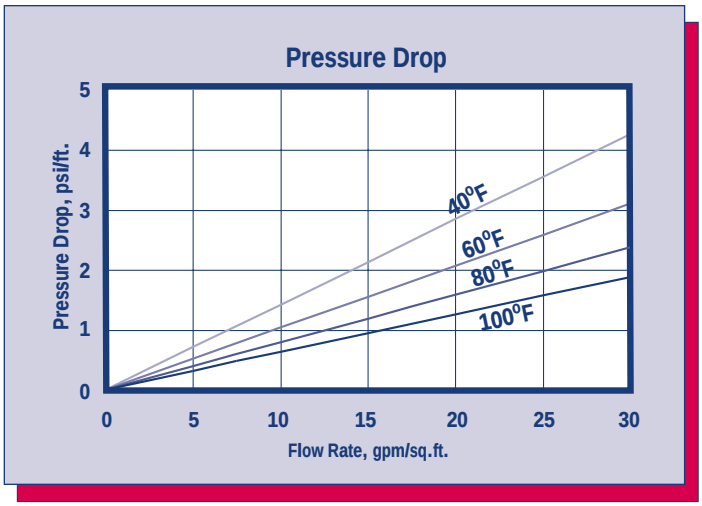
RESINTECH CGS is a high purity, light colored, high capacity, gel type sulfonated polystyrene cation resin supplied in the sodium form as moist, tough uniform spherical beads. *ResinTech CGS* specifically is intended for use in all water softening applications,including beverages, potable water and water used for food processing. It's high capacity and high DVB content provide long life and good chlorine resistance in all potable water applications. (It is also available as a dark colored product *RESINTECH CGS-BL* with identical properties.)

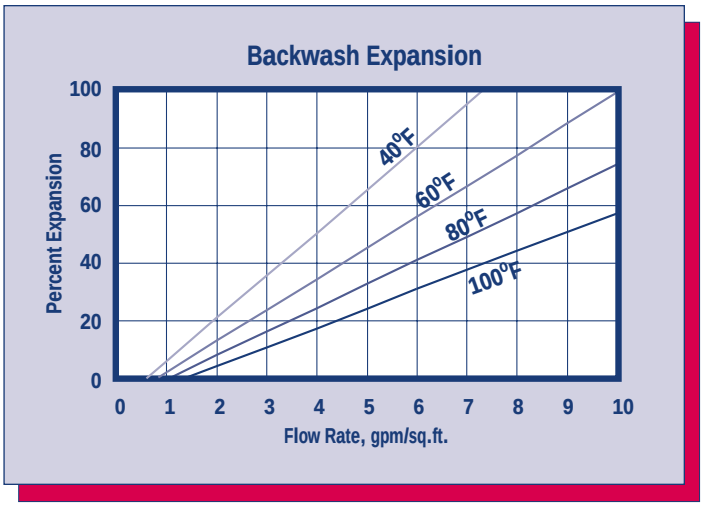
FEATURES & BENEFITS

- **COMPLIES WITH FDA REGULATIONS FOR POTABLE WATER APPLICATIONS**
  Conforms to paragraph 21CFR173.25 of the Food Additives Regulations of the F.D.A.*
- **EXCELLENT REGENERATION EFFICIENCY**
  Virtually the same operating capacity as premium grade *ResinTech CG8-BL*
- **NSF/ANSI-61 VALIDATED**
- **UNIFORM PARTICLE SIZE**
  16 to plus 50 mesh range; gives a LOWER PRESSURE DROP while maintaining SUPERIOR KINETICS.
- **SUPERIOR PHYSICAL STABILITY**
  90% plus sphericity and high crush strengths together with a very uniform particle size provide greater resistance to bead breakage while maintaining low pressure drops.
- **LOW COLOR THROW**

*For potable water applications, the resin must be properly pre-treated, usually by multiple exhaustion and regeneration cycles, to insure compliance with extractable levels.

HYDRAULIC PROPERTIES





PRESSURE DROP - The graph above shows the expected pressure loss per foot of bed depth as a function of flow rate, at various temperatures.

BACKWASH - After each cycle the resin bed should be backwashed at a rate that expands the bed 50 to 75 percent. This will remove any foreign matter and reclassify the bed. The graph above shows the expansion characteristics of *RESINTECH CGS* in the sodium form.

1 Resintech Plaza • 160 Cooper Road • West Berlin,NJ 08091 • Phone:(856)768-9600 • Fax:(856)768-9601 • E-mail:ixresin@resintech.com • Web Site:www.resintech.com

RESINTECH® CGS

PHYSICAL PROPERTIES

Polymer Structure	Styrene Crosslinked with DVB
Functional Group	$R-(SO_3)^-M^+$
Ionic Form, as shipped	Sodium
Physical Form	Tough, Spherical Beads
Screen Size Distribution	16 to 50
+16 mesh (U.S. Std)	< 5 percent
-50 mesh (U.S. Std)	< 1 percent
pH Range	0 to 14
Sphericity	90+ percent
Uniformity Coefficient	Approx. 1.6
Water Retention	
Sodium Form	48 to 54 percent
Solubility	Insoluble
Shipping Weight	
Sodium Form	48 lbs./cu.ft.
Total Capacity	
Sodium Form	1.8 meq/ml min

SUGGESTED OPERATING CONDITIONS

Maximum Temperature	
Sodium Form	250^0 F
Minimum Bed Depth	24 inches
Backwash Rate	50 to 75% Bed Expansion
Regenerant (NaCl or KCl)	
Concentration	10 to 15 percent
Flow Rate	0.5 to 1.5 gpm/cu.ft.
Contact Time	> 20 minutes
Level	4 to 15 pounds/cu.ft.
Displacement Rate	Same as Regen Flow Rate
Volume	10 to 15 gallons/cu.ft.
Fast Rinse Rate	Same as Service Flow Rate
Volume	35 to 60 gallons/cu.ft.
Service Flow Rate	2 to 10 gpm/cu.ft.

OPERATING CAPACITY

Sodium Chloride (NaCl) Regeneration

The sodium cycle operating capacity of *RESINTECH CGS* for hardness removal at various regeneration levels with an influent calcium/magnesium ratio of 2/1 and a hardness level of 500 ppm, as $CaCO_3$, is shown in the following table:

Pounds NaOH/cu.ft.	Capacity Kilograins/cu.ft.
5	20.0
7.5	25.4
10	29.0
15	33.0

Potassium Chloride (KCl) Regeneration

The potassium cycle operating capacity of *RESINTECH CGS* for hardness removal at various regeneration levels with an influent calcium/magnesium ratio of 2/1 and a hardness level of 500 ppm, as $CaCO_3$, is shown in the following table:

Pounds NaOH/cu.ft.	Capacity Kilograins/cu.ft.
5	16.6
7.5	21.8
10	26.6
15	31.2

APPLICATIONS

Softening

RESINTECH CGS is ideally suited for industrial, commercial, or residential softening applications where free chlorine is not present because of its high capacity, uniform particle size and good physical stability.

CGSver010603

SBG1

ANION EXCHANGE RESIN TYPE ONE GEL Cl OR OH FORM

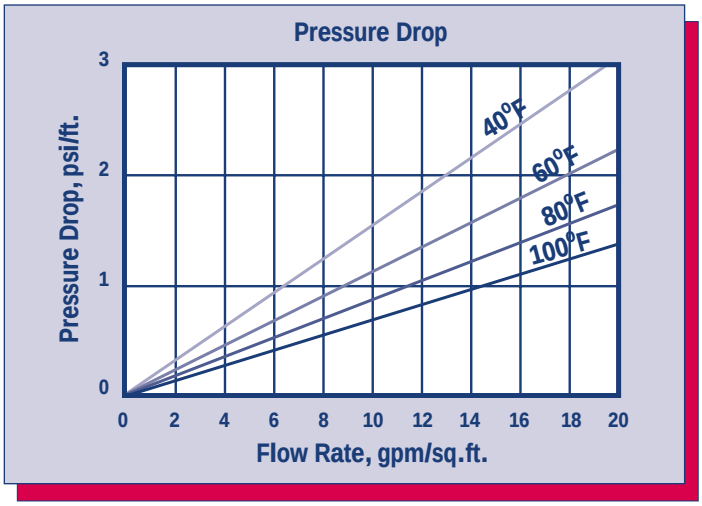
RESINTECH SBG1 is a high capacity, shock resistant, gelular, Type 1, strongly basic anion exchange resin supplied in the chloride or hydroxide form as moist, tough, uniform, spherical beads. *RESINTECH SBG1* is intended for use in all types of deionization systems and chemical processing applications. It is similar to *RESINTECH SBG1P* but has a higher volumetric capacity and exhibits lower TOC leach rates. This makes it the better performer in single use applications such as in cartridge deionization and when high levels of regeneration are used such as in polishing mixed beds. On the other hand, *RESINTECH SBG1P* is more resistant to organic fouling and gives higher operating capacities at low regeneration levels such as those used in make up demineralizers.

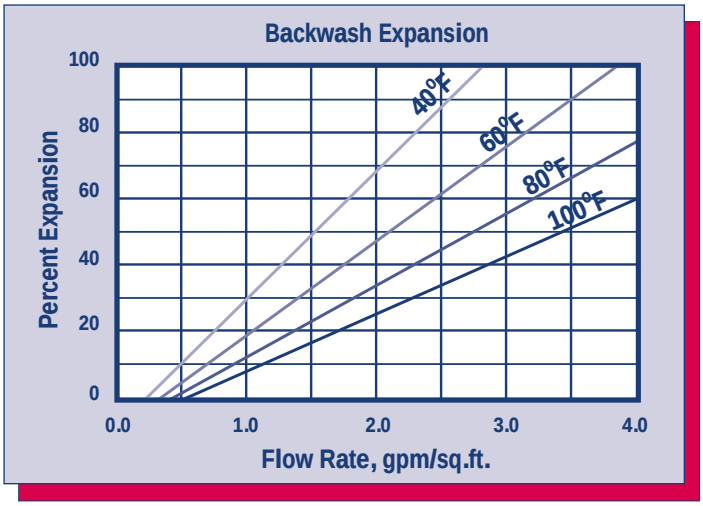
FEATURES & BENEFITS

- **COMPLIES WITH FDA REGULATIONS FOR POTABLE WATER APPLICATIONS.**
  Conforms to paragraph 21CFR173.125 of the Food Additives Regulations of the F.D.A.*
- **HIGH TOTAL CAPACITY**
  Provides longer run lengths in single use applications or where high levels of regeneration are used such as in mixed bed polishers, cartridge demineralizers.
- **UNIFORM PARTICLE SIZE**
  16 to plus 50 mesh range; gives a LOWER PRESSURE DROP while maintaining SUPERIOR KINETICS.
- **SUPERIOR PHYSICAL STABILITY**
- **LOWER TOC LEACH RATE**
  Makes it ideal for polishing mixed beds in wafer washing and other high purity water polishing applications.

*For potable water applications, the resin must be properly pre-treated, usually by multiple exhaustion and regeneration cycles, to ensure compliance with extractable levels.

HYDRAULIC PROPERTIES





PRESSURE DROP

The graph above shows the expected pressure loss per foot of bed depth as a function of flow rate, at various temperatures.

BACKWASH

After each cycle the resin bed should be backwashed at a rate that expands the bed 50 to 75 percent. This will remove any foreign matter and reclassify the bed. The graph above shows the expansion characteristics of *RESINTECH SBG1* in the sodium form.

RESINTECH® SBG1

PHYSICAL PROPERTIES

Polymer Structure	Styrene Crosslinked with DVB
Functional Group	R-N-$(CH_3)_3^+Cl^-$
Ionic Form, as shipped	Chloride or Hydroxide
Physical Form	Tough, Spherical Beads
Screen Size Distribution	16 to 50
+16 mesh (U.S. Std)	< 5 percent
-50 mesh (U.S. Std)	< 1 percent
pH Range	0 to14
Sphericity	> 93 percent
Uniformity Coefficient	Approx. 1.6
Water Retention	
Chloride Form	43 to 50 percent
Hydroxide Form	Approx. 53 to 60 percent
Solubility	Insoluble
Approximate Shipping Weight	
Cl Form	44 lbs/cu.ft.
OH Form	41 lbs/cu.ft.
Swelling Cl- to OH-	18 to 25 percent
Total Capacity	
Cl Form	1.45 meq/ml min
OH Form	1.15 meq/ml min

SUGGESTED OPERATING CONDITIONS

Maximum Continuous Temperature	
Hydroxide Form	140°F
alt Form	170°F
Minimum Bed Depth	24 inches
Backwash Rate	50 to 75 percent Bed Expansion
Regenerant Concentration*	2 to 6 percent
Regenerant Flow Rate	0.25 to 1.0 gpm/cu.ft.
Regenerant Contact Time	At least 40 Minutes
Regenerant Level	4 to 10 pounds/cu.ft.
Displacement Rinse Rate	Same as Regenerant Flow Rate
Displacement Rinse Volume	10 to 15 gals/cu.ft.
Fast Rinse Rate	Same as Service Flow Rate
Fast Rinse Volume	35 to 60 gals/cu.ft.
Service Flow Rates	
Polishing Mixed Beds	3 to 15 gpm/cu.ft.
Non-Polishing Apps.	2 to 4 gpm/cu.ft.

OPERATING CAPACITY

The operating capacity of *RESINTECH SBG1* for a variety of acids at various regeneration levels when treating an influent with a concentration 500 ppm, expressed as $CaCO_3$ is shown in the following table:

Pounds NaOH/ft³	Capacity Kilograms per cubic foot			
	HCl	H_2SO_4	H_2SiO_3	H_2CO_3
4	11.3	14.0	14.7	18.6
6	12.8	16.3	17.3	19.8
8	14.3	13.3	19.5	21.6
10	15.5	20.0	22.2	22.2

APPLICATIONS

DEMINERALIZATION – *RESINTECH SBG1* is highly recommended for use in mixed bed demineralizers, wherever complete ion removal; superior physical and osmotic stability and low TOC leachables are required such as in wafer fabrication and other ultrapure applications.

RESINTECH SBG1 has high total capacity and low swelling on regeneration and provides maximum operating capacity in cartridge deionization applications. It is ideal for single use applications such as precious metal recovery, radwaste disposal and purification of toxic waste streams.

Highly crosslinked Type 1, styrenic anion exchangers have greater thermal and oxidation resistance than other types of strong base resins. They can be operated and regenerated at higher temperatures. The combination of lower porosity, high total capacity and Type 1 functionality make *RESINTECH SBG1* the resin of choice when water temperatures exceed 85°F and where the combination of carbon dioxide, borate and silica exceed 40% of the total anions.

RESINTECH SBG1P and *RESINTECH SBG1* are quite similar; the difference between them is the degree of porosity. *RESINTECH SBG1P* has greater porosity that gives it faster kinetics, and greater ability to reversibly sorb slow moving ions such as Naturally occurring Organic Matter (NOM). At lower regeneration levels and where chlorides make up a substantial portion of the anion load, or where the removal and elution of naturally occurring organics is of concern *RESINTECH SBG1P*, SBACR or SBG2 should be considered. At the higher regeneration levels used in mixed bed polishers *RESINTECH SBG1* provides higher capacity, and the lowest possible TOC leach rates.

***CAUTION:DO NOT MIX ION EXCHANGE RESIN WITH STRONG OXIDIZING AGENTS.** Nitric acid and other strong oxidizing agents can cause explosive reactions when mixed with organic materials,such as ion exchange resins.

Material Safety Data Sheets (MSDS) are available for all ResinTech Inc.products.To obtain a copy,contact your local ResinTech sales representative or our corporate headquarters. They contain important health and safety information.That information may be needed to protect your employees and customers from any known health and safety hazards associated with our products.We recommend that you secure and study the pertinent MSDS for our products and any other products being used These suggestions and data are based on information we believe to be reliable.They are offered in good faith.However we do not make any guarantee or warranty. We caution against using these products in an unsafe manner or in violation of any patents;further we assume no liability for the consequences of any such actions.

Safety Data Sheet

Product Names: SBG1, SBG1-HP, SBG1-UPS, SBG1-C, SBG1-F, SBMP1, SBMP1-UPS, GP-SBA, SBG1P, SBG1P-UPS

(Type I Strong Base Anion Exchange Resin Chloride Form)

Effective date 31 March 2015

Section 1: Identification

1a	Product Names	ResinTech SBG1, SBG1-HP, SBG1-UPS, SBG1-C, SBG1-F, SBMP1, SBMP1-UPS, GP-SBA, SBG1P, SBG1P-UPS
1b	Common Name	Type I Strong base anion resin in the chloride form.
1c	Intended use	All general purpose anion exchanges for general use including salt form and demineralization.
1d	Manufacturer Address	ResinTech, Inc. 160 Cooper Road, West Berlin, NJ 08091 USA
	Phone Email	856-768-9600 ixresin@resintech.com

Section 2: Hazard Identification

2a Hazard classification — Not hazardous or dangerous

Product Hazard Rating	Scale
Health = 0	0 = Negligible
Fire = 1	1 = Slight
Reactivity = 0	2 = Moderate
Special – N/A	3 = High
	4 = Extreme

2b Product description — White, yellow, or orange colored solid beads approximately 0.6 mm diameter with little or no odor.

2c Precautions for use — Safety glasses and gloves recommended. Slipping hazard if spilled.

2c Potential health effects — Will cause eye irritation. Will cause skin skin irritation. Ingestion is not likely to pose a health risk.

2d Environmental effects — This product may alter the pH of any water that contacts it.

Section 2A: Hazard classification UN OSHA globally harmonized system

WARNING

(contains ion exchange resin)

H320: Causes eye irritation

Precautionary Statements

P264: Wash hands thoroughly after handling.

P280: Wear protective gloves/protective clothing/eye protection/face protection

P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.

P333+313: If skin irritation or a rash occurs: Get medical advice/attention.

P337+313: If eye irritation persists get medical advice/attention.

P403+233: Store in a well-ventilated place. Keep container tightly closed.

P411: Store at temperatures not exceeding 50 °C/ 122 °F.

Please refer to the safety data sheet for additional information regarding this product

ResinTech, Inc.
160 Cooper Road
West Berlin, NJ 08091-9234
856 768-9600
Ixresin@resintech.com

Section 3: Composition/ Information on Ingredients

3a	Chemical name	Trimethylamine functionalized chloromethylated copolymer of polystyrene in the chloride form.
3b	Ingredients	
	Trimethylamine functionalized Chloromethlyated copolymer of Styrene and divinylbenzene in the Chloride form	CAS# 60177-39-1 (35 - 65%)
	Water	CAS# 7732-18-5 (35 – 65%)

Section 4: First Aid Measures

4a	Inhalation	No adverse effects expected- normal use of product does not produce odors or vapors.
4b	Skin	Wash with soap and water- seek medical attention if a rash develops.
4c	Eye contact	Wash immediately with water-seek attention if discomfort continues.
4d	Ingestion	No adverse effects expected for small amounts, larger amounts can cause stomach irritation. Seek medical attention if discomfort occurs.

Section 5: Fire Fighting Measures

5a	Flammability	NFPA Fire rating = 1
5b	Extinguishing media	Water, CO2, foam, dry powder.
5c	Fire fighting Procedures	Follow general fire fighting procedures indicated in the work place. Seek medical attention if discomfort continues.
5d	Protective Equipment	MSHA/NIOSH approved self-contained breathing gear, full protective clothing.
5e	Combustion Products	Carbon oxides and other toxic gasses and vapors.
5f	Unusual Hazards	Product is not combustible until moisture is removed. Resin begins to burn at approximately 230º C. Auto ignition can occur above 500º C.

Section 6: Accidental Release Measures

6a	Personal Precautions	Keep people away, spilled resin can be a slipping hazard, wear gloves and safety glasses to minimize skin or eye contact.
6b	Incompatible Chemicals	Strong oxidants can create risk of combustion products similar to burning, exposure to strong bases can cause a rapid temperature increase.
6c	Environmental Precautions	Keep out of public sewers and waterways.
6d	Containment Materials	Use plastic or paper containers, unlined metal containers not recommended.
6e	Methods of Clean-up	Sweep up material and transfer to containers.

Section 7: Handling and Storage

7a	Handling	Avoid prolonged skin contact. Keep resin moist and avoid allowing resin to completely dry.
7b	Storage	Store in a cool dry place (0º to 45º C) in the original shipping container. This product is thermally sensitive and will have reduced shelf life if subjected to extended periods of time at temperatures exceeding 50º C. Although freezing does not usually damage ion exchange resins, avoid repeated freeze thaw cycles.
7c	TSCA considerations	Ion exchange resins should be listed on the TSCA Inventory in compliance with State and Federal Regulations.

Section 8: Exposure Controls/Personal Protection

8a	OSHA exposure limits	None noted.
8b	Engineering Controls	Provide adequate ventilation.
8c	Personal Protection Measures	
	Eye Protection	Safety glasses or goggles.
	Respiratory Protection	Not required for normal use.
	Protective Gloves	Not required for limited exposure but recommended for extended contact.

Section 9: Physical and Chemical Properties

Appearance	Amber, yellow, or red beads approx. 0.6 mm diameter.
Flammability or explosive limits	Flammable above 500º C
Odor	Little or no odor
Physical State	Solid
Vapor pressure	Not available
Odor threshold	Not available
Vapor density	Not available
pH	Near neutral (6 to 8 typical)
Relative density	Approx 710 grams/Liter
Melting point/freezing point	Does not melt, freezes at approx. 0 C
Solubility	Insoluble in water and most solvents
Boiling point	Does not boil
Flash point	Approx 500º C
Evaporation rate	Does not evaporate
Partition Coefficient (n-octonol/water)	Not applicable
Auto-ignition temperature	Approx 500º C
Decomposition temperature	Above 230º C
Viscosity	Not applicable

Section 10: Stability and Reactivity

10a Stability	Stable under normal conditions.
10b Conditions to Avoid	Heat, exposure to strong oxidants.
10c Hazardous by-products	Trimethylamine, charred polystyrene, aromatic acids and hydrocarbons, organic amines, nitrogen oxides, carbon oxides, chlorinated hydrocarbons.
10d Incompatible materials	Strong oxidizing agents, e.g. nitric acid (such as HNO_3)
10e Hazardous Polymerization	Does not occur

Section 11: Toxicological Information

11a Likely Routes of Exposure	Oral, skin or eye contact.
11b Effects of exposure	
Delayed	None known.
Immediate (acute)	None known.
Chronic	None known.
11c Toxicity Measures	
Skin Adsorption	Unlikely, some transfer of acidity is possible.
Ingestion	Oral toxicity believed to be low but no LD50 has been established.
Inhalation	Unknown, vapors are very unlikely due to physical properties (insoluble solid).
11d Toxicity Symptoms	
Skin Adsorption	Mild Rash.
Ingestion	Indigestion or general malaise.
Inhalation	Unknown.
11e Carcinogenicity	None known

Section 12: Ecological information

12a Eco toxicity	Not acutely harmful to plant or animal life.
12b Mobility	Insoluble, acidity or causticity may escape if wet.
12c Biodegradability	Not biodegradable.
12d Bioaccumulation	Insignificant.
12e Other adverse effects	Not Harmful to the environment.

Section 13: Disposal Considerations

13a General considerations	Material is non-hazardous. However, unused material can cause a pH change when wetted.
13b Disposal Containers	Most plastic and paper containers are suitable. Avoid use of unlined metal containers.
13c Disposal methods	No specific method necessary.
13d Sewage Disposal	Not recommended.

13e	Precautions for incineration	May release trimethylamine and toxic vapors when burned.
13f	Precautions for landfills	Resins used to remove hazardous materials may then become hazardous mixtures

Section 14: Transportation Information

14a	Transportation Class	Not classified as a dangerous good for transport by land, sea, or air.
14b	TDG	Not regulated.
14c	IATA	Not regulated.
14d	DOT (49 CFR 172.101)	Not Regulated.

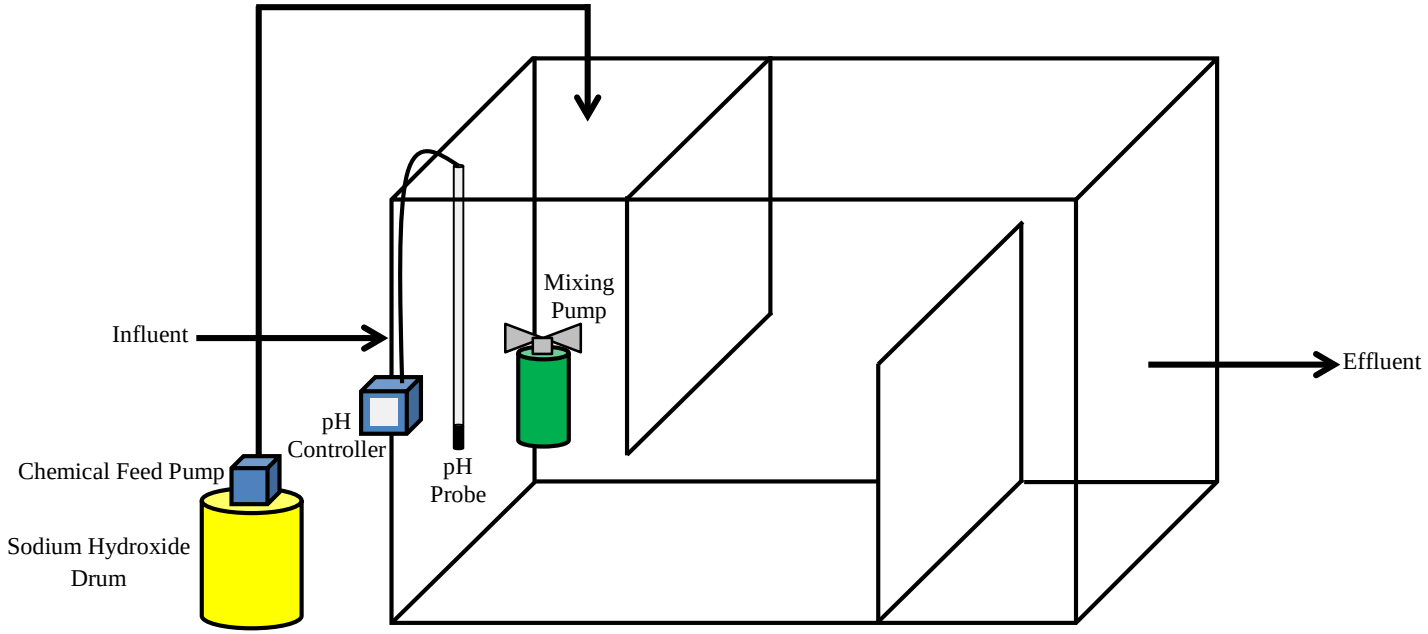
Section 15: Regulatory Information

15a	CERCLA	Not regulated
15b	SARA Title III	Not regulated
15c	Clean Air act	Not regulated
15d	Clean Water Act	Not regulated
15e	TSCA	Not regulated
15f	Canadian Regulations	
	WHMIS	Not a controlled product
	TDG	Not regulated
15g	Mexican Regulations	Not Dangerous

Section 16: Other Information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features. Regulatory requirements are subject to change and may differ from one location to another. It is the buyer's responsibility to ensure that their activities comply with federal, state, and local laws.

16a Date of Revision 31 March 2015



Notes:

1.) Figure is not to scale.
2.) System layout can vary with site conditions.

89 Crawford Street
Leominster, Massachusetts 01453
Tel: 774.450.7177
Fax: 888.835.0617
www.lrt-llc.net

Configuration of pH Adjustment System

Lockwood Remediation Technologies, LLC

One Controller for the Broadest Range of Sensors.

Choose from 30 digital and analog sensor families for up to 17 di:erent parameters.

Maximum Versatility

The sc200 controller allows the use of digital and analog sensors, either alone or in combination, to provide compatibility with Hach's broad range of sensors, eliminating the need for dedicated, parameter-specific controllers.

Ease of Use and Confidence in Results

Large, high-resolution, transreflective display provides optimal viewing resolution in any lighting condition. Guided calibration procedures in 19 languages minimize complexity and reduce operator error. Password-protected SD card reader o:ers a simple solution for data download and transfer. Visual warning system provides critical alerts.

Wide Variety of Communication Options

Utilize two to five analog outputs to transmit primary and secondary values for each sensor, or integrate Hach sensors and analyzers into MODBUS RS232/RS485, Profibus® DP, and HART networks.

Password protected SD card reader offers a simple solution for data download and transfer, and sc200 and digital sensor configuration file duplication and backup.

Controller Comparison

Features	Previous Models sc100™ Controller	Previous Models GLI53 Controller	sc200™ Controller	Benefits
Display	64 x 128 pixels 33 x 66 mm (1.3 x 2.6 in.)	64 x 128 pixels 33 x 66 mm (1.3 x 2.6 in.)	160 x 240 pixels 48 x 68 mm (1.89 x 2.67 in.) Transreflective	• Improved user interface—50% bigger • Easier to read in daylight and sunlight
Data Management	irDA Port/PDA Service Cable	N/A	SD Card Service Cable	• Simplifies data transfer • Standardized accessories/max compatibility
Sensor Inputs	2 Max Direct Digital Analog via External Gateway	2 Max Analog Depending on Parameter	2 Max Digital and/or Analog with Sensor Card	• Simplifies analog sensor connections • Works with analog and digital sensors
Analog Inputs	N/A	N/A	1 Analog Input Signal Analog 4-20mA Card	• Enables non-sc analyzer monitoring • Accepts mA signals from other analyzers for local display • Consolidates analog mA signals to a digital output
4-20 mA Outputs	2 Standard	2 Standard	2 Standard Optional 3 Additional	• Total of five (5) 4-20 mA outputs allows multiple mA outputs per sensor input
Digital Communication	MODBUS RS232/RS485 Profibus DP V1.0	HART	MODBUS RS232/RS485 Profibus DP V1.0 HART 7.2	• Unprecedented combination of sensor breadth and digital communication options

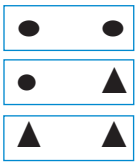
Choose from Hach's Broad Range of Digital and Analog Sensors

Parameter	Sensor	Digital or Analog
Ammonia	AMTAX™ sc, NH4D sc, AISE sc, AN-ISE sc	●
Chlorine	CLF10 sc, CLT10 sc, 9184 sc	●
Chlorine Dioxide	9185 sc	●
Conductivity	GLI 3400 Contacting, GLI 3700 Inductive	▲
Dissolved Oxygen	LDO® Model 2, 5740 sc	●
Dissolved Oxygen	5500	▲
Flow	U53, F53 Sensors	▲
Nitrate	NITRATAX™ sc, NO3D sc, NISE sc, AN-ISE sc	●
Oil in Water	FP360 sc	●
Organics	UVAS sc	●
Ozone	9187 sc	●
pH/ORP	pHD	●
pH/ORP	pHD, pH Combination, LCP	▲
Phosphate	PHOSPHAX™ sc	●
Sludge Level	SONATAX™ sc	●
Suspended Solids	SOLITAX™ sc, TSS sc	●
Turbidity	1720E, FT660 sc, SS7 sc, ULTRATURB sc, SOLITAX sc, TSS sc	●
Ultra Pure Conductivity	8310, 8311, 8312, 8315, 8316, 8317 Contacting	▲
Ultra Pure pH/ORP	8362	▲

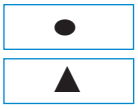
● = Digital ▲ = Analog

Connect up to two of any of the sensors listed above, in any combination, to meet your application needs. The diagrams below demonstrate the potential configurations. Operation of analog sensors requires the controller to be equipped with the appropriate sensor module. Contact Hach Technical Support for help with selecting the appropriate module.

2 Channel Configurations



1 Channel Configurations



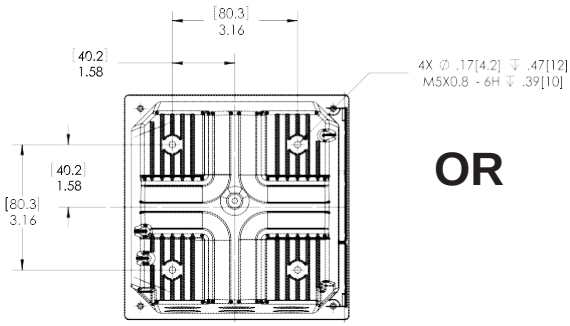
Specifications*

Dimensions (H x W x D)	5.7 in x 5.7 in x 7.1 in (144 mm x 144 mm x 181 mm)
Display	Graphic dot matrix LCD with LED backlighting, transreflective
Display Size	1.9 x 2.7 in. (48 mm x 68 mm)
Display Resolution	240 x 160 pixels
Weight	3.75 lbs. (1.70 kg)
Power Requirements (Voltage)	100 - 240 V AC, 24 V DC
Power Requirements (Hz)	50/60 Hz
Operating Temperature Range	-20 to 60 °C , 0 to 95% RH non-condensing
Analog Outputs	Two (Five with optional expansion module) to isolated current outputs, max 550 Ω , Accuracy: ± 0.1% of FS (20mA) at 25 °C, ± 0.5% of FS over -20 °C to 60 °C range Operational Mode: measurement or calculated value
Analog Output Functional Mode	Linear, Logarithmic, Bi-linear, PID
Security Levels	2 password-protected levels
Mounting Configurations	Wall, pole, and panel mounting
Enclosure Rating	NEMA 4X/IP66
Conduit Openings	1/2 in NPT Conduit
Relay: Operational Mode	Primary or secondary measurement, calculated value (dual channel only) or timer
Relay Functions	Scheduler (Timer), Alarm, Feeder Control, Event Control, Pulse Width Modulation, Frequency Control, and Warning
Relays	Four electromechanical SPDT (Form C) contacts, 1200 W, 5 A
Communication	MODBUS RS232/RS485, PROFIBUS DPV1, or HART 7.2 optional
Memory Backup	Flash memory
Electrical Certifications	EMC CE compliant for conducted and radiated emissions: - CISPR 11 (Class A limits) - EMC Immunity EN 61326-1 (Industrial limits) Safety cETLus safety mark for: - General Locations per ANSI/UL 61010-1 & CAN/CSA C22.2. No. 61010-1 - Hazardous Location Class I, Division 2, Groups A,B,C & D (Zone 2, Group IIC) per FM 3600 / FM 3611 & CSA C22.2 No. 213 M1987 with approved options and appropriately rated Class I, Division 2 or Zone 2 sensors cULus safety mark - General Locations per UL 61010-1 & CAN/CSA C22.2. No. 61010-1

**Subject to change without notice.*

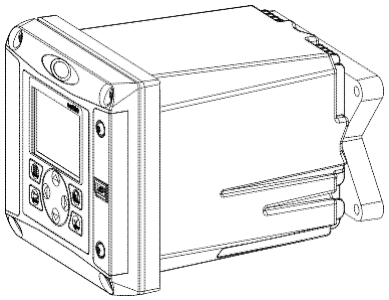
Dimensions

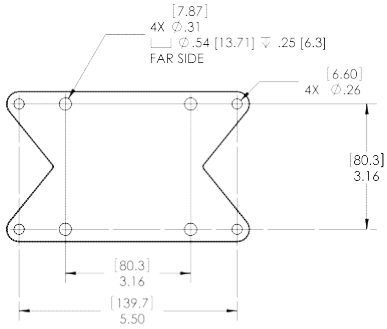
Surface Mounting Dimensions



Mounting Dimensions
(Rear View)

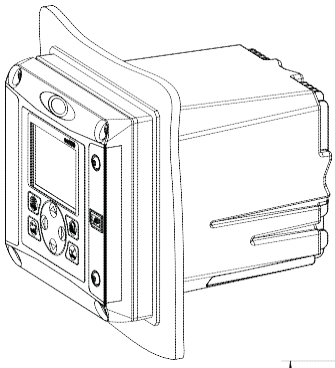
OR

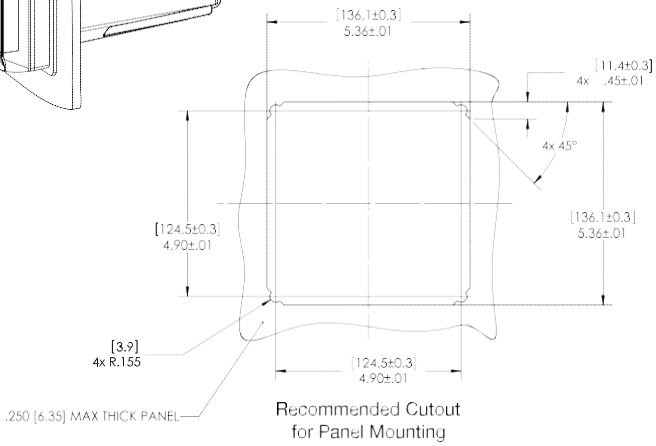




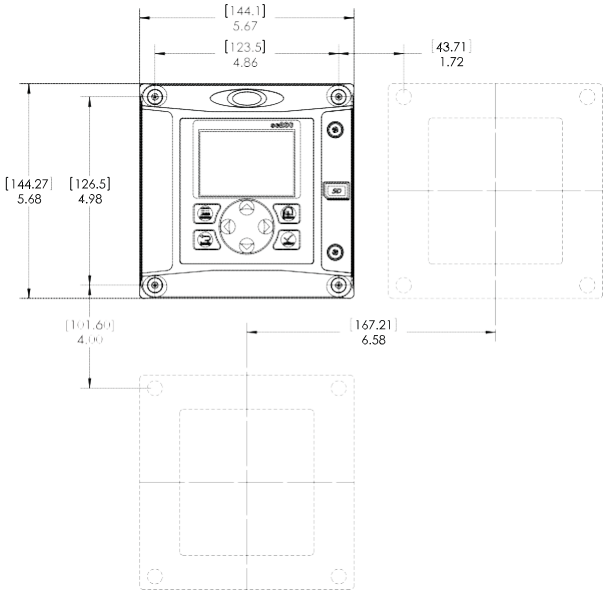
Bracket (supplied) for Surface Mounting
(Not compatible with Weather and Sun Shield p/n 9220600 when surface mounting.)

Panel Mounting Dimensions



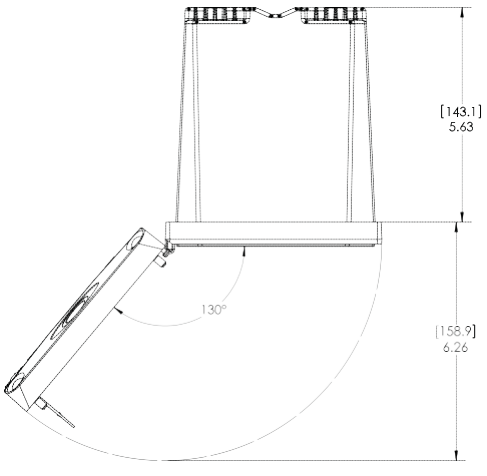


Recommended Cutout
for Panel Mounting

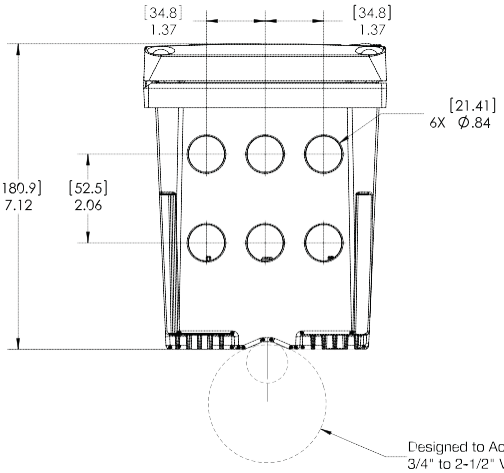


Minimum Spacing Dimensions
for Group Mounting

Top and Bottom Views



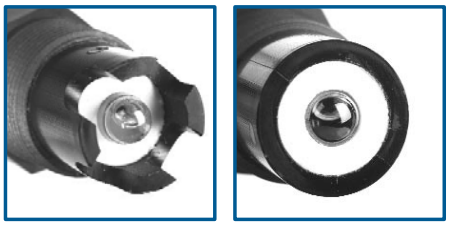
Door Opening Details



Designed to Accommodate
3/4" to 2-1/2" Vertical / Horizontal Pipe

3/4-inch Combination pH and ORP Sensor Kits

Use the Digital Gateway to make any Hach analog combination pH or ORP sensor compatible with the Hach sc1000 Controller.



Digital combination pH and ORP sensors are available in convertible, insertion, and sanitary mounting styles. Choose from rugged dome electrodes or "easy-to-clean" flat glass electrodes.

Features and Benefits

Low Price—High Performance

These combination sensors are designed for specialty applications for immersion or in-line mounting. The reference cell features a double-junction design for extended service life, and a built-in solution ground. The body is molded from chemically-resistant Ryton® or PVDF, and the reference junction is coaxial porous Teflon®. All sensors are rated 0 to 105ºC up to 100 psig, and have integral 4.5 m (15 ft.) cables with tinned leads. The PC-series (for pH) and RC-series (for ORP) combination sensors are ideal for measuring mild and aggressive media.

Special Electrode Configurations

Sensors with rugged dome electrodes, "easy-to-clean" flat glass electrodes, and even HF (hydrofluoric acid) resistant glass electrodes are available for a wide variety of process solutions.

Temperature Compensation Element Option

The PC-series combination pH sensors are available with or without a Pt 1000 ohm RTD temperature element. The RC-series combination ORP sensors are supplied without a temperature element.

Versatile Mounting Styles

Sensors are available in three mounting styles—convertible, insertion, and sanitary. Please turn to page 3 for more information.

Full-Featured "Plug and Play" Hach sc Digital Controllers

There are no complicated wiring or set up procedures with any Hach sc controller. Just plug in any combination of Hach digital sensors and it's ready to use—it's "plug and play."

One or multiple sensors—The sc controller family allows you to receive data from up to eight Hach digital sensors in any combination using a single controller.

Communications—Multiple alarm/control schemes are available using the relays and PID control outputs. Available communications include analog 4-20 mA, digital MODBUS® (RS485 and RS232) or Profibus DP protocols. (Other digital protocols are available. Contact your Hach representative for details.)

Data logger—A built-in data logger collects measurement data, calibration, verification points, and alarm history.

Specifications*

Most pH applications fall in the 2.5-12.5 pH range. General purpose pH glass electrodes perform well in this range. Some industrial applications require accurate measurements and control at pH values below 2 or above 12. Consult Hach Technical Support for details on these applications.

Combination pH Sensors

Measuring Range
0 to 14 pH

Accuracy
Less than 0.1 pH under reference conditions

Temperature Range
0 to 105ºC (32 to 221ºF)

Flow Rate
0 to 2 m/s (0 to 6.6 ft./s); non-abrasive

Pressure Range
0 to 6.9 bar at 100ºC (0 to 100 psig at 212ºF)

Signal Transmission Distance
100 m (328 ft.) when used with the Hach Digital Gateway and a Hach sc Digital Controller.

1000 m (3280 ft.) when used with the Hach Digital Gateway, Termination Box, and a Hach sc Digital Controller.

Sensor Cable
Integral coaxial cable (plus two conductors for temperature compensator option); 4.5 m (15 ft.) long

Wetted Materials

Convertible style: Ryton® body (glass filled)

Insertion style: PVDF body (Kynar®)

Sanitary style: 316 stainless steel sleeved PVDF body

Common materials for all sensor styles include PTFE Teflon double junction, glass process electrode, and Viton® O-rings

Warranty
90 days

Combination ORP Sensors

Measuring Range
-2000 to +2000 millivolts

Accuracy
Limited to calibration solution accuracy (± 20 mV)

Temperature Range
0 to 105ºC (32 to 221ºF)

Flow Rate
0 to 2 m/s (0 to 6.6 ft./s); non-abrasive

Pressure Range
0 to 6.9 bar at 100ºC (0 to 100 psig at 212ºF)

Signal Transmission Distance
100 m (328 ft.) when used with the Hach Digital Gateway and a Hach sc Digital Controller.

1000 m (3280 ft.) when used with the Hach Digital Gateway, Termination Box, and a Hach sc Digital Controller.

Sensor Cable
Integral coaxial cable; 4.5 m (15 ft.) long; terminated with stripped and tinned wires

Wetted Materials

Convertible style: Ryton® body (glass filled)

Insertion style: PVDF body (Kynar®)

Common materials for all sensor styles include PTFE Teflon double junction, glass with platinum process electrode, and Viton® O-rings

Warranty
90 days

**Specifications subject to change without notice.*

Engineering Specifications

1. The pH sensor shall be available in convertible, insertion or sanitary styles. The ORP sensor shall be available in only convertible or insertion styles.
2. The convertible style sensor shall have a Ryton® body. The insertion style sensor shall have a PVDF body. The sanitary style sensor shall have a 316 stainless steel sleeved PVDF body. Common materials for all sensor styles shall include a PTFE Teflon® double junction, and Viton® O-rings. The pH sensor shall have a glass pH electrode. The ORP sensor shall have a platinum ORP electrode.
3. The convertible style pH sensor shall be available with or without a built-in Pt 1000 ohm RTD temperature element. Insertion and sanitary style pH sensors shall have a built-in Pt 1000 ohm RTD temperature element. Convertible and insertion style ORP sensors shall not have a built-in temperature element.
4. The sensor shall communicate via MODBUS® RS-485 to a Hach sc Digital Controller.
5. The sensor shall be Hach Company Model PC sc or PC-series for pH measurement or Model PC sc or RC-series for ORP measurement.

Dimensions

Convertible Style Sensor

The convertible style sensor has a Ryton® body that features 3/4-inch NPT threads on both ends. The sensor can be directly mounted into a standard 3/4-inch pipe tee for flow-through mounting or fastened onto the end of a pipe for immersion mounting. The convertible style sensor enables inventory consolidation, thereby reducing associated costs. Mounting tees and immersion mounting hardware are offered in a variety of materials to suit application requirements.

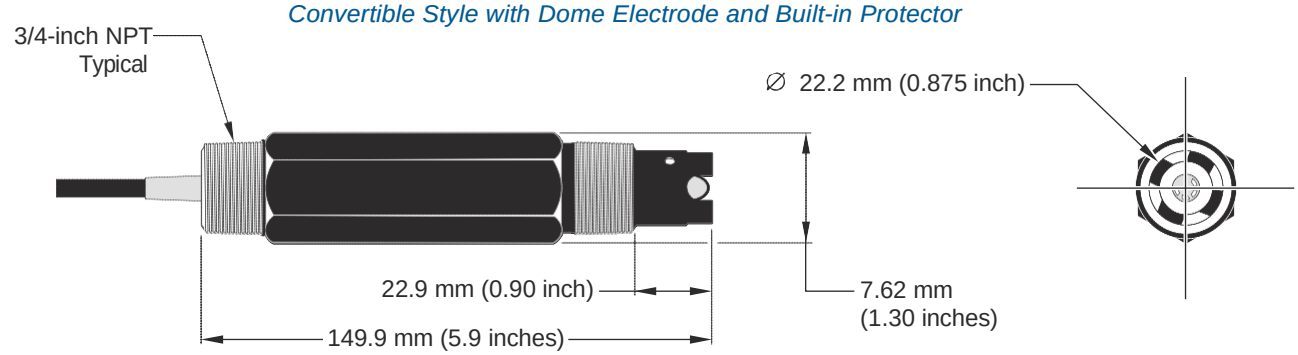
Insertion Style Sensor

Insertion style sensors feature a longer, non-threaded PVDF body with two Viton® O-rings, providing a seal when used with the optional Hach insertion mount hardware assembly. This ball valve hardware enables sensor insertion and retraction from a pipe or vessel without having to stop the process flow.

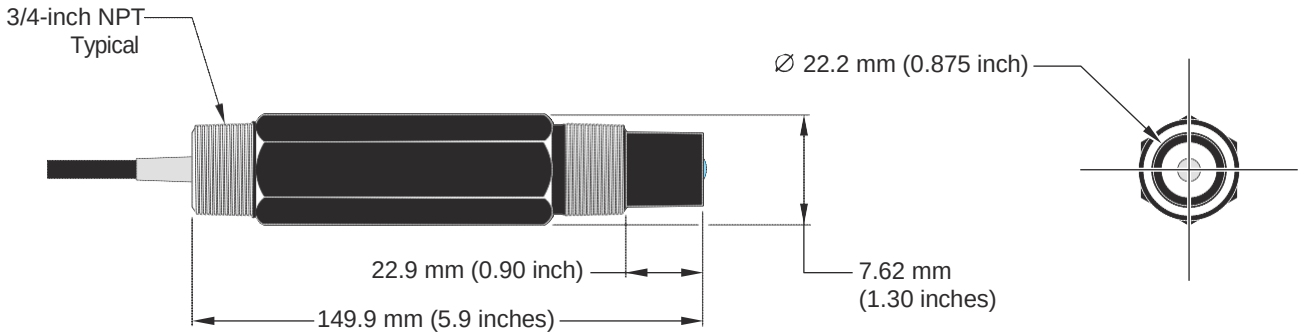
Sanitary Style Sensor

The sanitary style sensor, offered for pH measurement, has a 316 stainless steel-sleeved PVDF body with a 2-inch flange. The sensor mates to a standard 2-inch Tri-Clover fitting. The optional Hach sanitary mounting hardware includes a standard 2-inch sanitary tee, sanitary clamp, and Viton® sanitary gasket.

Convertible Style with Dome Electrode and Built-in Protector



Convertible Style with Flat Electrode



Lockwood Remediation Technologies, LLC

The Pulsatron Series A Plus offers manual function controls over stroke length and stroke rate as standard with the option to select external pace for automatic control.

Ten distinct models are available, having pressure capabilities to 250 PSIG (17 BAR) @ 12 GPO (1.9 lph), and flow capacities to 58 GPO (9.1 lph) @ 100 PSIG (7.0 BAR), with a standard turndown ratio of 100:1, and optional ratio of 1000:1. Metering performance is reproducible to within ± 3% of maximum capacity.

Features

- Manual Control by on-line adjustable stroke rate and stroke length.
- Highly Reliable timing circuit.
- Circuit Protection against voltage and current upsets.
- Solenoid Protection by thermal overload with auto-reset.
- Water Resistant, for outdoor and indoor applications.
- Internally Dampened To Reduce Noise.
- Guided Ball Check Valve Systems, to reduce back flow and enhance outstanding priming characteristics.
- Few Moving Parts and Wall Mountable.
- Safe & Easy Priming with durable leak-free bleed valve assembly (standard).
- Optional Control: External pace with auto/manual selection.

Controls

Manual Stroke Rate

Manual Stroke Length

External Pacing - Optional

External Pace With Stop - Optional (125 SPM only)

Controls Options		
Feature	Standard Configuration	Optional Configuration [1]
External Pacing	--	Auto / Manual Selection
External Pace w/ Stop (125 SPM only)	--	Auto / Manual Selection [2]
Manual Stroke Rate	10:1 Ratio	100:1 Raio
Manual Stroke Length	10:1 Ratio	10:1 Ratio
Total Turndown Ratio	100:1 Ratio	1000:1 Ratio

Note 1: On S2, S3 & S4 sizes only.

Note 2: Not available on 1000:1 turndown pumps.

Operating Benefits

- Reliable metering performance.
- Rated "hot" for continuous duty.
- High viscosity capability.
- Leak-free, sealless, liquid end.

Aftermarket

- KOPkits
- Gauges
- Dampeners
- Pressure Relief Valves
- Tanks
- Pre-Engineered Systems
- Process Controllers (PULSAblue, MicroVision)

Series A Plus
Electronic Metering Pumps

Lockwood Remediation Technologies, LLC

Series A Plus

Specifications and Model Selection

MODEL			LBC2	LB02	LBC3	LB03	LB04	LB64	LBC4	LBS2	LBS3	LBS4
Capacity nominal (max.)		GPH	0.25	0.25	0.42	0.50	1.00	1.25	2.00	0.50	1.38	2.42
		GPO	6	6	10	12	24	30	48	12	33	58
		LPH	0.9	0.9	1.6	1.9	3.8	4.7	7.6	1.9	5.2	9.14
Pressure[3] (max.)	GFPP, PVDF, 316SS or PVC <;N code) wITFE Seats)	PSIG (Bar)	250 (17)	150 (10)	250 (17)	150 (10)	100 (7)	100 (7)	50 (3.3)	250 (17)	150 (10)	100 (7)
	PVC (V code) Viton or CSPE Seats IDegas Liquid End		150 (10)							150 (10)		
Connections:		Tubina	1.14'ID X 3.18' OD						3.18'D X 1.12' OD	1.14'D X 3.18' OD		
		Pioina	1.14'FNPT									
Strokes/Minute		SPM	125							250		

Note 3: Pumps with rated pressure above 150 PSI will be de-rated to 150 PSI Max. when selecting certain valve options, see Price Book for details.

Engineering Data

Pump Head Materials Available:	GFPPL
	PVC
	PVDF
	316 SS
Diaphragm:	PTFE-faced CSPE-backed
Check Valves Materials Available:	
Seats/0-Rings:	PTFE
	CSPE
	Viton
Balls:	Ceramic
	PTFE
	316 SS
	Alloy C
Fittings Materials Available:	GFPPL
	PVC
	PVDF
Bleed Valve:	Same as fitting and check valve selected, except 316SS
Injection Valve & Foot Valve Assy:	Same as fitting and check valve selected
Tubing:	Clear PVC
	White PE

Important: Material Code - GFPPL=Glass-filled Polypropylene, PVC=Polyvinyl Chloride, PE=Polyethylene, PVDF=Polyvinylidene Fluoride, CSPE=Generic formulation of Hypalon, a registered trademark of E.I. DuPont Company. Viton is a registered trademark of E.I. DuPont Company. PVC wetted end recommended for sodium hypochlorite.

Engineering Data

Reproducibility:	+/- 3% at maximum capacty
Viscosity Max CPS:	1000 CPS
Stroke Frequency Max SPM:	125 / 250 by Model
Stroke Frequency Turn-Down Ratio:	10:1 / 100:1 by Model
Stroke Length Turn-Down Ratio:	10:1
Power Input:	115 VAC/50-60 HZ/1 ph
	230 VAC/50-60 HZ/1 ph
Average Current Draw:	
@ 115 VAC; Amps:	0.6 Amps
@ 230 VAC; Amps:	0.3 Amps
Peak hput Power:	130 Watts
Average Input Power @ Max SPM:	50 Watts

Custom Engineered Designs - Pre-Engineered Systems

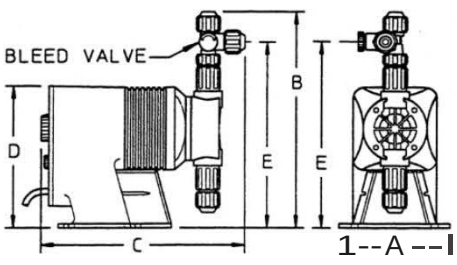
Pre-Engineered Systems

Pulsafeeder's Pre-Engineered Systems are designed to provide complete chemical feed solutions for all electronic metering applications. From stand alone simplex pH control applications to full-featured, redundant sodium hypochlorite disinfection metering, these rugged fabricated assemblies offer turn-key simplicity and industrial-grade durability. The UV-stabilized, high-grade HOPE frame offers maximum chemical compatibility and structural rigidity. Each system is factory assembled and hydrostatically tested prior to shipment.

Dimensions

Series A PLUS Dimensions (inches)						
Model No.	A	B	C	D	E	Shipping Weight
LB02 IS2	5.0	9.6	9.5	6.5	8.2	10
LBC2	5.0	9.9	9.5	6.5	8.5	10
LBC3	5.0	9.9	9.5	6.5	8.5	10
LB03 IS3	5.0	9.9	9.5	6.5	8.5	10
LB0B4	5.0	9.9	9.5	6.5	8.5	10
LB64	5.0	9.9	9.5	6.5	8.5	10
LBC4	5.0	9.9	9.5	6.5	8.5	10

NOTE: Inches X 2.54 cm



95-Gallon OverPack - 32" dia x 41.5", 1 each/package

Stock a SpillTech® OverPack with sorbents for emergency spill response, or use it as a salvage drum to ship damaged containers or hazardous waste.

- DOT-Approved for Salvage: All SpillTech® OverPacks are DOT-approved and X-rated for use as salvage drums. Helps companies conform to federal regulations when shipping damaged or leaking containers of hazardous materials, or absorbents contaminated with hazardous substances.
- Perfect for Spill Kits: Stores sorbent products (not included) for easy access as needed for spill control. Saves time when quick response is necessary.
- Sturdy Construction: 100% polyethylene OverPack resists chemicals, rust and corrosion for years of use. Integrated handles make them easy to lift, move or carry with standard material handling equipment. Twist-on, double-wall lid with closed-cell gasket provides sealed, secure closure to prevent leaks and protect contents from moisture, dirt and damage. Durable to withstand rough handling.
- Customized for You: We can customize a Spill Kit to your exact specifications, including the container, its contents and accessories, with no upcharge! Contact your local Distributor for details.

A95OVER Specifications

Dimensions:	ext. dia. 32" x 41.5" H
Shipping Dimensions:	31.75" W x 41.5" L x 31.75" H
Sold as:	1 per package
Color:	Yellow
Composition:	Polyethylene
# per Pallet:	3
Incinerable:	No
Ship Class:	250

Metric Equivalent Specifications

Dimensions:	ext. dia. 81.3cm x 105.4cm H
Shipping Dimensions:	80.6cm W x 105.4cm L x 80.6cm H

A95OVER Technical Information

Warnings & Restrictions:
There are no known warnings and restrictions for this product.

Regulations and Compliance:
49 CFR 173.3(c)(1) - If a container of hazardous waste is damaged or leaking, it can be placed in a compatible salvage drum that meets UN criteria for shipping

49 CFR 173.12(b)(2)(iv) - When labpacking, "Inner packagings…must be surrounded by a chemically compatible absorbent material in sufficient quantity to absorb the total liquid contents."

49 CFR 173.12(b) - A container used for labpacking must be "a UN 1A2 or UN 1B2 metal drum, a UN 1D plywood drum, a UN 1G fiber drum or a UN 1H2 plastic drum tested and marked at least for the Packing Group III performance level for liquids or solids."

Revision date 2019-15-4

SAFETY DATA SHEET

Revision number 1

SECTION 1) CHEMICAL PRODUCT AND SUPPLIER'S IDENTIFICATION

Product ID:	Redux-823
Product Name:	Processing aid for industrial applications
Revision Date:	Apr 15, 2019
Supersedes Date:	Jan 25, 2018
Manufacturer's Name:	Azure Water Services
Address:	280 Callegari Drive West Haven, CT, US, 06516
Emergency Phone:	Chemtrec 800-424-9300, in US and Canada only

SECTION 2) HAZARDS IDENTIFICATION

Classification of the substance or mixture

Not a hazardous substance or mixture according to United States Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200).

Hazards Not Otherwise Classified (HNOC)

None.

SECTION 3) COMPOSITION / INFORMATION ON INGREDIENTS

None of the chemicals in this product are hazardous according to the GHS.

SECTION 4) FIRST-AID MEASURES

Inhalation

Remove source of exposure or move person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor/. If breathing has stopped, trained personnel should begin rescue breathing or, if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED).

Eye Contact

Remove source of exposure or move person to fresh air. Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing for a flushing duration of 30 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately call a POISON CENTER/doctor.

Skin Contact

Take off immediately all contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Rinse skin with lukewarm, gently flowing water/shower for a duration of 30 minutes or until medical aid is available. Immediately call a POISON CENTER/doctor. Wash contaminated clothing before re-use or discard.

Ingestion

Rinse mouth with water. Do NOT induce vomiting. Give 1 to 2 cups of milk or water to drink. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, lie on your side, in the recovery position. Immediately call a POISON CENTER/doctor.

Most Important Symptoms and Effects, Both acute and Delayed

No data available.

Indication of Any Immediate Medical Attention and Special Treatment Needed

No data available.

SECTION 5) FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Dry chemical, foam, carbon dioxide. Sand or earth may be used for small fires only.

Use extinguishing agent suitable for type of surrounding fire.

Unsuitable Extinguishing Media

Do not use direct water stream since this may cause fire to spread.

Specific Hazards in Case of Fire

In case of fire, hazardous decomposition products may include sulphur oxides.

Fire-Fighting Procedures

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Water may be ineffective but can be used to cool containers exposed to heat or flame. Caution should be exercised when using water or foam as frothing may occur, especially if sprayed into containers of hot, burning liquid. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

Special Protective Actions

Wear protective pressure self-contained breathing apparatus (SCBA) and full turnout gear.

SECTION 6) ACCIDENTAL RELEASE MEASURES

Emergency Procedure

Isolate hazard area and keep unnecessary people away. Remove all possible sources of ignition in the surrounding area. Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.

Absorb spill with absorbent material or vacuum spill into polyethylene lined steel or plastic drums.

Do not touch or walk through spilled material.

If spilled material is cleaned up using a regulated solvent, the resulting waste mixture may be regulated.

Recommended Equipment

Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).

Personal Precautions

Avoid breathing vapor or mist. Avoid contact with skin, eye or clothing. Ensure adequate ventilation. Do not touch damaged containers or spilled materials unless wearing appropriate protective clothing.

Environmental Precautions

Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems and natural waterways by using sand, earth, or other appropriate barriers.

Methods and Materials for Containment and Cleaning Up

Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Contaminated absorbent material may pose the same hazard as the spilled product.

SECTION 7) HANDLING AND STORAGE

General

Wash hands after use.
Do not get in eyes, on skin or on clothing.
Do not breathe vapors or mists.
Use good personal hygiene practices.
Eating, drinking and smoking in work areas is prohibited.
Remove contaminated clothing and protective equipment before entering eating areas.
Eyewash stations and showers should be available in areas where this material is used and stored.

Ventilation Requirements

Use only with adequate ventilation to control air contaminants to their exposure limits. The use of local ventilation is recommended to control emissions near the source.

Storage Room Requirements

Keep container(s) tightly closed and properly labeled. Store in cool, dry, well-ventilated areas away from heat, direct sunlight and strong oxidizers. Store in approved containers and protect against physical damage. Keep containers securely sealed when not in use. Indoor storage should meet OSHA standards and appropriate fire codes. Containers that have been opened must be carefully resealed to prevent leakage. Empty containers retain residue and may be dangerous.
Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas where this product is used and stored.

SECTION 8) EXPOSURE CONTROLS, PERSONAL PROTECTION

Eye Protection

Wear eye protection with side shields or goggles. Wear indirect-vent, impact and splash resistant goggles when working with liquids. If additional protection is needed for entire face, use in combination with a face shield.

Skin Protection

Use of gloves approved to relevant standards made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Use of an apron and over-boots of chemically impervious materials such as neoprene or nitrile rubber is recommended to avoid skin sensitization. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Launder soiled clothes or properly disposed of contaminated material, which cannot be decontaminated.

Respiratory Protection

If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker, a respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed. Check with respiratory protective equipment suppliers.

Appropriate Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

SECTION 9) PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Density	6.26 lb/gal
Specific Gravity	0.6 - 0.9
Appearance	granular, white solid
pH	5 - 9 @ 5 g/L
Odor Threshold	N/A
Odor Description	N/A
Water Solubility	Complete
Viscosity	N/A
Vapor Pressure	Similar to water
Vapor Density	N/A
Freezing Point	<32 °F
Boiling Point	>212 °F
Evaporation Rate	N/A
Flammability	Will not burn

SECTION 10) STABILITY AND REACTIVITY

Stability

Stable under normal storage and handling conditions.

Conditions To Avoid

Avoid heat, sparks, flame, high temperature and contact with incompatible materials.

Hazardous Reactions/Polymerization

Hazardous polymerization will not occur.

Incompatible Materials

Strong bases, acids, oxidizing and reducing agents.

Hazardous Decomposition Products

May produce carbon monoxide, carbon dioxide.

SECTION 11) TOXICOLOGICAL INFORMATION

Likely Routes of Exposure

No Data Available

Acute Toxicity

Inhalation, Testing: Not expected to be toxic by inhalation.
Ingestion, Testing: LD50, Rat > 5,00 mg/kg
Dermal, Testing: LD50, Rat > 5,000 mg/kg

Respiratory/Skin Sensitization

No Data Available

Serious Eye Damage/Irritation

No Data Available

Skin Corrosion/Irritation

No Data Available

Specific Target Organ Toxicity - Repeated Exposure

No Data Available

Specific Target Organ Toxicity - Single Exposure

No Data Available

SECTION 12) ECOLOGICAL INFORMATION

Acute Ecotoxicity

Danio Rerio: 96 hr LC50 >100 mg/l (OECD 203)

Fathead Minnow (pimephales promelas): 96hr LC50 >100 mg/l (OECD 203)

Daphnia Magna: 48hr EC50 >100 mg/l (OECD 202)

Scenedesmus Subspicatus: 72hr IC50 >100 mg/l (OECD 201)

Mobility in Soil

No data available.

Bio-accumulative Potential

Not bioaccumulating.

Persistence and Degradability

Not readily biodegradable.

Other Adverse Effect

No data available.

SECTION 13) DISPOSAL CONSIDERATIONS

Waste Disposal

Under RCRA it is the responsibility of the user of the product to determine at the time of disposal whether the product meets RCRA criteria for hazardous waste. Waste management should be in full compliance with federal, state and local laws.
Empty Containers retain product residue which may exhibit hazards of material, therefore do not pressurize, cut, glaze, weld or use for any other purposes. Return drums to reclamation centers for proper cleaning and reuse.

SECTION 14) TRANSPORT INFORMATION

U.S. DOT Information

For all transportation accidents, call CHEMTREC at 800/424-9300. All spills and leaks of this material must be handled in accordance with local, state, and federal regulations.

DOT Shipping Designation:

Non-hazardous under 29-CFR 1910.1200. Water treatment compound

SECTION 15) REGULATORY INFORMATION

CAS	Chemical Name	% By Weight	Regulation List
No applicable CAS	No applicable chemical	-	-

SECTION 16) OTHER INFORMATION

Glossary

ACGIH- American Conference of Governmental Industrial Hygienists; ANSI- American National Standards Institute; Canadian TDGCanadian Transportation of Dangerous Goods; CAS- Chemical Abstract Service; Chemtrec- Chemical Transportation Emergency Center(US); CHIP- Chemical Hazard Information and Packaging; DSL- Domestic Substances List; EC- Equivalent Concentration; EH40 (UK)- HSE Guidance Note EH40 Occupational Exposure Limits; EPCRA- Emergency Planning and Community Right-To-Know Act; ESL Effects screening levels; HMIS- Hazardous Material Information Service; LC- Lethal Concentration; LD- Lethal Dose; NFPA- National Fire Protection Association; OEL- Occupational Exposure Limits; OSHA- Occupational Safety and Health Administration, US Department of Labor; PEL- Permissible Exposure Limit; SARA (Title III)- Superfund Amendments and Reauthorization Act; SARA 313- Superfund Amendments and Reauthorization Act, Section 313; SCBA- Self Contained Breathing Apparatus; STEL-Short Term Exposure Limit; TCEQ Texas Commission on Environmental Quality; TLV- Threshold Limit Value; TSCA- Toxic Substances Control Act Public Law 94-469; TWA Time Weighted Value; US DOT- US Department of Transportation; WHMIS- Workplace Hazardous Materials Information System.

Additional Information

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Version 1.0:

Revision Date: Jan 25, 2018
First Edition.

DISCLAIMER

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

Revision date 2019-15-4

SAFETY DATA SHEET

Revision number 1

SECTION 1) CHEMICAL PRODUCT AND SUPPLIER'S IDENTIFICATION

Product Name:	Redux E50
Product Use:	Water and Wastewater Treatment Coagulant/Flocculant
Revision Date:	Apr 15, 2019
Supersedes Date:	Mar 5, 2015
Manufacturer's Name:	Azure Water Services
Address:	280 Callegari Dr. West Haven CT, 06516
Emergency Phone:	Chemtrec, (1) 800-424-9300, in US and Canada only

SECTION 2) HAZARDS IDENTIFICATION

Classification

Corrosive to metals - Category 1

Eye Irritation - Category 2

Skin Irritation - Category 2

Pictograms

Signal Word

Warning

Hazardous Statements - Health

Causes serious eye irritation

Causes skin irritation

Hazardous Statements - Physical

May be corrosive to metals

Precautionary Statements - General

If medical advice is needed, have product container or label at hand.

Keep out of reach of children.

Read label before use.

Precautionary Statements - Prevention

Keep only in original packaging.

Wash thoroughly after handling.

Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary Statements - Response

Absorb spillage to prevent material damage.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/attention.

IF ON SKIN: Wash with plenty of water.

Specific treatment (see first-aid on this SDS).

If skin irritation occurs: Get medical advice/attention.

Take off contaminated clothing. And wash it before reuse.

Precautionary Statements - Storage

Store in a corrosive resistant container with a resistant inner liner.

Precautionary Statements - Disposal

No precautionary statement available.

Hazards Not Otherwise Classified (HNOC)

None.

SECTION 3) COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Chemical Name	% By Weight
PROPRIETARY	Trade Secret Ingredient	45 - 55%

Specific chemical identity and/or exact percentage (concentration) of the composition has been withheld to protect confidentiality.

SECTION 4) FIRST-AID MEASURES

Inhalation

Remove source of exposure or move person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor/. If breathing has stopped, trained personnel should begin rescue breathing or, if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED).

Eye Contact

Remove source of exposure or move person to fresh air. Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing for a flushing duration of 30 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately call a POISON CENTER/doctor.

Skin Contact

Take off immediately all contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Rinse skin with lukewarm, gently flowing water/shower for a duration of 30 minutes or until medical aid is available. Immediately call a POISON CENTER/doctor. Wash contaminated clothing before re-use or discard.

Ingestion

Rinse mouth with water. Do NOT induce vomiting. Give 1 to 2 cups of milk or water to drink. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, lie on your side, in the recovery position. Immediately call a POISON CENTER/doctor.

Most Important Symptoms and Effects, Both acute and Delayed

No data available.

Indication of Any Immediate Medical Attention and Special Treatment Needed

No data available.

SECTION 5) FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Dry chemical, foam, carbon dioxide. Sand or earth may be used for small fires only.

Use extinguishing agent suitable for type of surrounding fire.

Unsuitable Extinguishing Media

Do not use direct water stream since this may cause fire to spread.

Specific Hazards in Case of Fire

In case of fire, hazardous decomposition products may include sulphur oxides.

Fire-Fighting Procedures

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Water may be ineffective but can be used to cool containers exposed to heat or flame. Caution should be exercised when using water or foam as frothing may occur, especially if sprayed into containers of hot, burning liquid. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

Special Protective Actions

Wear protective pressure self-contained breathing apparatus (SCBA) and full turnout gear.

SECTION 6) ACCIDENTAL RELEASE MEASURES

Emergency Procedure

Isolate hazard area and keep unnecessary people away. Remove all possible sources of ignition in the surrounding area. Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.

Absorb spill with absorbent material or vacuum spill into polyethylene lined steel or plastic drums.

Do not touch or walk through spilled material.

If spilled material is cleaned up using a regulated solvent, the resulting waste mixture may be regulated.

Recommended Equipment

Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).

Personal Precautions

Avoid breathing vapor or mist. Avoid contact with skin, eye or clothing. Ensure adequate ventilation. Do not touch damaged containers or spilled materials unless wearing appropriate protective clothing.

Environmental Precautions

Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems and natural waterways by using sand, earth, or other appropriate barriers.

Methods and Materials for Containment and Cleaning Up

Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Contaminated absorbent material may pose the same hazard as the spilled product.

SECTION 7) HANDLING AND STORAGE

General

Wash hands after use.
Do not get in eyes, on skin or on clothing.
Do not breathe vapors or mists.
Use good personal hygiene practices.
Eating, drinking and smoking in work areas is prohibited.
Remove contaminated clothing and protective equipment before entering eating areas.
Eyewash stations and showers should be available in areas where this material is used and stored.

Ventilation Requirements

Use only with adequate ventilation to control air contaminants to their exposure limits. The use of local ventilation is recommended to control emissions near the source.

Storage Room Requirements

Keep container(s) tightly closed and properly labeled. Store in cool, dry, well-ventilated areas away from heat, direct sunlight and strong oxidizers. Store in approved containers and protect against physical damage. Keep containers securely sealed when not in use. Indoor storage should meet OSHA standards and appropriate fire codes. Containers that have been opened must be carefully resealed to prevent leakage. Empty containers retain residue and may be dangerous.

Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas where this product is used and stored.

SECTION 8) EXPOSURE CONTROLS, PERSONAL PROTECTION

Eye Protection

Wear eye protection with side shields or goggles. Wear indirect-vent, impact and splash resistant goggles when working with liquids. If additional protection is needed for entire face, use in combination with a face shield.

Skin Protection

Use of gloves approved to relevant standards made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Use of an apron and over-boots of chemically impervious materials such as neoprene or nitrile rubber is recommended to avoid skin sensitization. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Launder soiled clothes or properly disposed of contaminated material, which cannot be decontaminated.

Respiratory Protection

If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker, a respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed. Check with respiratory protective equipment suppliers.

Appropriate Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

SECTION 9) PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Density	11.10 lb/gal
Specific Gravity	1.33 - 1.35
Appearance	Colorless to yellow liquid
pH	3 - 4
Odor Threshold	N/A
Odor Description	N/A
Water Solubility	complete
Viscosity	< 100cps @20C
Vapor Pressure	Similar to water
Vapor Density	N/A
Freezing Point	<19 °F
Boiling Point	>212 °F
Evaporation Rate	N/A
Flammability	Will not burn

SECTION 10) STABILITY AND REACTIVITY

Stability

Stable under normal storage and handling conditions.

Conditions To Avoid

Avoid heat, sparks, flame, high temperature and contact with incompatible materials.

Hazardous Reactions/Polymerization

Hazardous polymerization will not occur.

Incompatible Materials

Strong bases, acids, oxidizing and reducing agents.

Hazardous Decomposition Products

May produce carbon monoxide, carbon dioxide.

SECTION 11) TOXICOLOGICAL INFORMATION

Likely Routes of Exposure

Inhalation LC50 : Not Available
Oral LD50 : Not Available
Dermal LD50 : Not Available

Acute Toxicity

Component	weight-%	Oral LD50	Dermal LD50	Inhalation LC50
Trade Secret Ingredient	45 - 55%	= 9187 mg/kg (Rat)	> 2000 mg/k (Rat)	--

Aspiration Hazard

No Data Available

Respiratory/Skin Sensitization

No Data Available

Serious Eye Damage/Irritation

Causes serious eye irritation

Skin Corrosion/Irritation

Causes skin irritation

Specific Target Organ Toxicity - Repeated Exposure

No Data Available

Specific Target Organ Toxicity - Single Exposure

No Data Available

SECTION 12) ECOLOGICAL INFORMATION

Ecotoxicity

Acute aquatic toxicity - Product Information

Fish
LC 50 (96 hour, static) 776.4 mg/L *Pimephales promelas* (Fathead Minnow) [1]
EC 50 (96 hour, static) 265.5 mg/L *Pimephales promelas* (Fathead Minnow) [1]

Crustacea
LC 50 (48 hour, static) 803.8 mg/L *Ceriodaphnia dubia* (Water Flea) [1]
EC 50 (48 hour, static) 33.2 mg/L *Ceriodaphnia dubia* (Water Flea) [1]

Algae/aquatic plants
No information available

Acute aquatic toxicity - Component Information

Component	weight-%	Algae/aquatic plants	Fish	Toxicity to daphnia and other aquatic invertebrates
Trade Secret Ingredient	45 - 55%	--	LC50 (96 h static) 100 - 500 mg/L (Brachydanio rerio)	--

Mobility in Soil

No data available.

Bio-accumulative Potential

No data available.

Persistence and Degradability

No data available.

Other Adverse Effect

No data available.

SECTION 13) DISPOSAL CONSIDERATIONS

Waste Disposal

Under RCRA it is the responsibility of the user of the product to determine at the time of disposal whether the product meets RCRA criteria for hazardous waste. Waste management should be in full compliance with federal, state and local laws.
Empty Containers retain product residue which may exhibit hazards of material, therefore do not pressurize, cut, glaze, weld or use for any other purposes. Return drums to reclamation centers for proper cleaning and reuse.

SECTION 14) TRANSPORT INFORMATION

U.S. DOT Information

NOT REGULATED FOR TRANSPORTATION

This product is excepted from DOT regulations under 49 CFR 173.154(d) when shipped by road or railway. The product exception is referenced in 49 CFR 172.101 Table. Packaging material must not be aluminum, steel or be degraded by this product

SECTION 15) REGULATORY INFORMATION

CAS	Chemical Name	% By Weight	Regulation List
No applicable CAS	No applicable chemical	-	-

SECTION 16) OTHER INFORMATION

Glossary

ACGIH- American Conference of Governmental Industrial Hygienists; ANSI- American National Standards Institute; Canadian TDGCanadian Transportation of Dangerous Goods; CAS- Chemical Abstract Service; Chemtrec- Chemical Transportation Emergency Center(US); CHIP- Chemical Hazard Information and Packaging; DSL- Domestic Substances List; EC- Equivalent Concentration; EH40 (UK)- HSE Guidance Note EH40 Occupational Exposure Limits; EPCRA- Emergency Planning and Community Right-To-Know Act; ESL Effects screening levels; HMIS- Hazardous Material Information Service; LC- Lethal Concentration; LD- Lethal Dose; NFPA- National Fire Protection Association; OEL- Occupational Exposure Limits; OSHA- Occupational Safety and Health Administration, US Department of Labor; PEL- Permissible Exposure Limit; SARA (Title III)- Superfund Amendments and Reauthorization Act; SARA 313- Superfund Amendments and Reauthorization Act, Section 313; SCBA- Self Contained Breathing Apparatus; STEL-Short Term Exposure Limit; TCEQ Texas Commission on Environmental Quality; TLV- Threshold Limit Value; TSCA- Toxic Substances Control Act Public Law 94-469; TWA Time Weighted Value; US DOT- US Department of Transportation; WHMIS- Workplace Hazardous Materials Information System.

Additional Information

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Version 1.0:

Revision Date: Apr 15,2019

First Edition.

DISCLAIMER

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

Job Safety Analysis

pH/Chem Feed System

Date: 5/10/2016
Completed By: Tammie Hagie
Approved By: Mike Deso

Required PPE: Hard Hat, Safety Toe Boots, Reflective Vest, Safety Glasses, Chemical Resistant Gloves

TASK	POTENTIAL RISK/HAZARD	CONTROLS
Transporting acid/chemical drum	Splash, spill, heavy lifting	Inspect condition of drum prior to transportation. Use material handling devices when possible to move equipment (lift gates, pallet jacks, hand trucks, etc.). If necessary, use a ramp for loading/unloading wheeled devices, ensuring the ramp is properly supported prior to use. Lift with your knees and use drum dolly. Make sure drum is secure in vehicle prior to transportation. Review SDS on acid/chemical. Wear proper PPE and dispose of materials after clean up in a sealed container. Immediately use the eye wash station if acid or chemical comes in contact with your eye.
Opening acid drum	Splash, spill	Review MSDS on acid/chemical. Wear proper PPE and dispose of materials after clean up in a sealed container. Immediately use the eye wash station if acid or chemical comes in contact with your eye. Use bung wrench to open the drum properly.
Set up chemical feed pump	Splash, spill, leak	Wear proper PPE and dispose of materials after clean up in a sealed container. Immediately use the eye wash station if acid or chemical comes in contact with your eye. Monitor chem feed pump to assure its working and not leaking. Use chemical resistant tubing to transport liquid from the pump.
Notes:		

Note any changes/deviations to this JSA

SAFETY DATA SHEET

Creation Date 16-Jun-2009 **Revision Date** 07-Aug-2015 **Revision Number** 8

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identification

Product Description:	**Sodium hydroxide**
Cat No. :	**SP/1238/25**
Synonyms	Caustic soda
CAS-No	1310-73-2
EC-No.	215-185-5
Molecular Formula	H Na O
Reach Registration Number	01-2119457892-27

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use	Laboratory chemicals.
Sector of use	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites
Product category	PC21 - Laboratory chemicals
Process categories	PROC15 - Use as a laboratory reagent
Environmental release category	ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)
Uses advised against	No Information available

1.3. Details of the supplier of the safety data sheet

Company	Fisher Scientific UK Bishop Meadow Road, Loughborough, Leicestershire LE11 5RG, United Kingdom
E-mail address	begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

Tel: 01509 231166
Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Substances/mixtures corrosive to metal	Category 1

Health hazards

Skin Corrosion/irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1

Environmental hazards
Based on available data, the classification criteria are not met

2.2. Label elements

Signal Word **Danger**

Hazard Statements

H290 - May be corrosive to metals
H314 - Causes severe skin burns and eye damage

Precautionary Statements

P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician
P301 + P330 + P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower

2.3. Other hazards

No information available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008
Sodium hydroxide	1310-73-2	EEC No. 215-185-5	100	Skin Corr. 1A (H314) Eye Dam. 1 (H318) Met. Corr. 1 (H290)

Reach Registration Number	01-2119457892-27

Full text of Hazard Statements: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required. Keep eye wide open while rinsing.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Call a physician immediately.

Ingestion Do not induce vomiting. Immediate medical attention is required. Never give anything by mouth to an unconscious person. Drink plenty of water.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Call a physician or Poison Control Center immediately.

Protection of First-aiders Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

4.2. Most important symptoms and effects, both acute and delayed

Causes burns by all exposure routes. . Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
CO_2, dry chemical, dry sand, alcohol-resistant foam.

Extinguishing media which must not be used for safety reasons
No information available.

5.2. Special hazards arising from the substance or mixture

The product causes burns of eyes, skin and mucous membranes.

Hazardous Combustion Products
Sodium oxides, Hydrogen.

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Evacuate personnel to safe areas. Avoid contact with skin, eyes and clothing.

6.2. Environmental precautions

Do not allow material to contaminate ground water system. Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.

6.3. Methods and material for containment and cleaning up

Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Wear personal protective equipment. Use only under a chemical fume hood. Do not get in eyes, on skin, or on clothing. Do not breathe dust. Do not ingest.

7.2. Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area.

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits
List source(s): **UK** - EH40/2005 Containing the workplace exposure limits (WELs) for use with the Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended). Updated by September 2006 official press release and October 2007 Supplement. **IRE -** 2010 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001. Published by the Health and Safety Authority.

Component	European Union	The United Kingdom	France	Belgium	Spain
Sodium hydroxide		2 mg/m³ STEL	TWA / VME: 2 mg/m³ (8 heures).	2 mg/m³ VLE	STEL / VLA-EC: 2 mg/m³ (15 minutos).

Component	Italy	Germany	Portugal	The Netherlands	Finland
Sodium hydroxide		2 mg/m³ TWA (inhalable fraction)	Ceiling: 2 mg/m³		STEL: 2 mg/m³ 15 minuutteina Ceiling: 2 mg/m³

Component	Austria	Denmark	Switzerland	Poland	Norway
Sodium hydroxide	MAK-KZW: 4 mg/m³ 15 Minuten MAK-TMW: 2 mg/m³ 8 Stunden	Ceiling: 2 mg/m³	STEL: 2 mg/m³ 15 Minuten TWA: 2 mg/m³ 8 Stunden	STEL: 1 mg/m³ 15 minutach TWA: 0.5 mg/m³ 8 godzinach	Ceiling: 2 mg/m³

Component	Bulgaria	Croatia	Ireland	Cyprus	Czech Republic
Sodium hydroxide	TWA: 2.0 mg/m³	STEL-KGVI: 2 mg/m³ 15 minutama.	STEL: 2 mg/m³ 15 min		TWA: 1 mg/m³ 8 hodinách. Ceiling: 2 mg/m³

Component	Estonia	Gibraltar	Greece	Hungary	Iceland
Sodium hydroxide	TWA: 1 mg/m³ 8 tundides. Ceiling: 2 mg/m³		STEL: 2 mg/m³ TWA: 2 mg/m³	STEL: 2 mg/m³ 15 percekben. CK TWA: 2 mg/m³ 8 órában. AK	STEL: 2 mg/m³

Component	Latvia	Lithuania	Luxembourg	Malta	Romania
Sodium hydroxide	TWA: 0.5 mg/m³	Ceiling: 2 mg/m³			

Component	Russia	Slovak Republic	Slovenia	Sweden	Turkey
Sodium hydroxide		TWA: 2 mg/m³	TWA: 2 mg/m³ 8 urah inhalable fraction STEL: 2 mg/m³ 15 minutah inhalable fraction	LLV: 1 mg/m³ 8 timmar. inhalable dust CLV: 2 mg/m³	

Biological limit values
This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies.

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of

exposure to chemical and biological agents.
MDHS14/3 General methods for sampling and gravimetric analysis of respirable and inhalable dust

Derived No Effect Level (DNEL) See table for values

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				
Inhalation	1 mg/m³			

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Engineering Measures
Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment

Eye Protection Goggles (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Neoprene	> 480 minutes	0.45 mm	Level 6	As tested under EN374-3 Determination of
Butyl rubber	> 480 minutes	0.35 mm	EN 374	Resistance to Permeation by Chemicals
Viton (R)	> 480 minutes	0.30 mm		

Skin and body protection Long sleeved clothing

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)
Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly

Large scale/emergency use Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced
Recommended Filter type: Particulates filter conforming to EN 143

Small scale/Laboratory use Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Recommended half mask:- Valve filtering: EN405; or; Half mask: EN140; plus filter, EN 141
When RPE is used a face piece Fit Test should be conducted

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

Environmental exposure controls Prevent product from entering drains.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance White
Physical State Solid

Odor	Odorless	
Odor Threshold	No data available	
pH	14	(5 %)
Melting Point/Range	318 °C / 604.4 °F	
Softening Point	No data available	
Boiling Point/Range	1390 °C / 2534 °F	@ 760 mmHg
Flash Point	No information available	**Method -** No information available
Evaporation Rate	Not applicable	Solid
Flammability (solid,gas)	Not flammable	
Explosion Limits	No data available	
Vapor Pressure	1 mbar @ 700 °C	
Vapor Density	Not applicable	Solid
Specific Gravity / Density	No data available	
Bulk Density	2.13 g/cm3	
Water Solubility	Completely soluble	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Autoignition Temperature		
Decomposition Temperature	No data available	
Viscosity	Not applicable	Solid
Explosive Properties	Not explosive	
Oxidizing Properties	No information available	

9.2. Other information

Molecular Formula	H Na O
Molecular Weight	40

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

Yes
Contact with metals may evolve flammable hydrogen gas

10.2. Chemical stability

Stable under normal conditions

10.3. Possibility of hazardous reactions

Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

10.4. Conditions to avoid

Incompatible products. Excess heat.

10.5. Incompatible materials

Strong oxidizing agents. Acids. Metals. Water. . Alcohols.

10.6. Hazardous decomposition products

Sodium oxides. Hydrogen.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information No acute toxicity information is available for this product

(a) acute toxicity;

Oral	Based on available data, the classification criteria are not met
Dermal	Based on available data, the classification criteria are not met
Inhalation	Based on available data, the classification criteria are not met

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium hydroxide		1350 mg/kg (Rabbit)	

(b) skin corrosion/irritation; Category 1 A

(c) serious eye damage/irritation; Category 1

(d) respiratory or skin sensitization;
Respiratory Based on available data, the classification criteria are not met
Skin Based on available data, the classification criteria are not met

(e) germ cell mutagenicity; Based on available data, the classification criteria are not met

Mutagenic effects have occurred in experimental animals

(f) carcinogenicity; Based on available data, the classification criteria are not met

There are no known carcinogenic chemicals in this product

(g) reproductive toxicity; Based on available data, the classification criteria are not met

(h) STOT-single exposure; Based on available data, the classification criteria are not met

(i) STOT-repeated exposure; Based on available data, the classification criteria are not met

Target Organs Eyes, Skin, Respiratory system, Gastrointestinal tract (GI).

(j) aspiration hazard; Not applicable
Solid

Other Adverse Effects See actual entry in RTECS for complete information

Symptoms / effects,both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity
Ecotoxicity effects Do not empty into drains. Contains a substance which is:. Harmful to aquatic organisms. The product contains following substances which are hazardous for the environment.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Sodium hydroxide	45.4 mg/L LC50 96 h			

12.2. Persistence and degradability
Persistence Soluble in water, Persistence is unlikely, based on information available.
Degradability Not relevant for inorganic substances.
Degradation in sewage treatment plant Neutralization is normally necessary before waste water is discharged into water treatment plants. Contains substances known to be hazardous to the environment or not degradable in waste water treatment plants.

12.3. Bioaccumulative potential Does not bioaccumulate; Bioaccumulation is unlikely

12.4. Mobility in soil The product is water soluble, and may spread in water systems Will likely be mobile in the environment due to its water solubility. Highly mobile in soils

12.5. Results of PBT and vPvB assessment No data available for assessment.

12.6. Other adverse effects

Endocrine Disruptor Information	This product does not contain any known or suspected endocrine disruptors
Persistent Organic Pollutant	This product does not contain any known or suspected substance
Ozone Depletion Potential	This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products	Waste is classified as hazardous. Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of in accordance with local regulations.
Contaminated Packaging	Dispose of this container to hazardous or special waste collection point.
European Waste Catalogue (EWC)	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Other Information	Do not dispose of waste into sewer. Waste codes should be assigned by the user based on the application for which the product was used. Do not empty into drains. Large amounts will affect pH and harm aquatic organisms. Solutions with high pH-value must be neutralized before discharge.

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

14.1. UN number	UN1823
14.2. UN proper shipping name	Sodium hydroxide, solid
14.3. Transport hazard class(es)	8
14.4. Packing group	II

ADR

14.1. UN number	UN1823
14.2. UN proper shipping name	Sodium hydroxide, solid
14.3. Transport hazard class(es)	8
14.4. Packing group	II

IATA

14.1. UN number	UN1823
14.2. UN proper shipping name	Sodium hydroxide, solid
14.3. Transport hazard class(es)	8
14.4. Packing group	II

14.5. Environmental hazards	No hazards identified
14.6. Special precautions for user	No special precautions required
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories X = listed

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	AICS	KECL
Sodium hydroxide	215-185-5	-		X	X	-	X	X	X	X	X

National Regulations

Component	Germany - Water Classification (VwVwS)	Germany - TA-Luft Class
Sodium hydroxide	WGK 1	

Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment.
Take note of Dir 94/33/EC on the protection of young people at work
Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has been conducted by the manufacturer/importer

SECTION 16: OTHER INFORMATION

Full Text of H-/EUH-Statements Referred to Under Section 3
H290 - May be corrosive to metals
H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage

Legend

CAS - Chemical Abstracts Service

EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japanese Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit
ACGIH - American Conference of Governmental Industrial Hygienists
DNEL - Derived No Effect Level
RPE - Respiratory Protective Equipment
LC50 - Lethal Concentration 50%
NOEC - No Observed Effect Concentration
PBT - Persistent, Bioaccumulative, Toxic

TWA - Time Weighted Average
IARC - International Agency for Research on Cancer
PNEC - Predicted No Effect Concentration
LD50 - Lethal Dose 50%
EC50 - Effective Concentration 50%
POW - Partition coefficient Octanol:Water
vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor

ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC - Volatile Organic Compounds

Key literature references and sources for data
Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice
Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.
Use of personal protective equipment, covering appropriate selection, compatibility, breakthrough thresholds, care, maintenance, fit and standards.
First aid for chemical exposure, including the use of eye wash and safety showers.
Chemical incident response training.

Creation Date	16-Jun-2009
Revision Date	07-Aug-2015
Revision Summary	Update to Format.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information

relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of Safety Data Sheet

SAFETY DATA SHEET

Creation Date 12-Nov-2010 **Revision Date** 24-May-2017 **Revision Number** 5

1. Identification

Product Name **Sulfuric Acid (Certified ACS Plus)**

Cat No. : **A300-212; A300-225LB; A300-500; A300-612GAL; A300-700LB; A300C212; A300C212EA; A300P500; A300S212; A300S212EA; A300S500; A300SI212**

Synonyms Hydrogen sulfate; Vitriol brown oil; Oil of vitriol

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes severe skin burns and eye damage
May cause respiratory irritation

Precautionary Statements
Prevention
Do not breathe dust/fume/gas/mist/vapors/spray
Wear protective gloves/protective clothing/eye protection/face protection
Wash face, hands and any exposed skin thoroughly after handling
Use only outdoors or in a well-ventilated area
Response
Immediately call a POISON CENTER or doctor/physician
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

WARNING! This product contains a chemical known in the State of California to cause cancer.
Unknown Acute Toxicity

3. Composition / information on ingredients

Component	CAS-No	Weight %
Sulfuric acid	7664-93-9	90 - 98
Water	7732-18-5	2 - 10

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing before re-use. Call a physician immediately.

Inhalation If not breathing, give artificial respiration. Remove from exposure, lie down. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician immediately.

Ingestion Do not induce vomiting. Clean mouth with water. Never give anything by mouth to an unconscious person. Call a physician immediately.

Most important symptoms/effects Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media CO_2, dry chemical, dry sand, alcohol-resistant foam.

Unsuitable Extinguishing Media DO NOT USE WATER

Flash Point Not applicable
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes.

Hazardous Combustion Products
Sulfur oxides Hydrogen
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	2	W

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe vapors or spray mist. Do not ingest.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from water. Corrosives area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Sulfuric acid	TWA: 0.2 mg/m³	(Vacated) TWA: 1 mg/m³ TWA: 1 mg/m³	IDLH: 15 mg/m³ TWA: 1 mg/m³	TWA: 1 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Long sleeved clothing.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear, Colorless to brown
Odor	Odorless
Odor Threshold	No information available
pH	0.3 (1N)
Melting Point/Range	10 °C / 50 °F
Boiling Point/Range	290 - 338 °C / 554 - 640.4 °F
Flash Point	Not applicable
Evaporation Rate	Slower than ether
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	< 0.001 mmHg @ 20 °C
Vapor Density	3.38 (Air = 1.0)
Specific Gravity	1.84
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	340°C
Viscosity	No information available
Molecular Formula	H2SO4
Molecular Weight	98.08

10. Stability and reactivity

Reactive Hazard Yes

Stability Reacts violently with water. Hygroscopic.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Water, Organic materials, Strong acids, Strong bases, Metals, Alcohols, Cyanides, Sulfides

Hazardous Decomposition Products Sulfur oxides, Hydrogen

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Dermal LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Vapor LC50 Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sulfuric acid	2140 mg/kg (Rat)	Not listed	LC50 = 510 mg/m³ (Rat) 2 h
Water	-	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Causes severe burns by all exposure routes

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen. Exposure to strong inorganic mists containing sulfuric acid may cause cancer by inhalation.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Sulfuric acid	7664-93-9	Group 1	Known	A2	X	A2
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

This product contains the following substance(s) which are hazardous for the environment. .

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sulfuric acid	-	LC50: > 500 mg/L, 96h static (Brachydanio rerio)	-	EC50: 29 mg/L/24h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN1830
Proper Shipping Name Sulfuric acid
Hazard Class 8
Packing Group II

TDG

UN-No UN1830
Proper Shipping Name SULFURIC ACID
Hazard Class 8
Packing Group II

IATA

UN-No UN1830
Proper Shipping Name SULFURIC ACID
Hazard Class 8
Packing Group II

IMDG/IMO

UN-No UN1830
Proper Shipping Name SULFURIC ACID
Hazard Class 8
Packing Group II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Sulfuric acid	X	X	-	231-639-5	-		X	X	X	X	X
Water	X	X	-	231-791-2	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Sulfuric acid	7664-93-9	90 - 98	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Sulfuric acid	X	1000 lb	-	-

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Sulfuric acid	1000 lb	1000 lb

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Sulfuric acid	7664-93-9	Carcinogen	-	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sulfuric acid	X	X	X	X	X
Water	-	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 12-Nov-2010
Revision Date 24-May-2017
Print Date 24-May-2017
Revision Summary SDS sections updated. 2.

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

APPENDIX D

Endangered Species Act (ESA) Assessment

HALEY ALDRICH

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Middlesex and Suffolk counties, Massachusetts

Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

http://www.fws.gov/newengland

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species

[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. 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.

THERE ARE NO ENDANGERED SPECIES EXPECTED TO OCCUR AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act

[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE"

INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus — Breeds Oct 15 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black-billed Cuckoo Coccyzus erythropthalmus — Breeds May 15 to Oct 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9399

Bobolink Dolichonyx oryzivorus — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Canada Warbler Cardellina canadensis — Breeds May 20 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Cerulean Warbler Dendroica cerulea — Breeds Apr 29 to Jul 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/2974

Dunlin Calidris alpina arcticola — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Evening Grosbeak Coccothraustes vespertinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Kentucky Warbler Oporornis formosus — Breeds Apr 20 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Nelson's Sparrow Ammodramus nelsoni This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Sep 5
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler Protonotaria citrea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Red-throated Loon Gavia stellata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Rusty Blackbird Euphagus carolinus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Semipalmated Sandpiper Calidris pusilla This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Snowy Owl Bubo scandiacus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

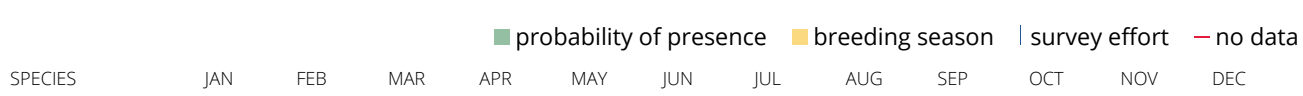
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

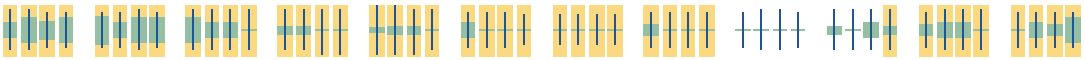
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

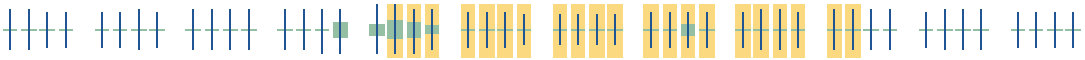
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



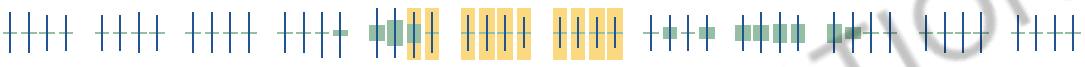
Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



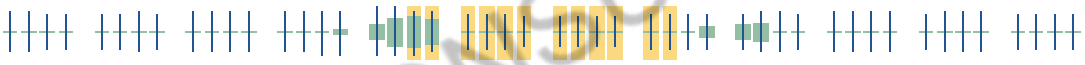
Black-billed Cuckoo
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



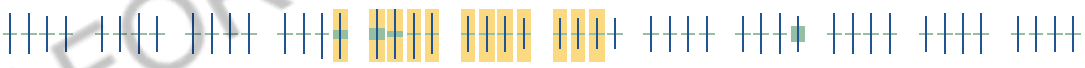
Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Canada Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

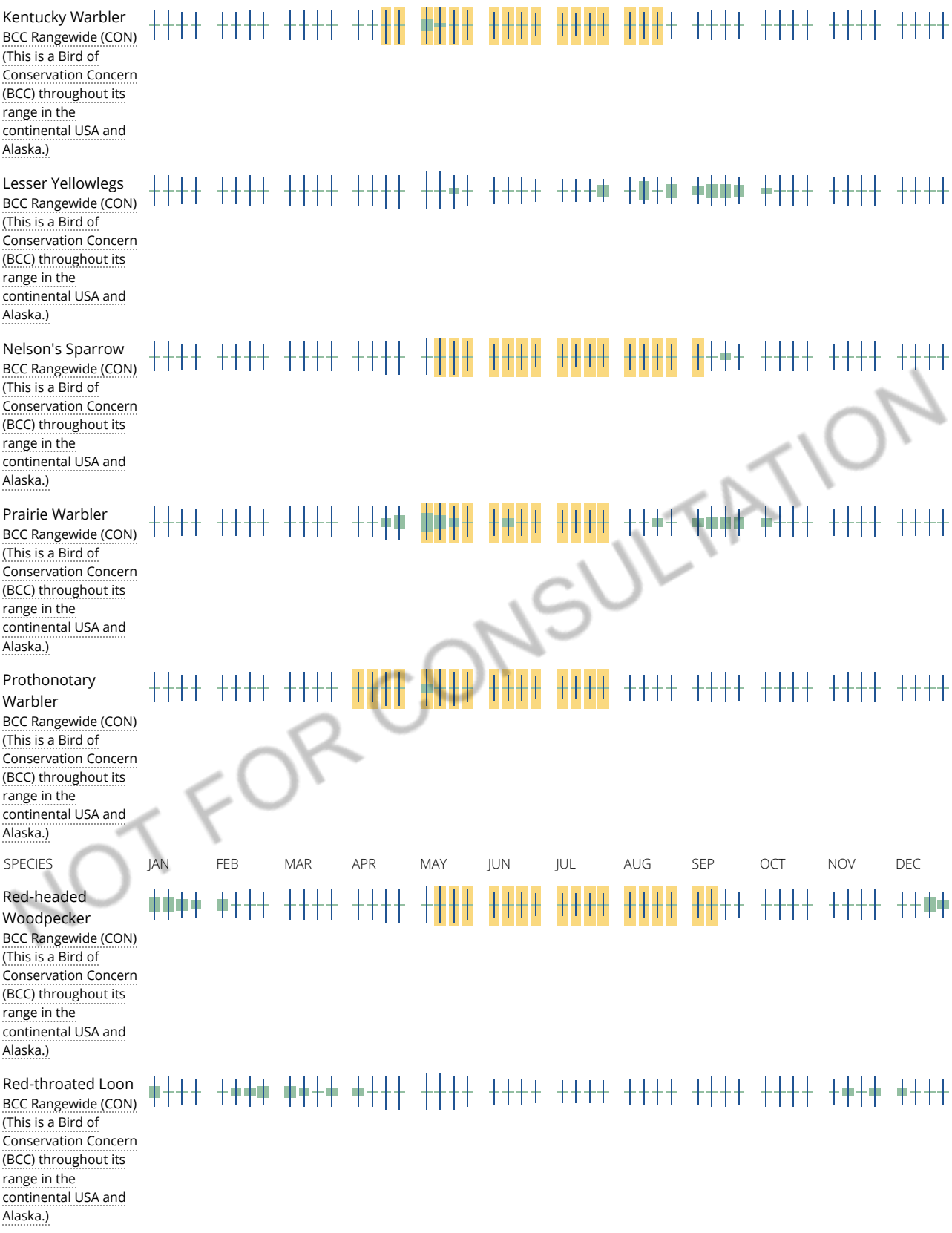


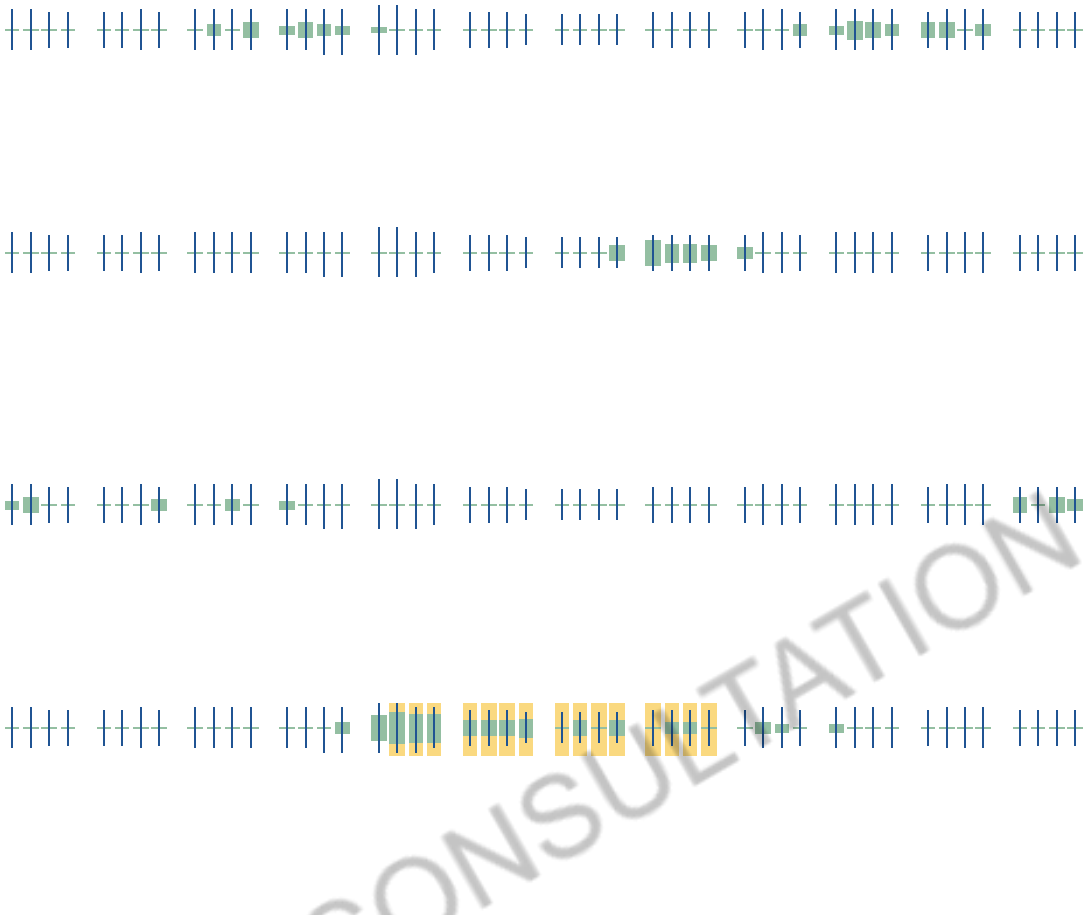
Cerulean Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Dunlin
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Evening Grosbeak
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)





Rusty Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Semipalmated Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Snowy Owl
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Wood Thrush
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

LAKE

L1UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

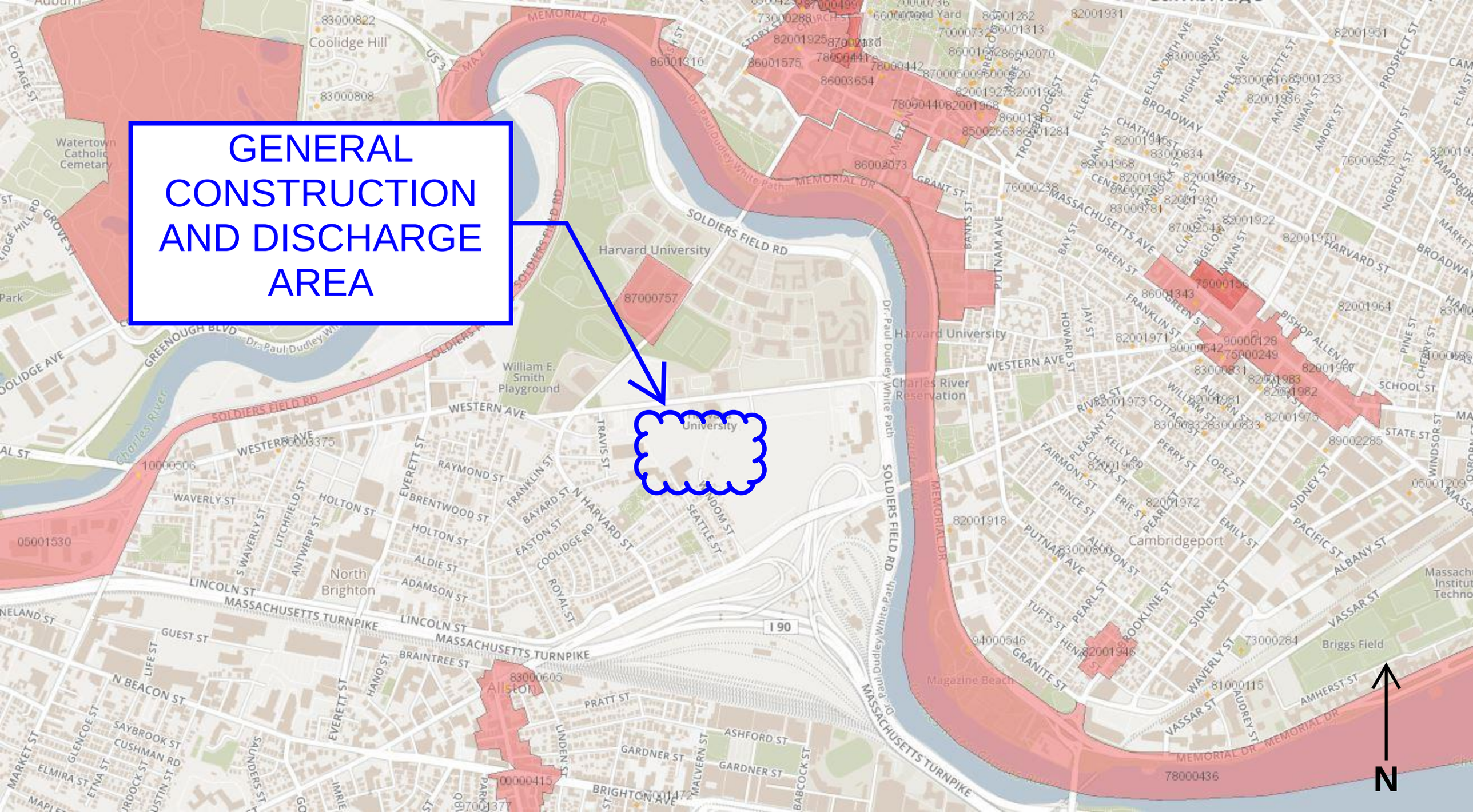
Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX E

National Historical Preservation Act Review

HALEY ALDRICH


GENERAL CONSTRUCTION AND DISCHARGE AREA
N

Massachusetts Cultural Resource Information System

MACRIS

MACRIS Search Results

Search Criteria: Town(s): Boston; Place: Allston; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year
BOS.CA	Charles River Basin Historic District		Boston	
BOS.JL	Harvard Business School		Boston	
BOS.JM	Saint Anthony's Area		Boston	
BOS.KM	Hano Street Area		Boston	
BOS.KN	Harvard Avenue Historic District		Boston	
BOS.KP	Adamson Street, 1-87		Boston	
BOS.KQ	Aldie Street, 1-75		Boston	
BOS.KS	Ashford Street, 5-69		Boston	
BOS.KT	Athol Street, 4-71		Boston	
BOS.LB	Franklin Street, 51-168		Boston	
BOS.LC	Gardner Street, 4-98		Boston	
BOS.LF	Holton Street, 7-60 and Everett Street, 205		Boston	
BOS.LQ	Raymond Street, 1-98		Boston	
BOS.LU	Westford Street, 3-10		Boston	
BOS.SG	Allston Congregational Church		Boston	
BOS.VH	St. Anthony of Padua Roman Catholic Church Complex		Boston	
BOS.YK	Charles River Reservation Parkways		Boston	
BOS.ZQ	Charles River Reservation Speedway - Upper Basin Headquarters		Boston	
BOS.AAC	Charles River Reservation Speedway - Upper Basin Headquarters		Boston	
BOS.ADJ	International Harvester New England Branch Headquarters		Boston	
BOS.8073		8-10 Adamson St	Boston	c 1846
BOS.8074		12-14 Adamson St	Boston	c 1846
BOS.8075		16-18 Adamson St	Boston	c 1846
BOS.8072		72 Adamson St	Boston	

Inv. No.	Property Name	Street	Town	Year
BOS.8079	Rice, Jennie Double House	22-24 Aldie St	Boston	1895
BOS.8076		42-44 Aldie St	Boston	1895
BOS.8077		50 Aldie St	Boston	1895
BOS.8078		62 Aldie St	Boston	1895
BOS.8392	Spinney, David F. Two-Family House	73-75 Aldie St	Boston	r 1895
BOS.8085		24 Ashford St	Boston	
BOS.8086		26 Ashford St	Boston	
BOS.8087		28 Ashford St	Boston	
BOS.8089	Russell, Fred A. House	44 Ashford St	Boston	1899
BOS.8088		53-55 Ashford St	Boston	1909
BOS.8090	Gage, Roscoe W. House	65 Ashford St	Boston	c 1892
BOS.15429	Electric Storage Battery Co. - Whitehall Co. Bldg	120 Ashford St	Boston	1925
BOS.8093	Cushing, S. B. Double House	15-17 Athol St	Boston	c 1875
BOS.8091		27 Athol St	Boston	
BOS.8390	Davenport, Samuel N. House	33 Athol St	Boston	c 1870
BOS.8391	Davenport, Samuel N. House	35 Athol St	Boston	c 1870
BOS.8092		46 Athol St	Boston	
BOS.8389	Cose House	69-71 Athol St	Boston	r 1895
BOS.8393	Davenport, John F. House	70 Athol St	Boston	c 1895
BOS.9550	Claflin, Sleeper and Rich Halls Courtyard	275 Babcock St	Boston	r 1965
BOS.15427	Boston Buick Company Garage	278 Babcock St	Boston	1919
BOS.15428	Pittsburgh Plate Glass Company Glass Warehouse	300-316 Babcock St	Boston	1926
BOS.8108	Roddy Hall	60 Birmingham Pkwy	Boston	1898
BOS.9333	Anderson, Larz Bridge	Boylston St	Boston	1915
BOS.9480	Brighton Avenue Streetlamps	Brighton Ave	Boston	r 1995
BOS.13220	Lincoln Block	101 Brighton Ave	Boston	1902
BOS.13221	Lincoln Block	103-109 Brighton Ave	Boston	1902
BOS.13222	Lincoln Block	113 Brighton Ave	Boston	1902
BOS.13224	Allston Auto Exchange - Allston Auto Body Repairs	116-118 Brighton Ave	Boston	1925
BOS.13223		117-125 Brighton Ave	Boston	1914
BOS.13225	Allston Garage	122-124 Brighton Ave	Boston	c 1914
BOS.13226		127-129 Brighton Ave	Boston	1915
BOS.13227		128 Brighton Ave	Boston	r 1980
BOS.8742	Frost, E. Willard Commercial Block	130-140 Brighton Ave	Boston	1913
BOS.13228		131-137 Brighton Ave	Boston	1915
BOS.13229		139-143 Brighton Ave	Boston	c 1913

Inv. No.	Property Name	Street	Town	Year
BOS.8743	Prindiville Building	143-155 Brighton Ave	Boston	c 1913
BOS.13230	Parkvale Garage	154-162 Brighton Ave	Boston	c 1920
BOS.13231		164-174 Brighton Ave	Boston	c 1920
BOS.9327	B. U. Bridge - Cottage Farm Bridge	Brookline St	Boston	1927
BOS.15426	Noyes Buick Company Service Station	25 Buick St	Boston	1928
BOS.13213		Cambridge St	Boston	r 1965
BOS.8111	Allen Building	334-354 Cambridge St	Boston	1895
BOS.13211		358-362 Cambridge St	Boston	r 1950
BOS.13212		372 Cambridge St	Boston	1935
BOS.8113	Chester, W. R. Block	373-391 Cambridge St	Boston	c 1876
BOS.8744		382-386 Cambridge St	Boston	1911
BOS.8745	English, John House	390 Cambridge St	Boston	c 1870
BOS.9332	Weeks, John Wingate Foot Bridge	Charles River	Boston	1927
BOS.8123	Williams, Peter House	67 Chester St	Boston	c 1896
BOS.9549	Boston University School of Law Courtyard	765 Commonwealth Ave	Boston	r 1965
BOS.15425	Boston University School of Law	765 Commonwealth Ave	Boston	1962
BOS.15424	Boston University Law Library	767 Commonwealth Ave	Boston	1964
BOS.9548	Boston University - Mugar Library Courtyard	771 Commonwealth Ave	Boston	r 1965
BOS.15423	Boston University - Mugar Memorial Library	771 Commonwealth Ave	Boston	1966
BOS.15422	Boston University - Sherman, George Student Union	775 Commonwealth Ave	Boston	1963
BOS.15421	Shell Oil Company Building	785 Commonwealth Ave	Boston	1931
BOS.8069	Noyes, H. K. Buick Company	855-861 Commonwealth Ave	Boston	1920
BOS.15420	Rand-Avery Supply Company - Pinkham Press Building	871 Commonwealth Ave	Boston	1924
BOS.15419	Youth's Companion Printing Plant	881 Commonwealth Ave	Boston	1915
BOS.8068	Commonwealth Armory	925 Commonwealth Ave	Boston	1914
BOS.15418	Holland System Motor Company Building	949 Commonwealth Ave	Boston	1916
BOS.15417	New England Velie Auto Company Building	983-985 Commonwealth Ave	Boston	1919
BOS.15416	Ford Auto Showroom and Service Station	1019-1023 Commonwealth Ave	Boston	1917
BOS.15415		1106-1110 Commonwealth Ave	Boston	1915
BOS.8143		19 Everett St	Boston	r 1840
BOS.8234		205 Everett St	Boston	
BOS.8385	Wright, Jonathan B. - Hammond, Leander House	233-235 Everett St	Boston	r 1830
BOS.13214		4-12 Farrington Ave	Boston	1912
BOS.8746	Longfellow Building	4-8 Franklin St	Boston	c 1880
BOS.8154	Allston Hall Block	10-14 Franklin St	Boston	1890
BOS.8112	Allston Depot	15 Franklin St	Boston	1887

Inv. No.	Property Name	Street	Town	Year
BOS.8159		69 Franklin St	Boston	
BOS.8160	Hill, George A. Row House	73 Franklin St	Boston	1887
BOS.8155		74-76 Franklin St	Boston	
BOS.8161	Hill, George A. Row House	75 Franklin St	Boston	1887
BOS.8162	Hill, George A. Row House	77 Franklin St	Boston	1887
BOS.8163	Hill, George A. Row House	79 Franklin St	Boston	1887
BOS.8164	Hill, George A. Row House	81 Franklin St	Boston	1887
BOS.8156	Tucker, Moses D. Worker Housing	122 Franklin St	Boston	
BOS.8157	Tucker, Moses D. Worker Housing	124 Franklin St	Boston	
BOS.8158	Tucker, Moses D. Worker Housing	126 Franklin St	Boston	
BOS.8165	Tucker, Moses D. House	134 Franklin St	Boston	c 1875
BOS.8166	Mead, John H. Row House	150-152 Franklin St	Boston	1889
BOS.8168	Mead, John H. Row House	154-156 Franklin St	Boston	1889
BOS.8170	Mead, John H. Row House	158-160 Franklin St	Boston	1889
BOS.8172	Mead, John H. Row House	162-164 Franklin St	Boston	1889
BOS.8174	Mead, John H. Row House	166-168 Franklin St	Boston	1889
BOS.8184	Braves Baseball Field Office and Entrance Gate	10-20 Gaffney St	Boston	1915
BOS.8747	Jenkins Apartment	4-8 Gardner St	Boston	1912
BOS.13215		9 Gardner St	Boston	c 1913
BOS.8180	Whitney, Rev. Frederic Augustus House	12 Gardner St	Boston	r 1850
BOS.13216		15 Gardner St	Boston	1915
BOS.8181	Winter, Royal Double House	38-40 Gardner St	Boston	c 1881
BOS.8178		41 Gardner St	Boston	
BOS.8179		53 Gardner St	Boston	
BOS.8176		65 Gardner St	Boston	
BOS.8177		71 Gardner St	Boston	
BOS.8182	Ivanhoe Court Apartments	72 Gardner St	Boston	1905
BOS.8183	Norton, Charles W. House	73 Gardner St	Boston	c 1885
BOS.13217	Ideal Garage	6 Glenville Terr	Boston	c 1914
BOS.13218	Edison Company Garage	9 Glenville Terr	Boston	c 1920
BOS.13219	Glenville Garage	10 Glenville Terr	Boston	c 1918
BOS.8191	Hano, Samuel Company Worker Housing	1-3 Hano St	Boston	1885
BOS.8206	Hano, Samuel Company Worker Housing	2-4 Hano St	Boston	1885
BOS.8192	Hano, Samuel Company Worker Housing	5-7 Hano St	Boston	1885
BOS.8207	Hano, Samuel Company Worker Housing	6-8 Hano St	Boston	1885
BOS.8193	Hano, Samuel Company Worker Housing	9-11 Hano St	Boston	1885
BOS.8194	Hano, Samuel Company Worker Housing	13-15 Hano St	Boston	1885
BOS.8208	Hano, Samuel Company Worker Housing	14-16 Hano St	Boston	1885

Inv. No.	Property Name	Street	Town	Year
BOS.8195	Hano, Samuel Company Worker Housing	17-19 Hano St	Boston	1885
BOS.8209	Hano, Samuel Company Worker Housing	18-20 Hano St	Boston	1885
BOS.8196	Hano, Samuel Company Worker Housing	21-23 Hano St	Boston	1885
BOS.8210	Hano, Samuel Company Worker Housing	22-24 Hano St	Boston	1885
BOS.8197	Hano, Samuel Company Worker Housing	25-27 Hano St	Boston	1885
BOS.8211	Hano, Samuel Company Worker Housing	26-28 Hano St	Boston	1885
BOS.8198	Hano, Samuel Company Worker Housing	29-31 Hano St	Boston	1885
BOS.8212	Hano, Samuel Company Worker Housing	30-32 Hano St	Boston	1885
BOS.8199	Hano, Samuel Company Worker Housing	33-35 Hano St	Boston	1885
BOS.8213	Hano, Samuel Company Worker Housing	34-36 Hano St	Boston	1885
BOS.8200	Hano, Samuel Company Worker Housing	37-39 Hano St	Boston	1885
BOS.8214	Hano, Samuel Company Worker Housing	38-40 Hano St	Boston	1885
BOS.8201	Hano, Samuel Company Worker Housing	41-43 Hano St	Boston	1885
BOS.8215	Hano, Samuel Company Worker Housing	42-44 Hano St	Boston	1885
BOS.8202	Hano, Samuel Company Worker Housing	45-47 Hano St	Boston	1885
BOS.8216	Hano, Samuel Company Worker Housing	46-48 Hano St	Boston	1885
BOS.8203	Hano, Samuel Company Worker Housing	49-51 Hano St	Boston	1885
BOS.8217	Hano, Samuel Company Worker Housing	50-52 Hano St	Boston	1885
BOS.8204	Hano, Samuel Company Worker Housing	53-55 Hano St	Boston	1885
BOS.8218	Hano, Samuel Company Worker Housing	54-56 Hano St	Boston	1885
BOS.8205	Hano, Samuel Company Worker Housing	57-59 Hano St	Boston	1885
BOS.8219	Hano, Samuel Company Worker Housing	58-60 Hano St	Boston	1885
BOS.8220	Hano, Samuel Company Worker Housing	62-64 Hano St	Boston	1885
BOS.8221	Hano, Samuel Company Worker Housing	66-68 Hano St	Boston	1885
BOS.8222	Hano, Samuel Company Worker Housing	70-72 Hano St	Boston	1885
BOS.15414	Braves Baseball Field - Pavilion A	32 Harry Agganis Way	Boston	1915
BOS.9481	Harvard Avenue Road Network	Harvard Ave	Boston	
BOS.8748	Wilson Block	4-8 Harvard Ave	Boston	c 1908
BOS.8749		11-17 Harvard Ave	Boston	c 1918
BOS.8223	Harvard Avenue Fire Station	16 Harvard Ave	Boston	1891
BOS.8750		20-24 Harvard Ave	Boston	c 1910
BOS.8751		25-27 Harvard Ave	Boston	r 1965
BOS.13232		31 Harvard Ave	Boston	r 1950
BOS.8752		32-34 Harvard Ave	Boston	c 1928
BOS.8753	U. S. Post Office - Allston Branch	39 Harvard Ave	Boston	r 1975
BOS.8754		44-58 Harvard Ave	Boston	1912
BOS.8224	Whitehead, R. F. Block	51-63 Harvard Ave	Boston	1913
BOS.8755	Allston Methodist Episcopal Church	62 Harvard Ave	Boston	1877

Inv. No.	Property Name	Street	Town	Year
BOS.13233	Shorey - Bassett House	66-68 Harvard Ave	Boston	c 1883
BOS.8756		67-73 Harvard Ave	Boston	1905
BOS.8757	Bacon and Barret Apartment	74-84 Harvard Ave	Boston	1912
BOS.8758		75-87 Harvard Ave	Boston	c 1920
BOS.8772		5 Harvard Terr	Boston	r 1910
BOS.8773		7 Harvard Terr	Boston	r 1910
BOS.8771		8-16 Harvard Terr	Boston	1912
BOS.8774		9 Harvard Terr	Boston	r 1910
BOS.8775		11 Harvard Terr	Boston	r 1910
BOS.8776		15 Harvard Terr	Boston	c 1910
BOS.8777		17 Harvard Terr	Boston	c 1910
BOS.8232	Ganzheimer, A. Double House	20-22 Highgate St	Boston	r 1880
BOS.8235	Stinson, John D. House	8 Holton St	Boston	1889
BOS.8236	Stinson, John D. Barn	8R Holton St	Boston	1889
BOS.8233		12 Holton St	Boston	r 1890
BOS.8237	Davenport, Jonathan House	21 Holton St	Boston	c 1875
BOS.8238	Saint Anthony of Padua Roman Catholic Church	37 Holton St	Boston	1894
BOS.8388	Saint Anthony of Padua Roman Catholic Rectory	43 Holton St	Boston	1896
BOS.8387	Saint Anthony of Padua Roman Catholic School	57 Holton St	Boston	1915
BOS.8386	Saint Anthony of Padua Roman Catholic Convent	69 Holton St	Boston	c 1930
BOS.9608	Charles River Reservation - Leo Birmingham Parkway	Leo Birmingham Pkwy	Boston	1936
BOS.9609	Charles River Reservation - Birmingham Pkwy Marker	Leo Birmingham Pkwy	Boston	r 1920
BOS.13241	Allen Building	1 Linden St	Boston	1895
BOS.13242	Allen Building	3 Linden St	Boston	1895
BOS.13243	Allen Building	5 Linden St	Boston	1895
BOS.13244	Allen Building	7 Linden St	Boston	1895
BOS.13245	Allen Building	9 Linden St	Boston	1895
BOS.13236		11 Linden St	Boston	1897
BOS.13237		11A Linden St	Boston	1897
BOS.13238		15 Linden St	Boston	1897
BOS.13239		15A Linden St	Boston	1897
BOS.8065	Storrow, James J. School	20 Lothrop St	Boston	1926
BOS.9607	Charles River Reservation - Nonantum Road	Nonantum Rd	Boston	1910
BOS.9610	Charles River Reservation - North Beacon Street	North Beacon St	Boston	r 1920
BOS.9611	North Beacon Street Bridge over Charles River	North Beacon St	Boston	r 1920
BOS.8283		19 North Beacon St	Boston	r 1810

Inv. No.	Property Name	Street	Town	Year
BOS.17085	International Harvester New England Branch Headquarters and Motor Truck Showroom	61 North Beacon St	Boston	1925
BOS.17086	Charles River Saab Parts Storage	61 North Beacon St	Boston	1995
BOS.17087	International Harvester New England Branch Headquarters - Service Station	67 North Beacon St	Boston	1924
BOS.5952	Englewood Diner	69 North Beacon St	Boston	r 1935
BOS.17088	International Harvester New England Branch Headquarters - Truck Storage Facility	69 North Beacon St	Boston	1925
BOS.8375	Harvard University - Blodgett Pool	North Harvard St	Boston	1978
BOS.9313	Harvard University Athletic Facility Fence	North Harvard St	Boston	c 1897
BOS.8286	Harvard Stadium	60 North Harvard St	Boston	1903
BOS.8285	Harvard University - Carey Cage	65 North Harvard St	Boston	1897
BOS.8067	Hill Memorial Baptist Church	279 North Harvard St	Boston	1903
BOS.14293	Allston Congregational Church Parsonage	31-41 Quint Ave	Boston	1891
BOS.8297	Allston Congregational Church	41 Quint Ave	Boston	1891
BOS.8298		31 Raymond St	Boston	
BOS.8299		33 Raymond St	Boston	
BOS.8381	Rice, Edmund House	34 Raymond St	Boston	c 1870
BOS.8303	McDermott, Patrick Double House	43-45 Raymond St	Boston	c 1875
BOS.8300		80-82 Raymond St	Boston	
BOS.8301		84-86 Raymond St	Boston	
BOS.8302		88-90 Raymond St	Boston	
BOS.9330	River Street Bridge	River St	Boston	1926
BOS.8305	Vanerin, John House	57-59 Royal St	Boston	1905
BOS.8306	Sanford, H. I. House	9 Sawyer Terr	Boston	1914
BOS.8310	Sinclair, Thomas House	1 Sinclair Rd	Boston	r 1835
BOS.8311	Tracy, Jedediah House	2 Sinclair Rd	Boston	r 1833
BOS.9314	Harvard University Athletic Facility Fence	Solders Field Rd	Boston	c 1897
BOS.8350	Harvard Business School - Kresge Hall	Soldiers Field Rd	Boston	1953
BOS.8351	Harvard Business School - Teele Hall	Soldiers Field Rd	Boston	c 1968
BOS.8352	Harvard Business School - Burden Hall	Soldiers Field Rd	Boston	c 1969
BOS.8353	Harvard Business School - Cumnock Hall	Soldiers Field Rd	Boston	1969
BOS.8354	Soldiers Field Park Apartments	Soldiers Field Rd	Boston	c 1974
BOS.8355	Harvard Business School - Shadd Gymnasium	Soldiers Field Rd	Boston	c 1990
BOS.8356	Harvard Business School Chapel	Soldiers Field Rd	Boston	c 1990
BOS.8357	Harvard Business School Dean's Residence	Soldiers Field Rd	Boston	1929
BOS.8358	Harvard Business School - Humphrey Hall	Soldiers Field Rd	Boston	1926
BOS.8359	Harvard Business School - McCullough Hall	Soldiers Field Rd	Boston	1926
BOS.8360	Harvard Business School - Glass Hall	Soldiers Field Rd	Boston	1926

Inv. No.	Property Name	Street	Town	Year
BOS.8361	Harvard Business School - Mellon Hall	Soldiers Field Rd	Boston	1926
BOS.8362	Harvard Business School - Dillon Hall	Soldiers Field Rd	Boston	1926
BOS.8363	Harvard Business School - Chase Hall	Soldiers Field Rd	Boston	1926
BOS.8364	Harvard Business School Students Club	Soldiers Field Rd	Boston	1926
BOS.8365	Harvard Business School - Aldrich Hall	Soldiers Field Rd	Boston	1953
BOS.8366	Harvard Business School - Baker Library	Soldiers Field Rd	Boston	1927
BOS.8367	Harvard Business School - Hamilton Hall	Soldiers Field Rd	Boston	1926
BOS.8368	Harvard Business School Faculty Club	Soldiers Field Rd	Boston	1926
BOS.8369	Harvard Business School - Gallatin Hall	Soldiers Field Rd	Boston	1926
BOS.8370	Harvard Business School - Fowler Hall	Soldiers Field Rd	Boston	1926
BOS.8371	Harvard Business School - Morgan Hall	Soldiers Field Rd	Boston	1927
BOS.8372	Harvard Business School - Loeb Hall	Soldiers Field Rd	Boston	1926
BOS.8373	Harvard Business School - Morris Hall	Soldiers Field Rd	Boston	1926
BOS.8374	Harvard Business School - Sherman Hall	Soldiers Field Rd	Boston	1926
BOS.8376	Harvard University - Briggs Cage	Soldiers Field Rd	Boston	1926
BOS.8377	Harvard University - Dillon Field House	Soldiers Field Rd	Boston	1929
BOS.8378	Harvard University - Dixon, Palmer Tennis Courts	Soldiers Field Rd	Boston	r 1965
BOS.8379	Harvard University - Bright Hockey Center	Soldiers Field Rd	Boston	r 1950
BOS.8380	Harvard University Gordon Track and Tennis Center	Soldiers Field Rd	Boston	r 1950
BOS.9602	Charles River Reservation - Soldiers Field Road	Soldiers Field Rd	Boston	1899
BOS.9603	Soldiers Field Road Planted Median	Soldiers Field Rd	Boston	r 1920
BOS.9605	Soldiers Field Underpass at Western Avenue	Soldiers Field Rd	Boston	c 1954
BOS.9606	Soldiers Field Road - North Beacon Street Oval	Soldiers Field Rd	Boston	c 1958
BOS.8312	Harvard University - Newell Boat House	801-805 Soldiers Field Rd	Boston	1900
BOS.8063	Institute of Contemporary Art	1175 Soldiers Field Rd	Boston	1959
BOS.8064	Charles River Speedway Superintendent's Residence	1420-1440 Soldiers Field Rd	Boston	1899
BOS.9731	Charles River Speedway Courtyard	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15893	Charles River Speedway Headquarters and Stable	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15894	Metropolitan District Commission Police Station	1420-1440 Soldiers Field Rd	Boston	1904
BOS.15895	Charles River Speedway - South Shed	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15896	Charles River Speedway - East Shed	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15897	Charles River Speedway Garage	1420-1440 Soldiers Field Rd	Boston	c 1940
BOS.15898	Charles River Speedway Maintenance Garage	1420-1440 Soldiers Field Rd	Boston	c 1940
BOS.9334	Eliot Bridge	Soldier's Field Rd	Boston	1950
BOS.9335	Soldier's Field Road	Soldier's Field Rd	Boston	1895
BOS.9604	Charles River Reservation - Telford Street Bridge	Telford St	Boston	r 1965

Inv. No.	Property Name	Street	Town	Year
BOS.8066	Barrett, David L. Elementary School	25 Travis St	Boston	1933
BOS.8321	Longefellow, Henry W. House	4 Wadsworth St	Boston	r 1895
BOS.9331	Western Avenue Bridge	Western Ave	Boston	1924
BOS.8342	Ted's Diner	270 Western Ave	Boston	1953
BOS.8343	Sewall and Day Cordage Company	342 Western Ave	Boston	c 1885
BOS.8344	Engine House #34	444 Western Ave	Boston	1887
BOS.8345	Stanley Service Station	500 Western Ave	Boston	1938
BOS.8382	Moore, J. Albert - Reid, Maria House	3 Westford St	Boston	c 1870
BOS.8346		4 Westford St	Boston	r 1880
BOS.8383	Moore, J. Albert House	7 Westford St	Boston	c 1870
BOS.8347		8 Westford St	Boston	r 1880
BOS.8384	Moore, J. Albert House	9 Westford St	Boston	c 1870
BOS.8348		10 Westford St	Boston	r 1880
BOS.13240	Wilton, The	7 Wilton St	Boston	1890

Ref#	Property Name	Street & Number
87000885	Abbotsford	300 Walnut Ave.
82004456	Adams-Nervine Asylum	990-1020 Centre St.
71000087	African Meetinghouse	8 Smith St.
80000678	All Saints' Church	211 Ashmont St.
97001377	Allston Congregational Church	31-41 Quint Ave.
14000698	Almont Apartments	Address Restricted
74000382	Ames Building	1 Court St.
77001541	Appleton, Nathan, Residence	39-40 Beacon St.
73000313	Arlington Street Church	Arlington and Boylston Sts.
73000314	Armory of the First Corps of Cadets	97-105 Arlington St. and 130 Columbus Ave.
66000127	Arnold Arboretum	22 Divinity Ave.
87001478	Austin, Francis B., House	58 High St.
05000459	Ayer, Frederick, Mansion	395 Commonwealth Avenue
73001948	Back Bay Historic District	Roughly bounded by the Charles River, Arlington, Providence, Boylston and Newbury Sts., and Charlesgate East
98001381	Baker Congregational Church	760 Saratoga St.
83004285	Baker, Sarah J., School	33 Perrin St.
80000462	Beach-Knapp District	Roughly bounded by Harrison Ave., Washington, Kneeland, and Beach Sts.
66000130	Beacon Hill Historic District	Bounded by Beacon St., the Charles River Embankment, and Pinckney, Revere, and Hancock Sts.
79000368	Bedford Building	89-103 Bedford St.
89002251	Bellevue Standpipe	On Bellevue Hill at Washington St. and Roxbury Pkwy.
04000023	Benedict Fenwick School	150 Magnolia St.
100002790	Benjamin Silverman Apartments	50-52 Lorne & 4 Wilson Sts.
02000548	Bennington Street Burying Ground	Bennington St., bet. Swift and harmony Sts.
80000677	Berger Factory	37 Williams St.
85000316	Bigelow School	350 W. 4th St.
73000315	Blackstone Block Historic District	Area bound by Union, Hanover, Blackstone, and North Sts.
14000272	Blake and Amory Building	59 Temple Pl.
74002350	Blake, James, House	735 Columbia Rd.
80004396	Boston African American National Historic Site	Museum of Afro American History, Dudley Station, Box 5
66000132	Boston Athenaeum	10 1/2 Beacon St.
87000760	Boston Common	Beacon, Park, Tremont, Boylston, and Charles St.
72000144	Boston Common and Public Garden	Beacon, Park, Tremont, Boylston, and Arlington Sts.
01001557	Boston Consumptives Hospital	249 River St.
80000453	Boston Edison Electric Illuminating Company	25-39 Boylston St.
100001314	Boston Fish Pier Historic District	212-234 Northern Ave.
85003323	Boston Harbor Islands Archeological District	Address Restricted
66000133	Boston Light	Little Brewster Island, Boston Harbor
15000195	Boston National Historical Park	Charlestown Navy Yard
74002222	Boston National Historical Park	Inner harbor at mouth of Charles River
66000134	Boston Naval Shipyard	E of Chelsea St., Charlestown
15000048	Boston Police Station Number One--Traffic Tunnel Administration Building	128, 150 North & 130 -140 Richmond St.
87000761	Boston Public Garden	Beacon, Charles, Boylston, and Arlington Sts.
73000317	Boston Public Library	Copley Sq.
07000861	Boston Transit Commission Building	15 Beacon St.
98001082	Boston Young Men's Christian Association	312-320 Huntington Ave.
80000451	Boston Young Men's Christian Union	48 Boylston St.
90001145	Bowditch School	80--82 Greene St.
80000450	Boylston Building	2-22 Boylston St.
01000088	Brighton Center Historic District	Academy Hill R., Chestnut Hill Ave., Dighton, Elko, Henshaw, Leicester, Market, Washington, and Winship Sts.
97000920	Brighton Evangelical Congregational Church	404-410 Washington St.
66000141	Brook Farm	670 Baker St.
85002015	Building at 138--142 Portland Street	138--142 Portland St.
14000561	Buildings at 825--829 Blue Hill Avenue	825-829 Blue Hill Ave.
86000274	Bulfinch Triangle Historic District	Roughly bounded by Canal, Market, Merrimac, and Causeway Sts.
66000138	Bunker Hill Monument	Breed's Hill
87001771	Bunker Hill School	65 Baldwin St.
90001095	Calf Pasture Pumping Station Complex	435 Mount Vernon St.
98001361	Cathedral of St. George Historic District	517-523-525 E. Broadway
12001012	Central Congregational Church	67 Newbury St.
80000676	Charles Playhouse	74-78 Warenton St.
10000506	Charles River Reservation (Speedway)--Upper Basin Headquarters	1420-1440 Soldiers Field Rd
83000601	Charles Street African Methodist Episcopal Church	551 Warren St.
97000969	Charlestown Heights	Roughly bounded by St. Martin, Bunker Hill, Medford, and Sackville Sts.
89002271	Chestnut Hill Reservoir Historic District	Beacon St. and Commonwealth Ave.
86000140	Christ Church	1220 River Rd.
99001614	Church Green Buildings Historic District	101-113 Summer St.
74000911	Clapp Houses	199 and 195 Boston St.
83004097	Codman Building	55 Kilby St.
83000602	Codman Square District	Norfolk, Talbot, Epping, Lithgow, Centre, and Moultrie Sts.
05000559	Collins Building	213-217 Washington St.
100001582	Columbia Road--Bellevue Street Historic District	400-500 blk. of Columbia Rd., portions of Bellevue St.
100001315	Columbia Road--Devon Street Historic District	193-231 (odd) & 200-204 (even) Columbia Rd.
100002734	Columbia Road--Strathcona Road Historic District	90-94,102-108, 105-111, 129-135, 137, 143-147, 150-156 Columbia & 16 Strathcona Rds., 114-126 Washington St.
12001162	Commonwealth Pier Five	165 Northern Ave.
08001284	Compton Building	159, 161-175 Devonshire St., 18-20 Arch St.
99001304	Congregation Adath Jeshurun	397 Blue Hill Ave.
87001396	Congress Street Fire Station	344 Congress St.
74000385	Copp's Hill Burial Ground	Charter, Snowhill, and Hull Sts.
90000631	Copp's Hill Terrace	Between Commercial and Charter Sts. W of Jackson Place
72000145	Crowninshield House	164 Marlborough St.
73000321	Custom House District	Between J.F.K. Expwy. and Kirby St. and S. Market and High and Batterymarch Sts.
73000318	Cyclorama Building	543-547 Tremont St.
13000928	Davidson, Sarah, Apartment Block	3 Gaylord St.
00000871	Dearborn School	25 Ambrose St.
80000448	Dill Building	11-25 Stuart St.
80001683	Dillaway School	16-20 Kenilworth St.
85000317	Dimock Community Health Center Complex	41 and 55 Dimock St.
87002549	District 13 Police Station	28 Seaverns Ave.
66000050	Dorchester Heights National Historic Site	South Boston
74000915	Dorchester North Burying Ground	Stroughton St. and Columbia Rd.
08000089	Dorchester Park	Bounded by Dorchester Ave., Richmond, Adams & Richview Sts.
85000318	Dorchester Pottery Works	101-105 Victory Rd.
14000365	Dorchester South Burying Ground	2095 Dorchester Ave.
97001239	Dorchester Temple Baptist Church	670 Washington St.
80000675	Dorchester-Milton Lower Mills Industrial District	Both sides of Neponset River
01000304	Dorchester--Milton Lower Mills Industrial District (Boundary Increase)	Roughly: Adams, River, Medway Sts., Millers Lane, Eliot and Adams Sts.
96001063	Douglass, Frederick, Square Historic District	Roughly bounded by Hammond St., Cobat St., Windsor St., and Westminister St., Lower Roxbury
85003074	Dudley Station Historic District	Washington, Warren, and Dudley Sts.
98000149	Eagle Hill Historic District	Roughly bounded by Border, Lexington, Trenton, and Falcon Sts.
06000127	East Boston High School, Old	127 Marion St.
10000039	EDNA G. shipwreck (Eastern Rig dragger)	Address Restricted
10001066	Egleston Substation	3025 Washington St
74000388	Eliot Burying Ground	Eustis and Washington Sts.
93001587	Eliot Congregational Church	56 Dale St., corner 118--120 Walnut St.

88000959	Eliot Hall	7A Eliot St.
85003375	Engine House No. 34	444 Western Ave.
100003070	Esmond Street Historic District	Bicknell, Bradshaw, Esmond, & Harvard Sts.
66000366	Ether Dome, Massachusetts General Hospital	Fruit St.
09000612	Evergreen Cemetery	2060 Commonwealth Ave.
09000717	Fairview Cemetery	45 Fairview Ave.
66000368	Faneuil Hall	Dock Sq.
94001492	Faneuil, Peter, School	60 Joy St.
12000069	Fenway Park	24, & 2-4 Yawkey Wy., 64-76 Brookline Ave., & 70-80 Lansdowne St.
78000473	Fenway Studios	30 Ipswich St.
84002875	Fenway-Boylston Street District	Fenway, Boylston, Westland, and Hemenway Sts.
81000620	Fields Corner Municipal Building	1 Arcadia St., 195 Adams St.
86001909	Filene's Department Store	426 Washington St.
72000146	First Baptist Church	Commonwealth Ave. and Clarendon St.
88000955	First Church of Jamaica Plain	6 Eliot St.
99001308	First Congregational Church of Hyde Park	6 Webster St.
04001219	Forest Hills Cemetery	95 Forest Hills Ave.
70000921	Fort Independence	Castle Island
04000959	Fort Point Channel Historic District	Necco Court, Thomson Place, A, Binford, Congress, Farnsworth, Melcher, Midway, Sleeper, Stillings, Summer Sts.
70000540	Fort Warren	Georges Island, Boston Harbor
15000942	Fox, I.J., Building	407 Washington St.
02000081	Frances and Isabella Apartments	430-432 and 434-436 Dudley St.
16000409	Francis Street--Fenwood Road Historic District	Roughly bounded by Huntington Ave., Francis, Vining & Fenwood Sts., St. Albans Rd.
73000319	Fulton-Commercial Streets District	Fulton, Commercial, Mercantile, Lewis, and Richmond Sts.
00000160	Fulton-Commercial Streets Historic District (Boundary Increase)	81-95 Richmond St.
83000603	Gardner, Isabella Stewart, Museum	280 The Fenway
66000653	Garrison, William Lloyd, House	125 Highland St.
80000674	Garrison, William Lloyd, School	20 Hutchings St.
01001048	Gibson House	137 Beacon St.
07000510	Goldsmith Block	41 Ruggles St., 746-750 Shawmut Ave.
88000908	Goodwin, Ozias, House	7 Jackson Ave.
16000454	Governor Shirley Square Historic District	Dudley, Hampden, Dunmore & Magazine Sts., Blue Hill & Mt. Pleasant Ave.
88000957	Greek Orthodox Cathedral of New England	520 Parker St.
02000154	Greenwood Memorial United Methodist Church	378A-380 Washington St.
14000974	Gridley Street Historic District	Bounded by Congress, High, Pearl & Purchase Sts.
82004453	Haffenreffer Brewery	Germania St.
73000325	Hale, Edward Everett, House	12 Morley St.
66000764	Harding, Chester, House	16 Beacon St.
02001190	Harrison Square Historic District	Bounded by MBTA Braintree line embankment, Park, Everett, Freeport, Mill, Asland, Blanche Sts., Victory Rd.
86000375	Harriswood Crescent	60--88 Harold St.
83000605	Harvard Avenue Fire Station	16 Harvard Ave.
00000415	Harvard Avenue Historic District	Roughly bounded by Linden St., Commonwealth AVe., Harvard Ave., and Park Vale Ave.
87000757	Harvard Stadium	60 N. Harvard St.
04000085	Haskell, Edward H., Home for Nurses	220 Fisther Ave., 63 Parker Hill Ave.
80000446	Hayden Building	681-683 Washington St.
66000765	Headquarters House	55 Beacon St.
04000534	Hibernian Hall	182-186 Dudley St.
10000300	Highland Spring Brewery Bottling and Storage Buildings	154-166 Terrace St
05000879	Home for Aged Couples	409, 419 Walnut Ave. and 2055 Columbus Ave.
14000840	Home for Destitute Jewish Children	Address Restricted
93001573	House at 1 Bay Street	1 Bay St.
87001398	House at 17 Cranston Street	17 Cranston St.
74002044	Howe, Samuel Gridley and Julia Ward, House	13 Chestnut St.
87001399	Hoxie, Timothy, House	135 Hillside St.
79000369	International Trust Company Building	39-47 Milk St.
100003470	Intervale Street-Columbia Road Historic District	117-121, 123-127, 129-135, 137-143, 145-159, 161, 162 Intervale St. & 282-284, 286-288 Columbia Rd.
74000391	John Adams Courthouse	Pemberton Sq.
73000854	John Eliot Square District	John Eliot Sq.
08000793	Joshua Bates School	731 Harrison Ave.
74002045	King's Chapel	Tremont and School Sts.
73000855	Kittredge, Alvah, House	12 Linwood St.
83000606	Lawrence Model Lodging Houses	79, 89, 99 and 109 E. Canton St.
83004098	Leather District	Roughly bounded by Atlantic Ave., Kneeland, Lincoln, and Essex Sts.
80000460	Liberty Tree District	Roughly bounded by Harrison Ave., Washington, Essex and Beach Sts.
86001911	Locke--Ober Restaurant	3--4 Winter Pl.
87001481	Long Island Head Light	Long Island
66000768	Long Wharf and Customhouse Block	Foot of State St.
83000604	Loring, Harrison, House	789 E. Broadway St.
72000544	Loring-Greenough House	12 South St.
94001494	Lower Roxbury Historic District	Roughly, area surrounding Coventry, Cunard, and Walpole Sts.
83004099	LUNA (tugboat)	NDC Pier, Charles River
14000975	Lyman, Theodore, School	30 Gove St.
99001302	Mariner's House	11 North Square
70000682	Massachusetts General Hospital	Fruit Street
66000770	Massachusetts Historical Society Building	1154 Boylston St.
93001489	Massachusetts Mental Health Center	74 Fenwood Rd.
89000974	Massachusetts School of Art	364 Brookline Ave.
66000771	Massachusetts Statehouse	Beacon Hill
82004450	McKay, Donald, House	78-80 White St.
80000445	Metropolitan Theatre	252-272 Tremont St.
89001747	Mission Hill Triangle Historic District	Roughly bounded by Smith St., Worthington St., Tremont St., and Huntington Ave.
87001128	Monument Square Historic District	Monument Sq.
90001536	Monument Square Historic District	Roughly bounded by Jamaicaway, Pond, Centre and Eliot Sts.
84002890	Moreland Street Historic District	Roughly bounded by Kearsarge, Blue Hill Aves., Warren, Waverly, and Winthrop Sts.
04001572	Morton Street, Metropolitan Park System of Greater Boston	Morton St.
100003547	Mount Hope Cemetery	355 Walk Hill St.
89000004	Mount Pleasant Historic District	Roughly bounded by Forest St. and Mount Pleasant Ave.
04000426	Nazing Court Apartments	224-236 Seaver St. and 1-8 Nazing Court
76001979	Nell, William C., House	3 Smith Ct.
04001573	Neponset Valley Parkway, Metorpolitan Park System of Greater Boston	Neponset Valley Parkway
80000672	New England Conservatory of Music	290 Huntington Ave.
87001394	New Riding Club	52 Hemenway St.
83000607	Newspaper Row	322-328 Washington St., 5-23 Milk St., and 11 Hawley St.
04000189	Nix's Mate Daybeacon	Nubble Channel, The Narrows, Boston Harbor
97000971	North Terminal Garage	600 Commercial St.
80000465	Oak Square School	35 Nonantum St.
08000795	Ohabei Shalom Cemetery	147 Wordsworth St.
70000687	Old City Hall	School and Providence Sts.
73000322	Old Corner Bookstore	NW corner of Washington and School Sts.
08000693	Old Harbor Reservation Parkways, Metropolitan Park System of Greater Boston	William J. Day Blvd., Columbia Rd. between Farragut Rd and Kosciuszko Cir., Old Colony Ave. between Pacuska Ave.
66000776	Old North Church	193 Salem St.
70000690	Old South Church in Boston	645 Boylston St.
66000778	Old South Meetinghouse	Milk and Washington Sts.
66000779	Old State House	Washington and State Sts.
70000691	Old West Church	131 Cambridge St.

70000539	Otis, (First) Harrison Gray, House	141 Cambridge St.
73001955	Otis, (Second) Harrison Gray, House	85 Mt. Vernon St.
02001039	Paine Furniture Building	75-81 Arlington St.
74000390	Park Street District	Tremont, Park, and Beacon Sts.
66000782	Parkman, Francis, House	50 Chestnut St.
01000872	Peabody, The	195-197 Ashmont St.
74000907	Phipps Street Burying Ground	Phipps St.
80000458	Piano Row District	Boston Common, Park Sq., Boylston Pl. and Tremont St.
74000917	Pierce House	24 Oakton Ave.
68000042	Pierce-Hichborn House	29 North Sq.
13000929	Pilgrim Congregational Church	540-544 Columbia Rd.
03000781	Publicity Building	40-44 Bromfield St.
100001458	Quincy Grammar School	88-90 Tyler St.
66000784	Quincy Market	S. Market St.
66000785	Revere, Paul, House	19 North Sq.
86001504	Richardson Block	113--151 Pearl and 109--119 High Sts.
95001450	Riviera, The	270 Huntington Ave.
97001278	ROSEWAY (schooner)	Boston Harbor
98001330	Roslindale Baptist Church	52 Cummins Hwy.
13000621	Roslindale Substation	4228 Washington St.
82004448	Roughan Hall	15-18 City Sq.
73000856	Roxbury High Fort	Beech Glen St. at Fort Ave.
89000147	Roxbury Highlands Historic District	Roughly bounded by Dudley St., Washington St., and Columbus Ave.
89002125	Roxbury Presbyterian Church	328 Warren St.
80000463	Russia Wharf Buildings	518-540 Atlantic Ave., 270 Congress St. and 276-290 Congress St.
87001495	Saint Augustine Chapel and Cemetery	Dorchester St. between W. Sixth and Tudor Sts.
12000783	Saint Mark's Episcopal Church	73 Columbia Rd.
100003471	Samuel Edelman Apartments	97-103 Norfolk St.
03000385	Savin Hill Historic District	Roughly bounded by Savin Hill Ave., Morrissey Blvd., Dorchester Bay, and I-93
86001486	Sears' Crescent and Sears' Block	38--68 and 70--72 Cornhill
90001992	Sears Roebuck and Company Mail Order Store	309 Park Dr. and 201 Brookline Ave.
70000731	Sears, David, House	42 Beacon St.
86001913	Second Brazer Building	25--29 State St.
10000391	Second Church in Boston	874, 876, 880 Beacon St
12000978	Sherman Apartments Historic District	544-546 Washington, 4-6, 12-14, 18 Lyndhurst Sts.
80000444	Shubert, Sam S., Theatre	263-265 Tremont St.
05000936	South Boston Boat Clubs Historic District	1793-1849 William J. Day Blvd.
73000324	South End District	South Bay area between Huntington and Harrison Aves.
14001095	South End District (Boundary Increase)	200-224 Northampton St.
75000299	South Station Headhouse	Atlantic Ave. and Summer St.
89002169	St. Joseph's Roman Catholic Church Complex	Bounded by Circuit, Regent, Hulbert, and Fenwick Sts.
97001472	St. Luke's and St. Margaret's Church	5-7 St. Luke's Rd.
98001292	St. Mary's Episcopal Church	14-16 Cushing Ave.
70000730	St. Paul's Church	136 Tremont St.
75000300	St. Stephen's Church	Hanover St. between Clark and Harris Sts.
80000671	Stearns, R. H., House	140 Tremont St.
05001509	Stony Brook Reservation Parkways, Metropolitan Park System of Great Boston MPS	Dedham, Enneking, Turtle Pond Parkways, Smith Field, Reservation, W. Border Rds.
97000970	Students House	96 The Fenway
80000670	Suffolk County Jail	215 Charles St.
87001889	Sumner Hill Historic District	Roughly bounded by Seaverns Ave., Everett St., Carolina Ave., & Newbern St.
73001953	Sumner, Charles, House	20 Hancock St.
75000301	Symphony and Horticultural Halls	Massachusetts and Huntington Aves.
99000633	Symphony Hall	301 Massachusetts Avenue
88000427	Temple Place Historic District	11--55, 26--58 Temple Pl.
12000099	Terminal Storage Warehouse District	267-281 Medford St., 40 & 50 Terminal St.
90001757	Textile District	Roughly, Essex St. from Phillips Sq. to Columbia St. and Chauncy St. from Phillips Sq. to Rowe Pl.
73000850	Town Hill District	Bounded roughly by Rutherford Ave. and Main and Warren Sts.
66000788	Tremont Street Subway	Beneath Tremont, Boylston, and Washington Sts.
70000733	Trinity Church	Copley Sq.
92000356	Trinity Neighborhood House	406 Meridian St.
72000150	Trinity Rectory	Clarendon and Newbury Sts.
04001430	Truman Parkway--Metropolitan Park System of Greater Boston	Truman Parkway
66000789	U.S.S. CONSTITUTION	Boston Naval Shipyard
03000645	Union Oyster House	41-43 Union Street
80000669	Union Wharf	295-353 Commercial St.
80000668	United Shoe Machinery Corporation Building	138-164 Federal St.
11000160	United State Post Office, Courthouse, and Federal Building	5 Post Office Square
90001537	Upham's Corner Market	600 Columbia Rd.
86000084	USS CASSIN YOUNG (destroyer)	Charlestown Navy Yard
84000421	Vermont Building	6-12 Thacher St.
04001432	VFW Parkway, Metropolitan Park System of Greater Boston	VFW Parkway, bet. Spring And Centre Sts.
13000930	Walton and Roslin Halls	702-708 & 710-726 Washington St., 3-5 Walton St.
79000370	Washington Street Theatre District	511-559 Washington St.
80000455	West Street District	West St.
82000486	Wigglesworth Building	89-83 Franklin St.
80000443	Wilbur Theatre	244-250 Tremont St.
74000392	Winthrop Building	7 Water St.
80000442	Wirth, Jacob, Buildings	31-39 Stuart St.
99000593	Woodbourne Historic District	Roughly bounded by Walk Hill, Goodway, and Wachusett Sts.
74000393	Youth's Companion Building	209 Columbus Ave.
04000119	YWCA Boston	140 Clarendon St.

APPENDIX F

Copies of Construction Dewatering Permit Applications

Haley & Aldrich, Inc.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

2 April 2020
File No. 130437-004

Boston Water and Sewer Commission
Engineering Customer Services
900 Harrison Avenue
Boston, MA 02119

Attention: Jodi Begin

Subject: Request for Approval of Temporary Construction Dewatering
North Allston Storm Drain Extension Project
140-156 Western Avenue
Harvard University
Allston, Massachusetts

Dear Ms. Begin:

On behalf of our client, The President and Fellows of Harvard College, acting by and through Harvard Campus Services Capital Projects (CSCP), this letter submits the Dewatering Discharge Permit Application in support of the planned North Allston Storm Drain Extension Project (NASDEP) construction.

Dewatering is necessary to enable construction in-the-dry, and is anticipated to begin in June 2020 and continue through December 2021. Prior to discharge, collected water is routed through a sedimentation tank and bag filters (5-micron bag filter will be required by the Non-Traditional Asbestos Abatement Work Plan) to remove suspended solids and undissolved chemical constituents. Other pre-treatment may be conducted as necessary to comply with NPDES discharge criteria. The site location is shown on Figure 1 and the proposed dewatering discharge route and BWSC outfall location are shown on Figures 2.

A Notice of Intent to discharge under the 2017 NPDES Remediation General Permit (RGP) has been submitted to the Environmental Protection Agency (EPA). Discharge of the dewatering effluent is also currently under review by the Department of Conservation and Recreation (DCR). A copy of the submitted application is attached. If you have any questions, please feel free to contact the undersigned at 617-886-7442.

Sincerely yours,

HALEY & ALDRICH, INC.

Beck J. Straley
Project Manager

Katherine L. Dilawari, P.E., L.S.P.
Senior Associate

Attachments:

Dewatering Discharge Permit Application
Figure 1 – Project Locus
Figure 2 – Proposed Discharge Route
Copy of NPDES RGP Application

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Boston Water and
Sewer Commission
980 Harrison Avenue
Boston, MA 02119-2540

DEWATERING DISCHARGE PERMIT APPLICATION

OWNER / AUTHORIZED APPLICANT PROVIDE INFORMATION HERE:

Company Name: President and Fellows of Harvard College c/o Harvard CSCP Address: 1350 Massachusetts Avenue, 901, Cambridge, MA 02138

Phone Number: 617-495-9831 Fax number: _____

Contact person name: Joseph O'Farrell Title: Senior Project Manager

Cell number: 617-495-1659 Email address: joseph_ofarrell@harvard.edu

Permit Request (check one): ☑ New Application ☐ Permit Extension ☐ Other (Specify): _____

Owner's information (if different from above):

Owner of property being dewatered: _____

Owner's mailing address: _____ Phone number: _____

Location of Discharge & Proposed Treatment System(s):

Street number and name: 140-156 Western Avenue Neighborhood Allston

Discharge is to a: ☐ Sanitary Sewer ☐ Combined Sewer ☑ Storm Drain ☐ Other (specify): _____

Describe Proposed Pre-Treatment System(s): Sedimentation tank, 5 micron bag filters and other components as necessary (refer to attached NPDES RGP application)

BWSC Outfall No. SDO 001 Receiving Waters Charles River

Temporary Discharges (Provide Anticipated Dates of Discharge): From 06/01/2020 To 12/31/2021

☐ Groundwater Remediation	☐ Tank Removal/Installation	☐ Foundation Excavation
☐ Utility/Manhole Pumping	☐ Test Pipe	☑ Trench Excavation
☐ Accumulated Surface Water	☐ Hydrogeologic Testing	☐ Other _____

Permanent Discharges

☐ Foundation Drainage	☐ Crawl Space/Footing Drain
☐ Accumulated Surface Water	☐ Non-contact/Uncontaminated Cooling
☐ Non-contact/Uncontaminated Process	☐ Other; _____

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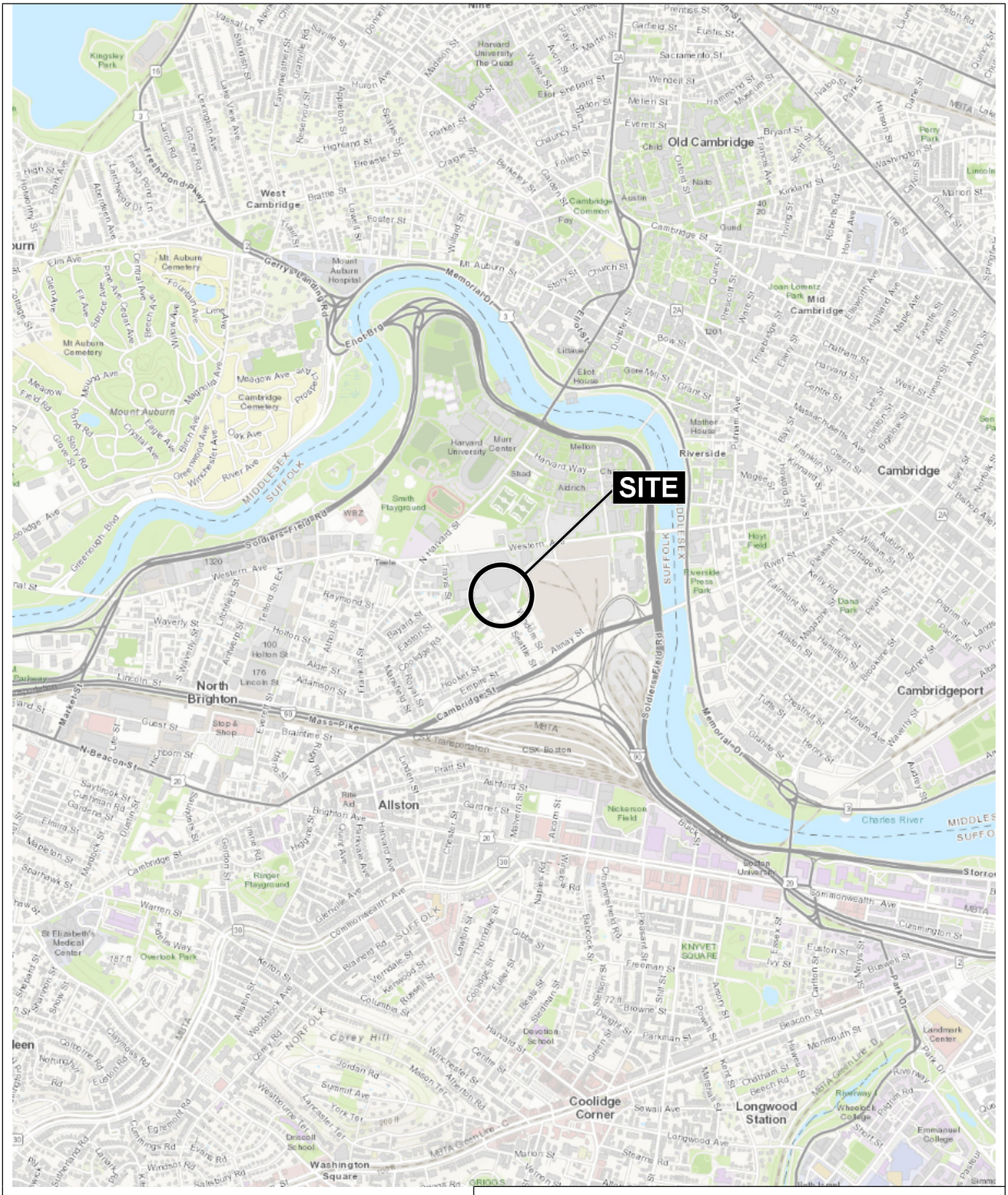
1. Attach a Site Plan showing the source of the discharge and the location of the point of discharge (i.e. the sewer pipe or catch basin). Include meter type, meter number, size, make and start reading. Note. All discharges to the Commission's sewer system will be assessed current sewer charges.
2. If discharging to a sanitary or combined sewer, attach a copy of MWRA's Sewer Use Discharge permit or application.
3. If discharging to a separate storm drain, attach a copy of EPA's NPDES Permit or NOI application, or NPDES Permit exclusion letter for the discharge, as well as other relevant information.
4. Dewatering Drainage Permit will be denied or revoked if applicant fails to obtain the necessary permits from MWRA or EPA.

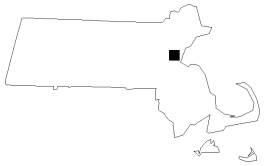
Submit Completed Application to: Boston Water and Sewer Commission
Engineering Customer Services
980 Harrison Avenue, Boston, MA 02119
Attn: Matthew Tuttle, Engineering Customer Service
E-mail: tuttlemp@bwsc.org
Phone: 617-989-7204 Fax: 617-989-7716

Signature of Authorized Representative for Property Owner: Joseph O'Farrell Joseph O'Farrell (Mar 31, 2020) Date: Mar 31, 2020



MAP SOURCE: ESRI

SITE COORDINATES: 42°21'42"N, 71°7'32"W



HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE
HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
MARCH 2020

FIGURE 1

129379-010_1_LOCUS.PDF

OUTFALL - SDO 001

PROPOSED DISCHARGE ROUTE

SEC-GP-51(OW)

PROPOSED PHASE 1 OF THE NASDEP ALLIGNMENT

RTN 3-26932 Disposal Site Boundary

SEC-GP-51(OW) Sampled on 3 December 2019 by Haley & Aldrich

HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE, HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

WORK AREA AND PROPOSED DISCHARGE ROUTE

SCALE: AS SHOWN
MARCH 2020

FIGURE 2

BOSTON WATER AND SEWER

N W E S

100 50 0 100 200 300 Feet

1 inch = 100 feet

PROPOSED DISCHARGE LOCATION

ANTICIPATED SEDIMENTATION TANK LOCATION

APPROXIMATE NASDEP ALLIGNMENT

Haley & Aldrich, Inc.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

2 April 2020
File No. 130437-004

Department of Conservation & Recreation
Permit Section
251 Causeway Street, Suite 600
Boston, MA 02114-2119

Subject: Request for Approval of Temporary Construction Dewatering
North Allston Storm Drain Extension Project
140-156 Western Avenue
Harvard University
Allston, Massachusetts

Ladies and Gentlemen:

On behalf of our client, The President and Fellows of Harvard College, acting by and through Harvard Campus Services Capital Projects (CSCP), this letter submits the Permit Application for Construction for temporary construction dewatering in support of the planned North Allston Storm Drain Extension Project (NASDEP). The Work Area location is shown on Figure 1.

Dewatering is necessary to enable construction in-the-dry, and is anticipated to begin in June 2020 and continue through December 2021. Prior to discharge, collected water is routed through a sedimentation tank and bag filters (5-micron bag filter will be required by the Non-Traditional Asbestos Abatement Work Plan) to remove suspended solids and undissolved chemical constituents. Other pre-treatment may be conducted as necessary to comply with National Pollution Discharge Elimination System (NPDES) discharge criteria. Proposed dewatering discharge route is shown on Figure 2. We understand that the portion of the storm drainage piping located below the Charles River Reservation and adjacent to Soldiers Field Road is controlled by DCR. This letter and attached permit application seek permission to discharge dewatering effluent through these pipes.

A Notice of Intent to discharge under the 2017 NPDES Remediation General Permit (RGP) has been submitted to the Environmental Protection Agency (EPA). Discharge of the dewatering effluent is also currently under review by the Boston Water and Sewer Commission (BWSC). A copy of the submitted NPDES RGP application is attached. If you have any questions, please feel free to contact the undersigned at 617-886-7442.

Sincerely yours,
HALEY & ALDRICH, INC.

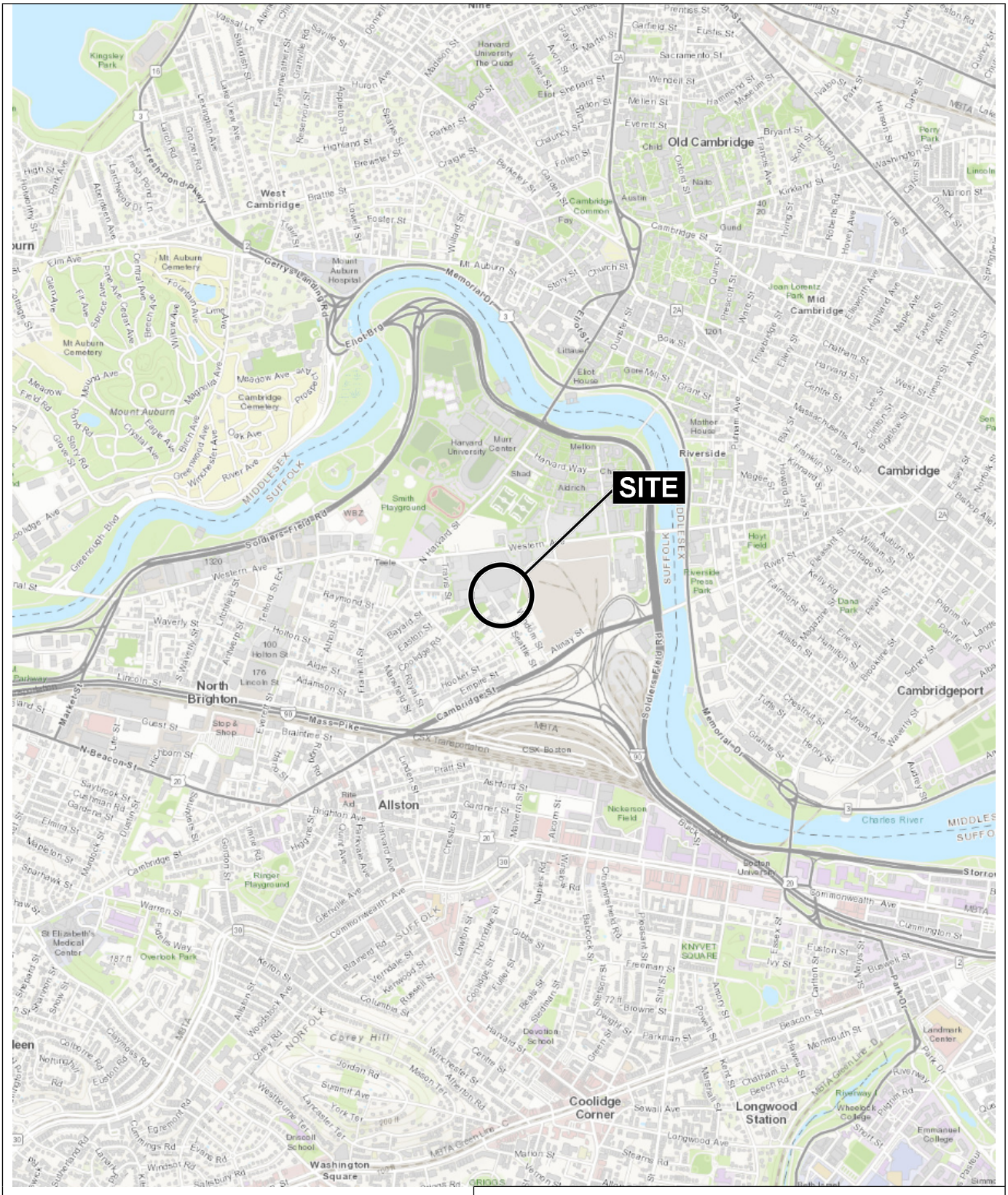
Beck J. Straley
Project Manager

Katherine L. Dilawari, P.E., L.S.P. (MA)
Senior Associate

Attachments:

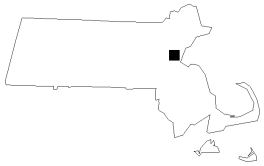
Figure 1 – Project Locus
Figures 2 – Proposed Discharge Route
Copy of NPDES RGP Permit Application

G:\130437\Dewatering\NPDES Permit\Appendix F - Dewatering Permit Applications\DCR Permit Application\2020-0325-NPDES DCR Letter-F.docx



MAP SOURCE: ESRI

SITE COORDINATES: 42°21'42"N, 71°7'32"W



HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE
HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
MARCH 2020

FIGURE 1

129379-010_1_LOCUS.PDF

OUTFALL - SDO 001

PROPOSED DISCHARGE ROUTE

SEC-GP-51(OW)

PROPOSED PHASE 1 OF THE NASDEP ALLIGNMENT

RTN 3-26932 Disposal Site Boundary

SEC-GP-51(OW) Sampled on 3 December 2019 by Haley & Aldrich

HALEY ALDRICH

NORTH ALLSTON STORM DRAIN EXTENSION PROJECT
140-156 WESTERN AVENUE, HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS

WORK AREA AND PROPOSED DISCHARGE ROUTE

SCALE: AS SHOWN
MARCH 2020

FIGURE 2

BOSTON WATER AND SEWER

N W E S

100 50 0 100 200 300 Feet

1 inch = 100 feet

PROPOSED DISCHARGE LOCATION

ANTICIPATED SEDIMENTATION TANK LOCATION

APPROXIMATE NASDEP ALLIGNMENT

APPENDIX G

Laboratory Data Reports

HALEY ALDRICH

ANALYTICAL REPORT

Lab Number:	L1957699
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Beck Straley
Phone:	(617) 886-7400
Project Name:	NASDEP
Project Number:	130437-004
Report Date:	12/18/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1957699-01	DI-TB-27(OW)_20191203	WATER	ALLSTON, MA	12/03/19 10:25	12/03/19
L1957699-02	SEC-GP-51(OW)_20191203	WATER	ALLSTON, MA	12/03/19 12:50	12/03/19

Project Name:	NASDEP	**Lab Number:**	L1957699
Project Number:	130437-004	**Report Date:**	12/18/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	NASDEP	**Lab Number:**	L1957699
Project Number:	130437-004	**Report Date:**	12/18/19

Case Narrative (continued)

Report Submission

December 18, 2019: This final report includes the results of all requested analyses.

December 17, 2019: This is a preliminary report.

The analysis of Ethanol was subcontracted. A copy of the laboratory report is included as an addendum.

Please note: This data is only available in PDF format and is not available on Data Merger.

Solids, Total Suspended

L1957699-01 (DI-TB-27(OW)_20191203): The sample has an elevated detection limit due to the dilution required by the sample matrix.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative Date: 12/18/19

ORGANICS

VOLATILES

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA
Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1
Analytical Date: 12/05/19 19:15
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethane	ND		ug/l	1.5	--	1
Carbon tetrachloride	ND		ug/l	1.0	--	1
1,1,2-Trichloroethane	ND		ug/l	1.5	--	1
Tetrachloroethene	ND		ug/l	1.0	--	1
1,2-Dichloroethane	ND		ug/l	1.5	--	1
1,1,1-Trichloroethane	ND		ug/l	2.0	--	1
Benzene	ND		ug/l	1.0	--	1
Toluene	ND		ug/l	1.0	--	1
Ethylbenzene	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	1.0	--	1
Trichloroethene	ND		ug/l	1.0	--	1
1,2-Dichlorobenzene	ND		ug/l	5.0	--	1
1,3-Dichlorobenzene	ND		ug/l	5.0	--	1
1,4-Dichlorobenzene	ND		ug/l	5.0	--	1
p/m-Xylene	ND		ug/l	2.0	--	1
o-xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
Acetone	ND		ug/l	10	--	1
Methyl tert butyl ether	ND		ug/l	10	--	1
Tert-Butyl Alcohol	ND		ug/l	100	--	1
Tertiary-Amyl Methyl Ether	ND		ug/l	20	--	1

Project Name: NASDEP **Lab Number:** L1957699

Project Number: 130437-004 **Report Date:** 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01 Date Collected: 12/03/19 10:25

Client ID: DI-TB-27(OW)_20191203 Date Received: 12/03/19

Sample Location: ALLSTON, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	101		60-140
Fluorobenzene	98		60-140
4-Bromofluorobenzene	103		60-140

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA
Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1-SIM
Analytical Date: 12/05/19 19:15
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-SIM - Westborough Lab						
1,4-Dioxane	ND		ug/l	50	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	83		60-140
4-Bromofluorobenzene	92		60-140

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 12/04/19 14:38
Analyst: AMM

Extraction Method: EPA 504.1
Extraction Date: 12/04/19 11:34

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Microextractables by GC - Westborough Lab							
1,2-Dibromoethane	ND		ug/l	0.010	--	1	A

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA
Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1
Analytical Date: 12/05/19 19:53
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethane	ND		ug/l	1.5	--	1
Carbon tetrachloride	ND		ug/l	1.0	--	1
1,1,2-Trichloroethane	ND		ug/l	1.5	--	1
Tetrachloroethene	ND		ug/l	1.0	--	1
1,2-Dichloroethane	ND		ug/l	1.5	--	1
1,1,1-Trichloroethane	ND		ug/l	2.0	--	1
Benzene	ND		ug/l	1.0	--	1
Toluene	ND		ug/l	1.0	--	1
Ethylbenzene	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	1.0	--	1
Trichloroethene	ND		ug/l	1.0	--	1
1,2-Dichlorobenzene	ND		ug/l	5.0	--	1
1,3-Dichlorobenzene	ND		ug/l	5.0	--	1
1,4-Dichlorobenzene	ND		ug/l	5.0	--	1
p/m-Xylene	ND		ug/l	2.0	--	1
o-xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
Acetone	ND		ug/l	10	--	1
Methyl tert butyl ether	ND		ug/l	10	--	1
Tert-Butyl Alcohol	ND		ug/l	100	--	1
Tertiary-Amyl Methyl Ether	ND		ug/l	20	--	1

Project Name: NASDEP **Lab Number:** L1957699

Project Number: 130437-004 **Report Date:** 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02 Date Collected: 12/03/19 12:50

Client ID: SEC-GP-51(OW)_20191203 Date Received: 12/03/19

Sample Location: ALLSTON, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	101		60-140
Fluorobenzene	97		60-140
4-Bromofluorobenzene	103		60-140

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1-SIM
Analytical Date: 12/05/19 19:53
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-SIM - Westborough Lab						
1,4-Dioxane	ND		ug/l	50	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	83		60-140
4-Bromofluorobenzene	94		60-140

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 12/04/19 14:55
Analyst: AMM

Extraction Method: EPA 504.1
Extraction Date: 12/04/19 11:34

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Microextractables by GC - Westborough Lab							
1,2-Dibromoethane	ND		ug/l	0.010	--	1	A

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 12/04/19 13:14
Analyst: AMM

Extraction Method: EPA 504.1
Extraction Date: 12/04/19 11:34

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01-02 Batch: WG1316480-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 12/05/19 13:42
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1317218-8					
Methylene chloride	ND		ug/l	1.0	--
1,1-Dichloroethane	ND		ug/l	1.5	--
Carbon tetrachloride	ND		ug/l	1.0	--
1,1,2-Trichloroethane	ND		ug/l	1.5	--
Tetrachloroethene	ND		ug/l	1.0	--
1,2-Dichloroethane	ND		ug/l	1.5	--
1,1,1-Trichloroethane	ND		ug/l	2.0	--
Benzene	ND		ug/l	1.0	--
Toluene	ND		ug/l	1.0	--
Ethylbenzene	ND		ug/l	1.0	--
Vinyl chloride	ND		ug/l	1.0	--
1,1-Dichloroethene	ND		ug/l	1.0	--
cis-1,2-Dichloroethene	ND		ug/l	1.0	--
Trichloroethene	ND		ug/l	1.0	--
1,2-Dichlorobenzene	ND		ug/l	5.0	--
1,3-Dichlorobenzene	ND		ug/l	5.0	--
1,4-Dichlorobenzene	ND		ug/l	5.0	--
p/m-Xylene	ND		ug/l	2.0	--
o-xylene	ND		ug/l	1.0	--
Xylenes, Total	ND		ug/l	1.0	--
Acetone	ND		ug/l	10	--
Methyl tert butyl ether	ND		ug/l	10	--
Tert-Butyl Alcohol	ND		ug/l	100	--
Tertiary-Amyl Methyl Ether	ND		ug/l	20	--

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 12/05/19 13:42
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1317218-8					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	101		60-140
Fluorobenzene	98		60-140
4-Bromofluorobenzene	104		60-140

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1-SIM
Analytical Date: 12/05/19 13:42
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01-02 Batch: WG1317657-4					
1,4-Dioxane	ND		ug/l	50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	84		60-140
4-Bromofluorobenzene	97		60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: NASDEP

Project Number: 130437-004

Lab Number: L1957699

Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab	Associated sample(s): 01-02 Batch: WG1316480-2								
1,2-Dibromoethane	87		-		80-120	-			A

Lab Control Sample Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1317218-7								
Methylene chloride	95		-		60-140	-		28
1,1-Dichloroethane	90		-		50-150	-		49
Carbon tetrachloride	95		-		70-130	-		41
1,1,2-Trichloroethane	95		-		70-130	-		45
Tetrachloroethene	100		-		70-130	-		39
1,2-Dichloroethane	100		-		70-130	-		49
1,1,1-Trichloroethane	105		-		70-130	-		36
Benzene	100		-		65-135	-		61
Toluene	105		-		70-130	-		41
Ethylbenzene	105		-		60-140	-		63
Vinyl chloride	90		-		5-195	-		66
1,1-Dichloroethene	100		-		50-150	-		32
cis-1,2-Dichloroethene	105		-		60-140	-		30
Trichloroethene	95		-		65-135	-		48
1,2-Dichlorobenzene	105		-		65-135	-		57
1,3-Dichlorobenzene	95		-		70-130	-		43
1,4-Dichlorobenzene	100		-		65-135	-		57
p/m-Xylene	100		-		60-140	-		30
o-xylene	100		-		60-140	-		30
Acetone	84		-		40-160	-		30
Methyl tert butyl ether	90		-		60-140	-		30
Tert-Butyl Alcohol	86		-		60-140	-		30
Tertiary-Amyl Methyl Ether	95		-		60-140	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: NASDEP

Project Number: 130437-004

Lab Number: L1957699

Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1317218-7								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Pentafluorobenzene	105				60-140
Fluorobenzene	101				60-140
4-Bromofluorobenzene	103				60-140

Lab Control Sample Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01-02 Batch: WG1317657-3								
1,4-Dioxane	85		-		60-140	-		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Fluorobenzene	84				60-140
4-Bromofluorobenzene	98				60-140

Matrix Spike Analysis

Batch Quality Control

Project Name: NASDEP

Project Number: 130437-004

Lab Number: L1957699

Report Date: 12/18/19

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*	*Column*
Microextractables by GC - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316480-3 QC Sample: L1956910-02 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.246	0.215	87		-	-		80-120	-		20	A
1,2-Dibromo-3-chloropropane	ND	0.246	0.212	86		-	-		80-120	-		20	A
1,2,3-Trichloropropane	ND	0.246	0.223	90		-	-		80-120	-		20	A

SEMIVOLATILES

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1
Analytical Date: 12/06/19 09:51
Analyst: SZ

Extraction Method: EPA 625.1
Extraction Date: 12/05/19 11:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.2	--	1
Butyl benzyl phthalate	ND		ug/l	4.9	--	1
Di-n-butylphthalate	ND		ug/l	4.9	--	1
Di-n-octylphthalate	ND		ug/l	4.9	--	1
Diethyl phthalate	ND		ug/l	4.9	--	1
Dimethyl phthalate	ND		ug/l	4.9	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	54		42-122
2-Fluorobiphenyl	62		46-121
4-Terphenyl-d14	98		47-138

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1-SIM
Analytical Date: 12/06/19 17:47
Analyst: CB

Extraction Method: EPA 625.1
Extraction Date: 12/05/19 10:55

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	0.27		ug/l	0.10	--	1
Fluoranthene	0.20		ug/l	0.10	--	1
Naphthalene	0.28		ug/l	0.10	--	1
Benzo(a)anthracene	0.12		ug/l	0.10	--	1
Benzo(a)pyrene	ND		ug/l	0.10	--	1
Benzo(b)fluoranthene	0.11		ug/l	0.10	--	1
Benzo(k)fluoranthene	ND		ug/l	0.10	--	1
Chrysene	ND		ug/l	0.10	--	1
Acenaphthylene	ND		ug/l	0.10	--	1
Anthracene	ND		ug/l	0.10	--	1
Benzo(ghi)perylene	ND		ug/l	0.10	--	1
Fluorene	ND		ug/l	0.10	--	1
Phenanthrene	0.15		ug/l	0.10	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--	1
Pyrene	0.21		ug/l	0.10	--	1
Pentachlorophenol	ND		ug/l	0.98	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	33		25-87
Phenol-d6	24		16-65
Nitrobenzene-d5	59		42-122
2-Fluorobiphenyl	68		46-121
2,4,6-Tribromophenol	66		45-128
4-Terphenyl-d14	97		47-138

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1
Analytical Date: 12/06/19 10:18
Analyst: SZ

Extraction Method: EPA 625.1
Extraction Date: 12/05/19 11:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.2	--	1
Butyl benzyl phthalate	ND		ug/l	4.9	--	1
Di-n-butylphthalate	ND		ug/l	4.9	--	1
Di-n-octylphthalate	ND		ug/l	4.9	--	1
Diethyl phthalate	ND		ug/l	4.9	--	1
Dimethyl phthalate	ND		ug/l	4.9	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	49		42-122
2-Fluorobiphenyl	54		46-121
4-Terphenyl-d14	76		47-138

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1-SIM
Analytical Date: 12/06/19 18:36
Analyst: CB

Extraction Method: EPA 625.1
Extraction Date: 12/05/19 10:55

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	ND		ug/l	0.10	--	1
Fluoranthene	ND		ug/l	0.10	--	1
Naphthalene	ND		ug/l	0.10	--	1
Benzo(a)anthracene	ND		ug/l	0.10	--	1
Benzo(a)pyrene	ND		ug/l	0.10	--	1
Benzo(b)fluoranthene	ND		ug/l	0.10	--	1
Benzo(k)fluoranthene	ND		ug/l	0.10	--	1
Chrysene	ND		ug/l	0.10	--	1
Acenaphthylene	ND		ug/l	0.10	--	1
Anthracene	ND		ug/l	0.10	--	1
Benzo(ghi)perylene	ND		ug/l	0.10	--	1
Fluorene	ND		ug/l	0.10	--	1
Phenanthrene	ND		ug/l	0.10	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--	1
Pyrene	ND		ug/l	0.10	--	1
Pentachlorophenol	ND		ug/l	0.98	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	34		25-87
Phenol-d6	25		16-65
Nitrobenzene-d5	61		42-122
2-Fluorobiphenyl	65		46-121
2,4,6-Tribromophenol	58		45-128
4-Terphenyl-d14	88		47-138

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1
Analytical Date: 12/05/19 17:17
Analyst: ALS

Extraction Method: EPA 625.1
Extraction Date: 12/05/19 02:17

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1316794-1					
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.2	--
Butyl benzyl phthalate	ND		ug/l	5.0	--
Di-n-butylphthalate	ND		ug/l	5.0	--
Di-n-octylphthalate	ND		ug/l	5.0	--
Diethyl phthalate	ND		ug/l	5.0	--
Dimethyl phthalate	ND		ug/l	5.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	65		42-122
2-Fluorobiphenyl	70		46-121
4-Terphenyl-d14	80		47-138

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1-SIM
Analytical Date: 12/05/19 22:56
Analyst: CB

Extraction Method: EPA 625.1
Extraction Date: 12/05/19 04:15

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01-02 Batch: WG1316826-1					
Acenaphthene	ND		ug/l	0.10	--
Fluoranthene	ND		ug/l	0.10	--
Naphthalene	ND		ug/l	0.10	--
Benzo(a)anthracene	ND		ug/l	0.10	--
Benzo(a)pyrene	ND		ug/l	0.10	--
Benzo(b)fluoranthene	ND		ug/l	0.10	--
Benzo(k)fluoranthene	ND		ug/l	0.10	--
Chrysene	ND		ug/l	0.10	--
Acenaphthylene	ND		ug/l	0.10	--
Anthracene	ND		ug/l	0.10	--
Benzo(ghi)perylene	ND		ug/l	0.10	--
Fluorene	ND		ug/l	0.10	--
Phenanthrene	ND		ug/l	0.10	--
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--
Pyrene	ND		ug/l	0.10	--
Pentachlorophenol	ND		ug/l	1.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	44		25-87
Phenol-d6	32		16-65
Nitrobenzene-d5	74		42-122
2-Fluorobiphenyl	75		46-121
2,4,6-Tribromophenol	83		45-128
4-Terphenyl-d14	84		47-138

Lab Control Sample Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1316794-2								
Bis(2-ethylhexyl)phthalate	101		-		29-137	-		82
Butyl benzyl phthalate	114		-		1-140	-		60
Di-n-butylphthalate	109		-		8-120	-		47
Di-n-octylphthalate	103		-		19-132	-		69
Diethyl phthalate	94		-		1-120	-		100
Dimethyl phthalate	95		-		1-120	-		183

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Nitrobenzene-d5	70				42-122
2-Fluorobiphenyl	70				46-121
4-Terphenyl-d14	78				47-138

Lab Control Sample Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01-02 Batch: WG1316826-2								
Acenaphthene	76		-		60-132	-		30
Fluoranthene	72		-		43-121	-		30
Naphthalene	71		-		36-120	-		30
Benzo(a)anthracene	77		-		42-133	-		30
Benzo(a)pyrene	79		-		32-148	-		30
Benzo(b)fluoranthene	83		-		42-140	-		30
Benzo(k)fluoranthene	83		-		25-146	-		30
Chrysene	72		-		44-140	-		30
Acenaphthylene	75		-		54-126	-		30
Anthracene	77		-		43-120	-		30
Benzo(ghi)perylene	82		-		1-195	-		30
Fluorene	73		-		70-120	-		30
Phenanthrene	74		-		65-120	-		30
Dibenzo(a,h)anthracene	85		-		1-200	-		30
Indeno(1,2,3-cd)pyrene	87		-		1-151	-		30
Pyrene	76		-		70-120	-		30
Pentachlorophenol	82		-		38-152	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01-02 Batch: WG1316826-2								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	50				25-87
Phenol-d6	36				16-65
Nitrobenzene-d5	77				42-122
2-Fluorobiphenyl	76				46-121
2,4,6-Tribromophenol	77				45-128
4-Terphenyl-d14	80				47-138

PCBS

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 127,608.3
Analytical Date: 12/08/19 13:45
Analyst: AWS

Extraction Method: EPA 608.3
Extraction Date: 12/06/19 05:48
Cleanup Method: EPA 3665A
Cleanup Date: 12/06/19
Cleanup Method: EPA 3660B
Cleanup Date: 12/06/19

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/l	0.250	--	1	A
Aroclor 1221	ND		ug/l	0.250	--	1	A
Aroclor 1232	ND		ug/l	0.250	--	1	A
Aroclor 1242	ND		ug/l	0.250	--	1	A
Aroclor 1248	ND		ug/l	0.250	--	1	A
Aroclor 1254	ND		ug/l	0.250	--	1	A
Aroclor 1260	ND		ug/l	0.200	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	**140**	Q	37-123	B
Decachlorobiphenyl	**156**	Q	38-114	B
2,4,5,6-Tetrachloro-m-xylene	98		37-123	A
Decachlorobiphenyl	**144**	Q	38-114	A

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 127,608.3
Analytical Date: 12/06/19 22:54
Analyst: KB

Extraction Method: EPA 608.3
Extraction Date: 12/06/19 05:48
Cleanup Method: EPA 3665A
Cleanup Date: 12/06/19
Cleanup Method: EPA 3660B
Cleanup Date: 12/06/19

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/l	0.250	--	1	A
Aroclor 1221	ND		ug/l	0.250	--	1	A
Aroclor 1232	ND		ug/l	0.250	--	1	A
Aroclor 1242	ND		ug/l	0.250	--	1	A
Aroclor 1248	ND		ug/l	0.250	--	1	A
Aroclor 1254	ND		ug/l	0.250	--	1	A
Aroclor 1260	ND		ug/l	0.200	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	81		37-123	B
Decachlorobiphenyl	88		38-114	B
2,4,5,6-Tetrachloro-m-xylene	87		37-123	A
Decachlorobiphenyl	90		38-114	A

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 127,608.3
Analytical Date: 12/07/19 00:05
Analyst: KB

Extraction Method: EPA 608.3
Extraction Date: 12/06/19 05:48
Cleanup Method: EPA 3665A
Cleanup Date: 12/06/19
Cleanup Method: EPA 3660B
Cleanup Date: 12/06/19

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01-02 Batch: WG1317449-1						
Aroclor 1016	ND		ug/l	0.250	--	A
Aroclor 1221	ND		ug/l	0.250	--	A
Aroclor 1232	ND		ug/l	0.250	--	A
Aroclor 1242	ND		ug/l	0.250	--	A
Aroclor 1248	ND		ug/l	0.250	--	A
Aroclor 1254	ND		ug/l	0.250	--	A
Aroclor 1260	ND		ug/l	0.200	--	A

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	81		37-123	B
Decachlorobiphenyl	93		38-114	B
2,4,5,6-Tetrachloro-m-xylene	81		37-123	A
Decachlorobiphenyl	89		38-114	A

Lab Control Sample Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01-02 Batch: WG1317449-2									
Aroclor 1016	83		-		50-140	-		36	A
Aroclor 1260	82		-		8-140	-		38	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	82				37-123	B
Decachlorobiphenyl	92				38-114	B
2,4,5,6-Tetrachloro-m-xylene	82				37-123	A
Decachlorobiphenyl	85				38-114	A

METALS

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA
Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Arsenic, Total	0.00222		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Iron, Total	1.60		mg/l	0.050	--	1	12/05/19 21:12	12/09/19 19:26	EPA 3005A	19,200.7	MC
Lead, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	12/05/19 11:23	12/05/19 15:36	EPA 245.1	3,245.1	GD
Nickel, Total	ND		mg/l	0.00200	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	12/05/19 21:12	12/06/19 14:42	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	229		mg/l	0.660	NA	1	12/05/19 21:12	12/09/19 19:26	EPA 3005A	19,200.7	MC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		12/06/19 14:42	NA	107,-	

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA
Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Arsenic, Total	0.00243		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Copper, Total	0.00247		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Iron, Total	0.979		mg/l	0.050	--	1	12/05/19 21:12	12/09/19 19:31	EPA 3005A	19,200.7	MC
Lead, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	12/05/19 11:23	12/05/19 15:38	EPA 245.1	3,245.1	GD
Nickel, Total	ND		mg/l	0.00200	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	12/05/19 21:12	12/06/19 14:47	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	219		mg/l	0.660	NA	1	12/05/19 21:12	12/09/19 19:31	EPA 3005A	19,200.7	MC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		12/06/19 14:47	NA	107,-	

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1317022-1										
Mercury, Total	ND		mg/l	0.00020	--	1	12/05/19 11:23	12/05/19 15:18	3,245.1	GD

Prep Information

Digestion Method: EPA 245.1

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1317275-1										
Antimony, Total	ND		mg/l	0.00400	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Lead, Total	ND		mg/l	0.00100	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	12/05/19 21:12	12/06/19 09:10	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1317276-1										
Iron, Total	ND		mg/l	0.050	--	1	12/05/19 21:12	12/09/19 18:10	19,200.7	MC

Prep Information

Digestion Method: EPA 3005A

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01-02 Batch: WG1317276-1										
Hardness	ND		mg/l	0.660	NA	1	12/05/19 21:12	12/09/19 18:10	19,200.7	MC

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1317022-2								
Mercury, Total	94		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1317275-2								
Antimony, Total	90		-		85-115	-		
Arsenic, Total	112		-		85-115	-		
Cadmium, Total	108		-		85-115	-		
Chromium, Total	103		-		85-115	-		
Copper, Total	96		-		85-115	-		
Lead, Total	111		-		85-115	-		
Nickel, Total	109		-		85-115	-		
Selenium, Total	114		-		85-115	-		
Silver, Total	103		-		85-115	-		
Zinc, Total	107		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1317276-2								
Iron, Total	106		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 Batch: WG1317276-2								
Hardness	89		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317022-3 QC Sample: L1956967-03 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00464	93		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317275-3 QC Sample: L1957525-01 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.4721	94		-	-		70-130	-		20
Arsenic, Total	0.00247	0.12	0.1364	112		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05638	110		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2004	100		-	-		70-130	-		20
Copper, Total	0.00513	0.25	0.2368	93		-	-		70-130	-		20
Lead, Total	ND	0.51	0.5488	108		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.5326	106		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1331	111		-	-		70-130	-		20
Silver, Total	ND	0.05	0.04998	100		-	-		70-130	-		20
Zinc, Total	0.03822	0.5	0.5664	106		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317275-5 QC Sample: L1957417-01 Client ID: MS Sample									
Antimony, Total	ND	0.5	0.4844	97	-	-	70-130	-	20
Arsenic, Total	ND	0.12	0.1269	106	-	-	70-130	-	20
Cadmium, Total	ND	0.051	0.05878	115	-	-	70-130	-	20
Chromium, Total	0.0015	0.2	0.2076	103	-	-	70-130	-	20
Copper, Total	0.04108	0.25	0.2864	98	-	-	70-130	-	20
Lead, Total	0.0030	0.51	0.5664	110	-	-	70-130	-	20
Nickel, Total	0.0038	0.5	0.5353	106	-	-	70-130	-	20
Selenium, Total	ND	0.12	0.1370	114	-	-	70-130	-	20
Silver, Total	ND	0.05	0.05320	106	-	-	70-130	-	20
Zinc, Total	0.1194	0.5	0.6026	97	-	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317276-3 QC Sample: L1957525-01 Client ID: MS Sample									
Iron, Total	0.068	1	1.09	102	-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317276-3 QC Sample: L1957525-01 Client ID: MS Sample									
Hardness	171	66.2	230	89	-	-	75-125	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317022-4 QC Sample: L1956967-03 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317275-4 QC Sample: L1957525-01 Client ID: DUP Sample						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	0.00247	0.00256	mg/l	4		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	ND	ND	mg/l	NC		20
Copper, Total	0.00513	0.00483	mg/l	6		20
Lead, Total	ND	ND	mg/l	NC		20
Nickel, Total	ND	ND	mg/l	NC		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.03822	0.03843	mg/l	1		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317275-6 QC Sample: L1957417-01 Client ID: DUP Sample						
Copper, Total	0.04108	0.04358	mg/l	6		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1317276-4 QC Sample: L1957525-01 Client ID: DUP Sample						
Iron, Total	0.068	0.051	mg/l	**29**	Q	20

INORGANICS
&
MISCELLANEOUS

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-01
Client ID: DI-TB-27(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 10:25
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	50	NA	10	-	12/04/19 12:31	121,2540D	DR
Cyanide, Total	ND		mg/l	0.005	--	1	12/04/19 01:22	12/04/19 11:12	121,4500CN-CE	LH
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	12/03/19 23:46	121,4500CL-D	JA
Nitrogen, Ammonia	1.80		mg/l	0.075	--	1	12/04/19 11:30	12/04/19 23:41	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	--	1	12/05/19 16:45	12/05/19 20:00	74,1664A	ML
Phenolics, Total	ND		mg/l	0.030	--	1	12/04/19 05:27	12/04/19 09:37	4,420.1	MV
Chromium, Hexavalent	ND		mg/l	0.010	--	1	12/04/19 06:00	12/04/19 08:12	1,7196A	MA
Anions by Ion Chromatography - Westborough Lab										
Chloride	782.		mg/l	25.0	--	50	-	12/06/19 01:33	44,300.0	AT

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

SAMPLE RESULTS

Lab ID: L1957699-02
Client ID: SEC-GP-51(OW)_20191203
Sample Location: ALLSTON, MA

Date Collected: 12/03/19 12:50
Date Received: 12/03/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	12/04/19 12:31	121,2540D	DR
Cyanide, Total	ND		mg/l	0.005	--	1	12/04/19 01:22	12/04/19 11:14	121,4500CN-CE	LH
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	12/03/19 23:46	121,4500CL-D	JA
Nitrogen, Ammonia	0.265		mg/l	0.075	--	1	12/04/19 11:30	12/04/19 23:42	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	--	1	12/05/19 16:45	12/05/19 20:00	74,1664A	ML
Phenolics, Total	ND		mg/l	0.030	--	1	12/04/19 05:27	12/04/19 09:38	4,420.1	MV
Chromium, Hexavalent	ND		mg/l	0.010	--	1	12/04/19 06:00	12/04/19 08:12	1,7196A	MA
Anions by Ion Chromatography - Westborough Lab										
Chloride	161.		mg/l	25.0	--	50	-	12/06/19 01:44	44,300.0	AT

Project Name: NASDEP
Project Number: 130437-004
Lab Number: L1957699
Report Date: 12/18/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1316253-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	12/03/19 23:46	121,4500CL-D	JA
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1316288-1										
Cyanide, Total	ND		mg/l	0.005	--	1	12/04/19 01:22	12/04/19 11:07	121,4500CN-CE	LH
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1316314-1										
Phenolics, Total	ND		mg/l	0.030	--	1	12/04/19 05:27	12/04/19 09:35	4,420.1	MV
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1316354-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	12/04/19 06:00	12/04/19 07:53	1,7196A	MA
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1316418-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	12/04/19 11:30	12/04/19 23:11	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1316448-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	12/04/19 12:31	121,2540D	DR
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1317238-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	12/05/19 16:45	12/05/19 20:00	74,1664A	ML
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-02 Batch: WG1317369-1										
Chloride	ND		mg/l	0.500	--	1	-	12/05/19 23:33	44,300.0	AT

Lab Control Sample Analysis

Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1316253-2								
Chlorine, Total Residual	92		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1316288-2								
Cyanide, Total	93		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1316314-2								
Phenolics, Total	103		-		70-130	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1316354-2								
Chromium, Hexavalent	100		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1316418-2								
Nitrogen, Ammonia	96		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1317238-2								
TPH	97		-		64-132	-		34
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 Batch: WG1317369-2								
Chloride	102		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316253-3 QC Sample: L1957679-02 Client ID: MS Sample												
Chlorine, Total Residual	ND	0.25	ND	**0**	Q	-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316288-4 QC Sample: L1957699-02 Client ID: SEC-GP-51(OW)_20191203												
Cyanide, Total	ND	0.2	0.206	103		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316314-4 QC Sample: L1957699-02 Client ID: SEC-GP-51(OW)_20191203												
Phenolics, Total	ND	0.4	0.46	114		-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316354-4 QC Sample: L1957699-02 Client ID: SEC-GP-51(OW)_20191203												
Chromium, Hexavalent	ND	0.1	0.095	95		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316418-4 QC Sample: L1957624-02 Client ID: MS Sample												
Nitrogen, Ammonia	ND	4	3.42	86		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1317238-4 QC Sample: L1956995-01 Client ID: MS Sample												
TPH	ND	20	16.9	84		-	-		64-132	-		34
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1317369-3 QC Sample: L1957861-01 Client ID: MS Sample												
Chloride	1.24	4	5.12	103		-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316253-4 QC Sample: L1957679-01 Client ID: DUP Sample						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316288-3 QC Sample: L1957699-01 Client ID: DI-TB-27(OW)_20191203						
Cyanide, Total	ND	ND	mg/l	NC		30
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316314-3 QC Sample: L1957699-02 Client ID: SEC-GP-51(OW)_20191203						
Phenolics, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316354-3 QC Sample: L1957699-02 Client ID: SEC-GP-51(OW)_20191203						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316418-3 QC Sample: L1957624-01 Client ID: DUP Sample						
Nitrogen, Ammonia	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1316448-2 QC Sample: L1957577-01 Client ID: DUP Sample						
Solids, Total Suspended	93	98	mg/l	5		29
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1317238-3 QC Sample: L1956873-01 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1317369-4 QC Sample: L1957861-01 Client ID: DUP Sample						
Chloride	1.24	1.45	mg/l	16		18

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
B	Absent
D	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1957699-01A	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1957699-01B	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1957699-01C	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1957699-01D	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1957699-01E	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		504(14)
L1957699-01F	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		504(14)
L1957699-01G	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		504(14)
L1957699-01H	Vial Na2S2O3 preserved	B	NA		3.3	Y	Absent		504(14)
L1957699-01I	Vial unpreserved	B	NA		3.3	Y	Absent		SUB-ETHANOL(14)
L1957699-01J	Vial unpreserved	B	NA		3.3	Y	Absent		SUB-ETHANOL(14)
L1957699-01K	Vial unpreserved	B	NA		3.3	Y	Absent		SUB-ETHANOL(14)
L1957699-01L	Vial unpreserved	B	NA		3.3	Y	Absent		SUB-ETHANOL(14)
L1957699-01M	Plastic 250ml NaOH preserved	B	>12	>12	3.3	Y	Absent		TCN-4500(14)
L1957699-01N	Plastic 250ml NaOH preserved	B	>12	>12	3.3	Y	Absent		HOLD-WETCHEM()
L1957699-01O	Plastic 500ml H2SO4 preserved	B	<2	<2	3.3	Y	Absent		NH3-4500(28)
L1957699-01P	Plastic 250ml HNO3 preserved	B	<2	<2	3.3	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1957699-01Q	Plastic 250ml HNO3 preserved	B	<2	<2	3.3	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),HARDU(180),FE-UI(180),CU-2008T(180),AG-2008T(180),HG-U(28),AS-2008T(180),SE-2008T(180),PB-2008T(180),SB-2008T(180),CR-2008T(180)
L1957699-01R	Plastic 950ml unpreserved	B	7	7	3.3	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1)
L1957699-01S	Plastic 950ml unpreserved	B	7	7	3.3	Y	Absent		TSS-2540(7)
L1957699-01T	Amber 950ml H2SO4 preserved	B	<2	<2	3.3	Y	Absent		TPHENOL-420(28)

*Values in parentheses indicate holding time in days

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1957699-01U	Amber 1000ml Na2S2O3	B	7	7	3.3	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1957699-01V	Amber 1000ml Na2S2O3	B	7	7	3.3	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1957699-01W	Amber 1000ml Na2S2O3	B	7	7	3.3	Y	Absent		PCB-608.3(7)
L1957699-01W1	Amber 1000ml Na2S2O3	B	7	7	3.3	Y	Absent		PCB-608.3(7)
L1957699-01X	Amber 1000ml Na2S2O3	B	7	7	3.3	Y	Absent		PCB-608.3(7)
L1957699-01X1	Amber 1000ml Na2S2O3	B	7	7	3.3	Y	Absent		PCB-608.3(7)
L1957699-01Z	Amber 1000ml HCl preserved	B	NA		3.3	Y	Absent		TPH-1664(28)
L1957699-01Z1	Amber 1000ml HCl preserved	B	NA		3.3	Y	Absent		TPH-1664(28)
L1957699-02A	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		624.1-SIM-RGP(7),624.1-RGP(7)
L1957699-02B	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		624.1-SIM-RGP(7),624.1-RGP(7)
L1957699-02C	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		624.1-SIM-RGP(7),624.1-RGP(7)
L1957699-02D	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		624.1-SIM-RGP(7),624.1-RGP(7)
L1957699-02E	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		504(14)
L1957699-02F	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		504(14)
L1957699-02G	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		504(14)
L1957699-02H	Vial Na2S2O3 preserved	D	NA		4.9	Y	Absent		504(14)
L1957699-02I	Vial unpreserved	D	NA		4.9	Y	Absent		SUB-ETHANOL(14)
L1957699-02J	Vial unpreserved	D	NA		4.9	Y	Absent		SUB-ETHANOL(14)
L1957699-02K	Vial unpreserved	D	NA		4.9	Y	Absent		SUB-ETHANOL(14)
L1957699-02L	Vial unpreserved	D	NA		4.9	Y	Absent		SUB-ETHANOL(14)
L1957699-02M	Plastic 250ml NaOH preserved	D	>12	>12	4.9	Y	Absent		TCN-4500(14)
L1957699-02N	Plastic 250ml NaOH preserved	D	>12	>12	4.9	Y	Absent		TCN-4500(14)
L1957699-02O	Plastic 500ml H2SO4 preserved	D	<2	<2	4.9	Y	Absent		NH3-4500(28)
L1957699-02P	Plastic 250ml HNO3 preserved	D	<2	<2	4.9	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1957699-02Q	Plastic 250ml HNO3 preserved	D	<2	<2	4.9	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),HARDU(180),FE-UI(180),HG-U(28),AS-2008T(180),AG-2008T(180),SE-2008T(180),PB-2008T(180),SB-2008T(180),CR-2008T(180)
L1957699-02R	Plastic 950ml unpreserved	D	7	7	4.9	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1)

*Values in parentheses indicate holding time in days

Project Name: NASDEP
Project Number: 130437-004

Lab Number: L1957699
Report Date: 12/18/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1957699-02S	Plastic 950ml unpreserved	D	7	7	4.9	Y	Absent		TSS-2540(7)
L1957699-02T	Amber 950ml H2SO4 preserved	D	<2	<2	4.9	Y	Absent		TPHENOL-420(28)
L1957699-02U	Amber 1000ml Na2S2O3	D	7	7	4.9	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1957699-02V	Amber 1000ml Na2S2O3	D	7	7	4.9	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1957699-02W	Amber 1000ml Na2S2O3	D	7	7	4.9	Y	Absent		PCB-608.3(7)
L1957699-02W1	Amber 1000ml Na2S2O3	D	7	7	4.9	Y	Absent		PCB-608.3(7)
L1957699-02X	Amber 1000ml Na2S2O3	D	7	7	4.9	Y	Absent		PCB-608.3(7)
L1957699-02X1	Amber 1000ml Na2S2O3	D	7	7	4.9	Y	Absent		PCB-608.3(7)
L1957699-02Z	Amber 1000ml HCl preserved	D	NA		4.9	Y	Absent		TPH-1664(28)
L1957699-02Z1	Amber 1000ml HCl preserved	D	NA		4.9	Y	Absent		TPH-1664(28)

*Values in parentheses indicate holding time in days

Project Name:	NASDEP	**Lab Number:**	L1957699
Project Number:	130437-004	**Report Date:**	12/18/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	NASDEP	**Lab Number:**	L1957699
Project Number:	130437-004	**Report Date:**	12/18/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

Report Format: Data Usability Report

Project Name:	NASDEP	**Lab Number:**	L1957699
Project Number:	130437-004	**Report Date:**	12/18/19

Data Qualifiers

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name: NASDEP **Lab Number:** L1957699

Project Number: 130437-004 **Report Date:** 12/18/19

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

4 Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. Revised March 1983.

14 Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. EPA/600/4-88/039, Revised July 1991.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.

74 Method 1664,Revision A: N-Hexane Extractable Material (HEM; Oil & Grease) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry, EPA-821-R-98-002, February 1999.

107 Alpha Analytical - In-house calculation method.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

127 Method 608.3: Organochlorine Pesticides and PCBs by GC/HSD, EPA 821-R-16-009, December 2016.

128 Method 624.1: Purgeables by GC/MS, EPA 821-R-16-008, December 2016.

129 Method 625.1: Base/Neutrals and Acids by GC/MS, EPA 821-R-16-007, December 2016.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

ALPHA — CHAIN OF CUSTODY

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430 Albany, NY 12205 Tonawanda, NY 14150 Holmes, PA 19043

Page 1 of 1

Date Rec'd in Lab: 12/3/19

ALPHA Job #: L1957699

Project Information

Project Name: [redacted] NASDEP JB
Project Location: Allston, MA
Project #: [redacted] 130437-004 JB
(Use Project name as Project ☐)
Project Manager: Beck Straley
ALPHAQuote #: Harvard

Turn-Around Time

Standard ☑ Due Date:
(only if pre approved) ☐ # of Days:

H&A Information

H&A Client: Harvard
H&A Address: 465 Medford St
Boston, MA 0212-1400
H&A Phone: 617-886-7400
H&A Fax:
H&A Email: bstraley@haleyaldrich.com

Deliverables

☑ Email ☐ Fax
☑ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other:

Regulatory Requirements (Program/Criteria)

NPDES RGP

Note: Select State from menu & identify criteria.

Billing Information

☑ Same as Client Info
PO #

Disposal Site Information

Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

3. HOLD PACN & ACN 11. Dissolved Metals ON HOLD (Field Filtered)
Please sample per EPA Approved 2017 RGP Permit methods

Please specify Metals or TAL.

ANALYSIS

1. TSS - 2540
2. TRC-4500
3.-TCN-4500 HOLD PACN & ACN
4. 504
5. 624.1, 634.1 SIM for Dioxane
6. HEXCR-3500 & Trivalent Chromium
7. TPHENOL-420
8. 625.1 (including Diethylhexylphthalate)
9. 625.1-SIM
10. CL-300
11. Total Metals - Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Zn, Fe, Hg
12. Ammonia
13. Total Hardness
14. A2-ALCOHOL (Ethanol)
15. TPH-1664
16. PCB-608

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Sample Specific Comments	Total Bottles
57699-01	DI-TB-27(OW)_20191203	12/3/2019	1025	AQ	JB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		22
-02	SEC-GP-51(OW)_20191203	12/3/2019	1250	AQ	JB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		22

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type
Preservative

Relinquished By:	Date/Time	Received By:	Date/Time
Jacle Bitens	12/3/19-16:04	RA Oliver	12/3/19 16:19
RA Oliver	12/3/19-16:??	[illegible] AAL	12/3/19 16:??
[illegible]	12/3/19 17:??	Alana Rivas AAL	12/3/19 1740

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/28/2016)

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Tek Lab, Inc.
5445 Horsehoe Lake Road
Collinsville, IL 62234-7425

Alpha Job Number
L1957699

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 603.319.5010 Email: mgulli@alphalab.com	Project Location: MA Project Manager: Melissa Gulli **Turnaround & Deliverables Information** Due Date: Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1957699

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	DI-TB-27(OW)_20191203	12-03-19 10:25	WATER	Ethanol by EPA 1671 Revision A	
	SEC-GP-51(OW)_20191203	12-03-19 12:50	WATER	Ethanol by EPA 1671 Revision A	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		12/4/19		
Form No: AL_subcoc				

December 18, 2019

Melissa Gulli
Alpha Analytical
145 Flanders Road
Westborough, MA 01581
TEL: (603) 319-5010
FAX:

RE: L1957699 **WorkOrder:** 19120325

Dear Melissa Gulli:

TEKLAB, INC received 2 samples on 12/5/2019 10:21:00 AM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Marvin L. Darling II

Marvin L. Darling
Project Manager
(618)344-1004 ex 41
mdarling@teklabinc.com

Teklab, Inc.
Environmental Laboratory

Report Contents

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 19120325
Client Project: L1957699
Report Date: 18-Dec-2019

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	4
Accreditations	5
Laboratory Results	6
Quality Control Results	8
Receiving Check List	9
Chain of Custody	Appended

Teklab, Inc.
Environmental Laboratory

Definitions

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 19120325
Client Project: L1957699
Report Date: 18-Dec-2019

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Qualifiers

# -	Unknown hydrocarbon	B -	Analyte detected in associated Method Blank
C -	RL shown is a Client Requested Quantitation Limit	E -	Value above quantitation range
H -	Holding times exceeded	I -	Associated internal standard was outside method criteria
J -	Analyte detected below quantitation limits	M -	Manual Integration used to determine area response
ND -	Not Detected at the Reporting Limit	R -	RPD outside accepted recovery limits
S -	Spike Recovery outside recovery limits	T -	TIC(Tentatively identified compound)
X -	Value exceeds Maximum Contaminant Level		

Teklab, Inc.
Environmental Laboratory

Case Narrative

http://www.teklabinc.com/

Client: Alpha Analytical
Client Project: L1957699

Work Order: 19120325
Report Date: 18-Dec-2019

Cooler Receipt Temp: 1.8 °C

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Teklab, Inc. Environmental Laboratory

Accreditations

http://www.teklabinc.com/

Client: Alpha Analytical

Work Order: 19120325

Client Project: L1957699

Report Date: 18-Dec-2019

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2020	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2020	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2020	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2020	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2020	Collinsville
Arkansas	ADEQ	88-0966		3/14/2020	Collinsville
Illinois	IDPH	17584		5/31/2021	Collinsville
Indiana	ISDH	C-IL-06		1/31/2020	Collinsville
Kentucky	KDEP	98006		12/31/2019	Collinsville
Kentucky	UST	0073		1/31/2020	Collinsville
Louisiana	LDPH	LA016		12/31/2019	Collinsville
Missouri	MDNR	930		1/31/2022	Collinsville
Missouri	MDNR	00930		5/31/2021	Collinsville
Tennessee	TDEC	04905		1/31/2020	Collinsville

Teklab, Inc. Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 19120325
Client Project: L1957699
Report Date: 18-Dec-2019
Lab ID: 19120325-001
Client Sample ID: DI-TB-27 (OW)_20191203
Matrix: AQUEOUS
Collection Date: 12/03/2019 10:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 1671A, PHARMACEUTICAL MANUFACTURING INDUSTRY NON-PURGEABLE VOLATILE ORGANICS								
Ethanol	*	20		**ND**	mg/L	1	12/16/2019 12:15	R270631

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 19120325
Client Project: L1957699
Report Date: 18-Dec-2019
Lab ID: 19120325-002
Client Sample ID: SEC-GP-51 (OW)_20191203
Matrix: AQUEOUS
Collection Date: 12/03/2019 12:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 1671A, PHARMACEUTICAL MANUFACTURING INDUSTRY NON-PURGEABLE VOLATILE ORGANICS								
Ethanol	*	20		**ND**	mg/L	1	12/17/2019 12:14	R270651

Teklab, Inc. Environmental Laboratory

Quality Control Results

http://www.teklabinc.com/

Client: Alpha Analytical
Client Project: L1957699

Work Order: 19120325
Report Date: 18-Dec-2019

EPA 600 1671A, PHARMACEUTICAL MANUFACTURING INDUSTRY NON-PURGEABLE VOLATILE ORG

Batch R270631 **SampType:** MBLK Units **mg/L**
SampID: MBLK-191216

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	20		**ND**						12/16/2019

Batch R270631 **SampType:** LCS Units **mg/L**
SampID: LCS-191216

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	20		**320**	250.0	0	126.6	70	132	12/16/2019

Batch R270631 **SampType:** MS Units **mg/L**
SampID: 19120325-001AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	20		**310**	250.0	0	122.6	70	132	12/16/2019

Batch R270631 **SampType:** MSD Units **mg/L** RPD Limit **30**
SampID: 19120325-001AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Ethanol	20		**300**	250.0	0	121.0	306.4	1.25	12/16/2019

Batch R270651 **SampType:** MBLK Units **mg/L**
SampID: MBLK-191217

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	20		**ND**						12/17/2019

Batch R270651 **SampType:** LCS Units **mg/L**
SampID: LCS-191217

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	20		**290**	250.0	0	115.8	70	132	12/17/2019

Batch R270651 **SampType:** MS Units **mg/L**
SampID: 19121012-001AMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	20		**280**	250.0	0	111.8	70	132	12/17/2019

Batch R270651 **SampType:** MSD Units **mg/L** RPD Limit **30**
SampID: 19121012-001AMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Ethanol	20		**310**	250.0	0	122.1	279.4	8.81	12/17/2019

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: Alpha Analytical
Client Project: L1957699

Work Order: 19120325
Report Date: 18-Dec-2019

Carrier: UPS

Received By: KMT

Completed by: Amber M. Dilallo
On: 05-Dec-2019

Reviewed by: Marvin L. Darling
On: 05-Dec-2019

Pages to follow: Chain of custody 1 Extra pages included 0

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 1.8
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☑	No ☐	No VOA vials ☐
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

19120325

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Tek Lab, Inc.
5445 Horsehoe Lake Road
Collinsville, IL 62234-7425

Alpha Job Number
L1957699

Client Information

Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019

Phone: 603.319.5010
Email: mgulli@alphalab.com

Project Information

Project Location: MA
Project Manager: Melissa Gulli

Turnaround & Deliverables Information

Due Date:
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1957699

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
19120325-001	DI-TB-27(OW)_20191203	12-03-19 10:25	WATER	Ethanol by EPA 1671 Revision A	
002	SEC-GP-51(OW)_20191203	12-03-19 12:50	WATER	Ethanol by EPA 1671 Revision A	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		12/4/19	UPS	12/5/19 1021
Form No: AL_subcoc				

1.8°C CLT03 OLHS VM 12/5/19

JOB: L1809146 REPORT STYLE: Data Usability Report
0010: Alpha Analytical Report Cover Page - OK
0015: Sample Cross Reference Summary - OK
0060: Case Narrative - OK
0100: Volatiles Cover Page - OK
0110: Volatiles Sample Results - OK
0120: Volatiles Method Blank Report - OK
0130: Volatiles LCS Report - OK
0150: Volatiles Matrix SpikeReport - OK
0180: Semivolatiles Cover Page - OK
0190: Semivolatiles Sample Results - OK
0200: Semivolatiles Method Blank Report - OK
0210: Semivolatiles LCS Report - OK
0700: PCBs Cover Page - OK
0710: PCBs Sample Results - OK
0720: PCBs Method Blank Report - OK
0730: PCBs LCS Report - OK
0750: PCBs Matrix Spike Report - OK
0760: PCBs Duplicate Report - OK
1005: Metals Sample Results - OK
1010: Metals Method Blank Report - OK
1020: Metals LCS Report - OK
1040: Metals Matrix Spike Report - OK
1050: Metals Duplicate Report - OK
1180: Inorganics Cover Page - OK
1200: Wet Chemistry Sample Results - OK
1210: Wet Chemistry Method Blank Report - OK
1220: Wet Chemistry LCS Report - OK
1240: Wet Chemistry Matrix Spike Report - OK
1250: Wet Chemistry Duplicate Report - OK
5100: Sample Receipt & Container Information Report - OK
5200: Glossary - OK
5400: References - OK

ANALYTICAL REPORT

Lab Number:	L1809146
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Beck Straley
Phone:	(617) 886-7400
Project Name:	SCIENCE DRIVE AND SOUTH OF SCI
Project Number:	129379-010
Report Date:	03/22/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1809146-01	HA18-SCIENCE-NPDES_03/16/2018	WATER	ALLSTON, MA	03/16/18 14:00	03/16/18
L1809146-02	TRIP BLANK	WATER	ALLSTON, MA	03/16/18 00:00	03/16/18

Project Name:	SCIENCE DRIVE AND SOUTH OF SCI	**Lab Number:**	L1809146
Project Number:	129379-010	**Report Date:**	03/22/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	SCIENCE DRIVE AND SOUTH OF SCI	**Lab Number:**	L1809146
Project Number:	129379-010	**Report Date:**	03/22/18

Case Narrative (continued)

Report Submission

March 22, 2018: This is a preliminary report.

Chlorine, Total Residual

The WG1097951-4 MS recovery (0%), performed on L1809146-01 (HA18-SCIENCE-NPDES_03/16/2018), is outside the acceptance criteria; however, the associated LCS recovery is within criteria. No further action was taken.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Amita Naik

Title: Technical Director/Representative Date: 03/22/18

ORGANICS

VOLATILES

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 03/21/18 13:34
Analyst: PK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	--	1
1,1-Dichloroethane	ND		ug/l	0.75	--	1
Chloroform	ND		ug/l	0.75	--	1
Carbon tetrachloride	ND		ug/l	0.50	--	1
1,2-Dichloropropane	ND		ug/l	1.8	--	1
Dibromochloromethane	ND		ug/l	0.50	--	1
1,1,2-Trichloroethane	ND		ug/l	0.75	--	1
Tetrachloroethene	ND		ug/l	0.50	--	1
Chlorobenzene	2.1		ug/l	0.50	--	1
Trichlorofluoromethane	ND		ug/l	2.5	--	1
1,2-Dichloroethane	ND		ug/l	0.50	--	1
1,1,1-Trichloroethane	ND		ug/l	0.50	--	1
Bromodichloromethane	ND		ug/l	0.50	--	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	--	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	--	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	--	1
1,1-Dichloropropene	ND		ug/l	2.5	--	1
Bromoform	ND		ug/l	2.0	--	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Benzene	ND		ug/l	0.50	--	1
Toluene	ND		ug/l	0.75	--	1
Ethylbenzene	ND		ug/l	0.50	--	1
Chloromethane	ND		ug/l	2.5	--	1
Bromomethane	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	1.0	--	1
Chloroethane	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	0.50	--	1
1,2-Dichloroethene, Total	ND		ug/l	0.50	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	ND		ug/l	0.50	--	1
1,2-Dichlorobenzene	ND		ug/l	2.5	--	1
1,3-Dichlorobenzene	ND		ug/l	2.5	--	1
1,4-Dichlorobenzene	ND		ug/l	2.5	--	1
Methyl tert butyl ether	ND		ug/l	1.0	--	1
p/m-Xylene	ND		ug/l	1.0	--	1
o-Xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	--	1
Dibromomethane	ND		ug/l	5.0	--	1
1,4-Dichlorobutane	ND		ug/l	5.0	--	1
1,2,3-Trichloropropane	ND		ug/l	5.0	--	1
Styrene	ND		ug/l	1.0	--	1
Dichlorodifluoromethane	ND		ug/l	5.0	--	1
Acetone	ND		ug/l	5.0	--	1
Carbon disulfide	ND		ug/l	5.0	--	1
2-Butanone	ND		ug/l	5.0	--	1
Vinyl acetate	ND		ug/l	5.0	--	1
4-Methyl-2-pentanone	ND		ug/l	5.0	--	1
2-Hexanone	ND		ug/l	5.0	--	1
Ethyl methacrylate	ND		ug/l	5.0	--	1
Acrylonitrile	ND		ug/l	5.0	--	1
Bromochloromethane	ND		ug/l	2.5	--	1
Tetrahydrofuran	ND		ug/l	5.0	--	1
2,2-Dichloropropane	ND		ug/l	2.5	--	1
1,2-Dibromoethane	ND		ug/l	2.0	--	1
1,3-Dichloropropane	ND		ug/l	2.5	--	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Bromobenzene	ND		ug/l	2.5	--	1
n-Butylbenzene	ND		ug/l	0.50	--	1
sec-Butylbenzene	ND		ug/l	0.50	--	1
tert-Butylbenzene	ND		ug/l	2.5	--	1
o-Chlorotoluene	ND		ug/l	2.5	--	1
p-Chlorotoluene	ND		ug/l	2.5	--	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Isopropylbenzene	ND		ug/l	0.50	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01 Date Collected: 03/16/18 14:00

Client ID: HA18-SCIENCE-NPDES_03/16/2018 Date Received: 03/16/18

Sample Location: ALLSTON, MA Field Prep: Field Filtered (Dissolved Metals)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
p-Isopropyltoluene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	2.5	--	1
n-Propylbenzene	ND		ug/l	0.50	--	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	--	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	--	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	--	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	--	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	--	1
Ethyl ether	ND		ug/l	2.5	--	1
Tert-Butyl Alcohol	ND		ug/l	10	--	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	95		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	110		70-130
Dibromofluoromethane	102		70-130

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Lab Number: L1809146
Project Number: 129379-010
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C-SIM(M)
Analytical Date: 03/21/18 13:34
Analyst: PK

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-SIM - Westborough Lab						
1,4-Dioxane	ND		ug/l	3.0	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Lab Number: L1809146
Project Number: 129379-010
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 03/22/18 11:57
Analyst: NS

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Extraction Method: EPA 504.1
Extraction Date: 03/22/18 09:35

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Microextractables by GC - Westborough Lab							
1,2-Dibromoethane	ND		ug/l	0.010	--	1	A
1,2-Dibromo-3-chloropropane	ND		ug/l	0.010	--	1	A

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-02
Client ID: TRIP BLANK
Sample Location: ALLSTON, MA

Date Collected: 03/16/18 00:00
Date Received: 03/16/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 03/21/18 10:13
Analyst: PK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	--	1
1,1-Dichloroethane	ND		ug/l	0.75	--	1
Chloroform	ND		ug/l	0.75	--	1
Carbon tetrachloride	ND		ug/l	0.50	--	1
1,2-Dichloropropane	ND		ug/l	1.8	--	1
Dibromochloromethane	ND		ug/l	0.50	--	1
1,1,2-Trichloroethane	ND		ug/l	0.75	--	1
Tetrachloroethene	ND		ug/l	0.50	--	1
Chlorobenzene	ND		ug/l	0.50	--	1
Trichlorofluoromethane	ND		ug/l	2.5	--	1
1,2-Dichloroethane	ND		ug/l	0.50	--	1
1,1,1-Trichloroethane	ND		ug/l	0.50	--	1
Bromodichloromethane	ND		ug/l	0.50	--	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	--	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	--	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	--	1
1,1-Dichloropropene	ND		ug/l	2.5	--	1
Bromoform	ND		ug/l	2.0	--	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Benzene	ND		ug/l	0.50	--	1
Toluene	ND		ug/l	0.75	--	1
Ethylbenzene	ND		ug/l	0.50	--	1
Chloromethane	ND		ug/l	2.5	--	1
Bromomethane	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	1.0	--	1
Chloroethane	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	0.50	--	1
1,2-Dichloroethene, Total	ND		ug/l	0.50	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-02 Date Collected: 03/16/18 00:00

Client ID: TRIP BLANK Date Received: 03/16/18

Sample Location: ALLSTON, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	ND		ug/l	0.50	--	1
1,2-Dichlorobenzene	ND		ug/l	2.5	--	1
1,3-Dichlorobenzene	ND		ug/l	2.5	--	1
1,4-Dichlorobenzene	ND		ug/l	2.5	--	1
Methyl tert butyl ether	ND		ug/l	1.0	--	1
p/m-Xylene	ND		ug/l	1.0	--	1
o-Xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	--	1
Dibromomethane	ND		ug/l	5.0	--	1
1,4-Dichlorobutane	ND		ug/l	5.0	--	1
1,2,3-Trichloropropane	ND		ug/l	5.0	--	1
Styrene	ND		ug/l	1.0	--	1
Dichlorodifluoromethane	ND		ug/l	5.0	--	1
Acetone	ND		ug/l	5.0	--	1
Carbon disulfide	ND		ug/l	5.0	--	1
2-Butanone	ND		ug/l	5.0	--	1
Vinyl acetate	ND		ug/l	5.0	--	1
4-Methyl-2-pentanone	ND		ug/l	5.0	--	1
2-Hexanone	ND		ug/l	5.0	--	1
Ethyl methacrylate	ND		ug/l	5.0	--	1
Acrylonitrile	ND		ug/l	5.0	--	1
Bromochloromethane	ND		ug/l	2.5	--	1
Tetrahydrofuran	ND		ug/l	5.0	--	1
2,2-Dichloropropane	ND		ug/l	2.5	--	1
1,2-Dibromoethane	ND		ug/l	2.0	--	1
1,3-Dichloropropane	ND		ug/l	2.5	--	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Bromobenzene	ND		ug/l	2.5	--	1
n-Butylbenzene	ND		ug/l	0.50	--	1
sec-Butylbenzene	ND		ug/l	0.50	--	1
tert-Butylbenzene	ND		ug/l	2.5	--	1
o-Chlorotoluene	ND		ug/l	2.5	--	1
p-Chlorotoluene	ND		ug/l	2.5	--	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Isopropylbenzene	ND		ug/l	0.50	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-02 Date Collected: 03/16/18 00:00

Client ID: TRIP BLANK Date Received: 03/16/18

Sample Location: ALLSTON, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
p-Isopropyltoluene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	2.5	--	1
n-Propylbenzene	ND		ug/l	0.50	--	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	--	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	--	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	--	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	--	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	--	1
Ethyl ether	ND		ug/l	2.5	--	1
Tert-Butyl Alcohol	ND		ug/l	10	--	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	100		70-130
Toluene-d8	101		70-130
4-Bromofluorobenzene	107		70-130
Dibromofluoromethane	104		70-130

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-02
Client ID: TRIP BLANK
Sample Location: ALLSTON, MA

Date Collected: 03/16/18 00:00
Date Received: 03/16/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C-SIM(M)
Analytical Date: 03/21/18 10:13
Analyst: PK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-SIM - Westborough Lab						
1,4-Dioxane	ND		ug/l	3.0	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Lab Number: L1809146
Project Number: 129379-010
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-02
Client ID: TRIP BLANK
Sample Location: ALLSTON, MA

Date Collected: 03/16/18 00:00
Date Received: 03/16/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 03/22/18 12:14
Analyst: NS

Extraction Method: EPA 504.1
Extraction Date: 03/22/18 09:35

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Microextractables by GC - Westborough Lab							
1,2-Dibromoethane	ND		ug/l	0.010	--	1	A
1,2-Dibromo-3-chloropropane	ND		ug/l	0.010	--	1	A

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/21/18 06:52
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1099277-5					
Methylene chloride	ND		ug/l	3.0	--
1,1-Dichloroethane	ND		ug/l	0.75	--
Chloroform	ND		ug/l	0.75	--
Carbon tetrachloride	ND		ug/l	0.50	--
1,2-Dichloropropane	ND		ug/l	1.8	--
Dibromochloromethane	ND		ug/l	0.50	--
1,1,2-Trichloroethane	ND		ug/l	0.75	--
Tetrachloroethene	ND		ug/l	0.50	--
Chlorobenzene	ND		ug/l	0.50	--
Trichlorofluoromethane	ND		ug/l	2.5	--
1,2-Dichloroethane	ND		ug/l	0.50	--
1,1,1-Trichloroethane	ND		ug/l	0.50	--
Bromodichloromethane	ND		ug/l	0.50	--
trans-1,3-Dichloropropene	ND		ug/l	0.50	--
cis-1,3-Dichloropropene	ND		ug/l	0.50	--
1,3-Dichloropropene, Total	ND		ug/l	0.50	--
1,1-Dichloropropene	ND		ug/l	2.5	--
Bromoform	ND		ug/l	2.0	--
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--
Benzene	ND		ug/l	0.50	--
Toluene	ND		ug/l	0.75	--
Ethylbenzene	ND		ug/l	0.50	--
Chloromethane	ND		ug/l	2.5	--
Bromomethane	ND		ug/l	1.0	--
Vinyl chloride	ND		ug/l	1.0	--
Chloroethane	ND		ug/l	1.0	--
1,1-Dichloroethene	ND		ug/l	0.50	--
1,2-Dichloroethene, Total	ND		ug/l	0.50	--
Trichloroethene	ND		ug/l	0.50	--

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/21/18 06:52
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1099277-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	--
1,3-Dichlorobenzene	ND		ug/l	2.5	--
1,4-Dichlorobenzene	ND		ug/l	2.5	--
Methyl tert butyl ether	ND		ug/l	1.0	--
p/m-Xylene	ND		ug/l	1.0	--
o-Xylene	ND		ug/l	1.0	--
Xylenes, Total	ND		ug/l	1.0	--
cis-1,2-Dichloroethene	ND		ug/l	0.50	--
Dibromomethane	ND		ug/l	5.0	--
1,4-Dichlorobutane	ND		ug/l	5.0	--
1,2,3-Trichloropropane	ND		ug/l	5.0	--
Styrene	ND		ug/l	1.0	--
Dichlorodifluoromethane	ND		ug/l	5.0	--
Acetone	ND		ug/l	5.0	--
Carbon disulfide	ND		ug/l	5.0	--
2-Butanone	ND		ug/l	5.0	--
Vinyl acetate	ND		ug/l	5.0	--
4-Methyl-2-pentanone	ND		ug/l	5.0	--
2-Hexanone	ND		ug/l	5.0	--
Ethyl methacrylate	ND		ug/l	5.0	--
Acrylonitrile	ND		ug/l	5.0	--
Bromochloromethane	ND		ug/l	2.5	--
Tetrahydrofuran	ND		ug/l	5.0	--
2,2-Dichloropropane	ND		ug/l	2.5	--
1,2-Dibromoethane	ND		ug/l	2.0	--
1,3-Dichloropropane	ND		ug/l	2.5	--
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--
Bromobenzene	ND		ug/l	2.5	--
n-Butylbenzene	ND		ug/l	0.50	--

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/21/18 06:52
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1099277-5					
sec-Butylbenzene	ND		ug/l	0.50	--
tert-Butylbenzene	ND		ug/l	2.5	--
o-Chlorotoluene	ND		ug/l	2.5	--
p-Chlorotoluene	ND		ug/l	2.5	--
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	--
Hexachlorobutadiene	ND		ug/l	0.50	--
Isopropylbenzene	ND		ug/l	0.50	--
p-Isopropyltoluene	ND		ug/l	0.50	--
Naphthalene	ND		ug/l	2.5	--
n-Propylbenzene	ND		ug/l	0.50	--
1,2,3-Trichlorobenzene	ND		ug/l	2.5	--
1,2,4-Trichlorobenzene	ND		ug/l	2.5	--
1,3,5-Trimethylbenzene	ND		ug/l	2.5	--
1,2,4-Trimethylbenzene	ND		ug/l	2.5	--
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	--
Ethyl ether	ND		ug/l	2.5	--
Tert-Butyl Alcohol	ND		ug/l	10	--
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	94		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	108		70-130
Dibromofluoromethane	97		70-130

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C-SIM(M)
Analytical Date: 03/21/18 06:52
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01-02 Batch: WG1099282-5					
1,4-Dioxane	ND		ug/l	3.0	--

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 03/22/18 11:08
Analyst: NS

Extraction Method: EPA 504.1
Extraction Date: 03/22/18 09:35

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01-02 Batch: WG1099492-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A
1,2-Dibromo-3-chloropropane	ND		ug/l	0.010	--	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1099277-3 WG1099277-4								
Methylene chloride	100		100		70-130	0		20
1,1-Dichloroethane	100		100		70-130	0		20
Chloroform	100		100		70-130	0		20
Carbon tetrachloride	98		100		63-132	2		20
1,2-Dichloropropane	100		100		70-130	0		20
Dibromochloromethane	98		98		63-130	0		20
1,1,2-Trichloroethane	110		110		70-130	0		20
Tetrachloroethene	92		92		70-130	0		20
Chlorobenzene	100		100		75-130	0		25
Trichlorofluoromethane	91		93		62-150	2		20
1,2-Dichloroethane	97		100		70-130	3		20
1,1,1-Trichloroethane	100		100		67-130	0		20
Bromodichloromethane	100		100		67-130	0		20
trans-1,3-Dichloropropene	100		100		70-130	0		20
cis-1,3-Dichloropropene	99		100		70-130	1		20
1,1-Dichloropropene	98		100		70-130	2		20
Bromoform	92		95		54-136	3		20
1,1,2,2-Tetrachloroethane	110		120		67-130	9		20
Benzene	110		110		70-130	0		25
Toluene	100		100		70-130	0		25
Ethylbenzene	100		100		70-130	0		20
Chloromethane	100		100		64-130	0		20
Bromomethane	100		99		39-139	1		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1099277-3 WG1099277-4								
Vinyl chloride	90		92		55-140	2		20
Chloroethane	87		88		55-138	1		20
1,1-Dichloroethene	95		94		61-145	1		25
Trichloroethene	100		100		70-130	0		25
1,2-Dichlorobenzene	100		110		70-130	10		20
1,3-Dichlorobenzene	100		100		70-130	0		20
1,4-Dichlorobenzene	100		110		70-130	10		20
Methyl tert butyl ether	99		100		63-130	1		20
p/m-Xylene	105		105		70-130	0		20
o-Xylene	105		105		70-130	0		20
cis-1,2-Dichloroethene	100		100		70-130	0		20
Dibromomethane	100		100		70-130	0		20
1,4-Dichlorobutane	110		110		70-130	0		20
1,2,3-Trichloropropane	110		120		64-130	9		20
Styrene	95		95		70-130	0		20
Dichlorodifluoromethane	94		94		36-147	0		20
Acetone	95		100		58-148	5		20
Carbon disulfide	89		91		51-130	2		20
2-Butanone	99		97		63-138	2		20
Vinyl acetate	98		100		70-130	2		20
4-Methyl-2-pentanone	92		91		59-130	1		20
2-Hexanone	89		86		57-130	3		20
Ethyl methacrylate	92		96		70-130	4		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1099277-3 WG1099277-4								
Acrylonitrile	98		100		70-130	2		20
Bromochloromethane	110		110		70-130	0		20
Tetrahydrofuran	130		130		58-130	0		20
2,2-Dichloropropane	100		100		63-133	0		20
1,2-Dibromoethane	100		100		70-130	0		20
1,3-Dichloropropane	100		100		70-130	0		20
1,1,1,2-Tetrachloroethane	100		100		64-130	0		20
Bromobenzene	97		100		70-130	3		20
n-Butylbenzene	100		100		53-136	0		20
sec-Butylbenzene	100		100		70-130	0		20
tert-Butylbenzene	95		100		70-130	5		20
o-Chlorotoluene	110		110		70-130	0		20
p-Chlorotoluene	110		110		70-130	0		20
1,2-Dibromo-3-chloropropane	91		87		41-144	4		20
Hexachlorobutadiene	80		81		63-130	1		20
Isopropylbenzene	99		100		70-130	1		20
p-Isopropyltoluene	97		100		70-130	3		20
Naphthalene	91		98		70-130	7		20
n-Propylbenzene	110		120		69-130	9		20
1,2,3-Trichlorobenzene	86		91		70-130	6		20
1,2,4-Trichlorobenzene	87		91		70-130	4		20
1,3,5-Trimethylbenzene	100		100		64-130	0		20
1,2,4-Trimethylbenzene	100		100		70-130	0		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1099277-3 WG1099277-4								
trans-1,4-Dichloro-2-butene	100		110		70-130	10		20
Ethyl ether	91		91		59-134	0		20
Tert-Butyl Alcohol	96		102		70-130	6		20
Tertiary-Amyl Methyl Ether	100		100		66-130	0		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	95		94		70-130
Toluene-d8	101		98		70-130
4-Bromofluorobenzene	107		107		70-130
Dibromofluoromethane	98		97		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01-02 Batch: WG1099282-3 WG1099282-4								
1,4-Dioxane	94		100		70-130	6		25

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab	Associated sample(s): 01-02 Batch: WG1099492-2								
1,2-Dibromoethane	99		-		80-120	-			A
1,2-Dibromo-3-chloropropane	94		-		80-120	-			A

Matrix Spike Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*	*Column*
Microextractables by GC - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1099492-3 QC Sample: L1809146-01 Client ID: HA18-SCIENCE-NPDES_03/16/2018													
1,2-Dibromoethane	ND	0.259	0.271	105		-	-		80-120	-		20	A
1,2-Dibromo-3-chloropropane	ND	0.259	0.253	98		-	-		80-120	-		20	A

SEMIVOLATILES

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Lab Number: L1809146
Project Number: 129379-010
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA

Sample Depth:
Matrix: Water
Analytical Method: 1,8270D
Analytical Date: 03/19/18 13:35
Analyst: RC

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:12

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Benzidine	ND		ug/l	20	--	1
1,2,4-Trichlorobenzene	ND		ug/l	5.0	--	1
Bis(2-chloroethyl)ether	ND		ug/l	2.0	--	1
1,2-Dichlorobenzene	ND		ug/l	2.0	--	1
1,3-Dichlorobenzene	ND		ug/l	2.0	--	1
1,4-Dichlorobenzene	ND		ug/l	2.0	--	1
3,3'-Dichlorobenzidine	ND		ug/l	5.0	--	1
2,4-Dinitrotoluene	ND		ug/l	5.0	--	1
2,6-Dinitrotoluene	ND		ug/l	5.0	--	1
Azobenzene	ND		ug/l	2.0	--	1
4-Chlorophenyl phenyl ether	ND		ug/l	2.0	--	1
4-Bromophenyl phenyl ether	ND		ug/l	2.0	--	1
Bis(2-chloroisopropyl)ether	ND		ug/l	2.0	--	1
Bis(2-chloroethoxy)methane	ND		ug/l	5.0	--	1
Hexachlorocyclopentadiene	ND		ug/l	20	--	1
Isophorone	ND		ug/l	5.0	--	1
Nitrobenzene	ND		ug/l	2.0	--	1
NDPA/DPA	ND		ug/l	2.0	--	1
n-Nitrosodi-n-propylamine	ND		ug/l	5.0	--	1
Bis(2-ethylhexyl)phthalate	ND		ug/l	3.0	--	1
Butyl benzyl phthalate	ND		ug/l	5.0	--	1
Di-n-butylphthalate	ND		ug/l	5.0	--	1
Di-n-octylphthalate	ND		ug/l	5.0	--	1
Diethyl phthalate	ND		ug/l	5.0	--	1
Dimethyl phthalate	ND		ug/l	5.0	--	1
Biphenyl	ND		ug/l	2.0	--	1
Aniline	ND		ug/l	2.0	--	1
4-Chloroaniline	ND		ug/l	5.0	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01 Date Collected: 03/16/18 14:00

Client ID: HA18-SCIENCE-NPDES_03/16/2018 Date Received: 03/16/18

Sample Location: ALLSTON, MA Field Prep: Field Filtered (Dissolved Metals)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
2-Nitroaniline	ND		ug/l	5.0	--	1
3-Nitroaniline	ND		ug/l	5.0	--	1
4-Nitroaniline	ND		ug/l	5.0	--	1
Dibenzofuran	ND		ug/l	2.0	--	1
n-Nitrosodimethylamine	ND		ug/l	2.0	--	1
2,4,6-Trichlorophenol	ND		ug/l	5.0	--	1
p-Chloro-m-cresol	ND		ug/l	2.0	--	1
2-Chlorophenol	ND		ug/l	2.0	--	1
2,4-Dichlorophenol	ND		ug/l	5.0	--	1
2,4-Dimethylphenol	ND		ug/l	5.0	--	1
2-Nitrophenol	ND		ug/l	10	--	1
4-Nitrophenol	ND		ug/l	10	--	1
2,4-Dinitrophenol	ND		ug/l	20	--	1
4,6-Dinitro-o-cresol	ND		ug/l	10	--	1
Phenol	ND		ug/l	5.0	--	1
2-Methylphenol	ND		ug/l	5.0	--	1
3-Methylphenol/4-Methylphenol	ND		ug/l	5.0	--	1
2,4,5-Trichlorophenol	ND		ug/l	5.0	--	1
Benzoic Acid	ND		ug/l	50	--	1
Benzyl Alcohol	ND		ug/l	2.0	--	1
Carbazole	ND		ug/l	2.0	--	1
Pyridine	ND		ug/l	3.5	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	52		21-120
Phenol-d6	39		10-120
Nitrobenzene-d5	82		23-120
2-Fluorobiphenyl	82		15-120
2,4,6-Tribromophenol	100		10-120
4-Terphenyl-d14	99		41-149

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Lab Number: L1809146
Project Number: 129379-010
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA

Sample Depth:
Matrix: Water
Analytical Method: 1,8270D-SIM
Analytical Date: 03/20/18 12:40
Analyst: DV

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	ND		ug/l	0.10	--	1
2-Chloronaphthalene	ND		ug/l	0.20	--	1
Fluoranthene	ND		ug/l	0.10	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	0.10	--	1
Benzo(a)anthracene	ND		ug/l	0.10	--	1
Benzo(a)pyrene	ND		ug/l	0.10	--	1
Benzo(b)fluoranthene	ND		ug/l	0.10	--	1
Benzo(k)fluoranthene	ND		ug/l	0.10	--	1
Chrysene	ND		ug/l	0.10	--	1
Acenaphthylene	ND		ug/l	0.10	--	1
Anthracene	ND		ug/l	0.10	--	1
Benzo(ghi)perylene	ND		ug/l	0.10	--	1
Fluorene	ND		ug/l	0.10	--	1
Phenanthrene	ND		ug/l	0.10	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--	1
Pyrene	ND		ug/l	0.10	--	1
1-Methylnaphthalene	ND		ug/l	0.10	--	1
2-Methylnaphthalene	ND		ug/l	0.10	--	1
Pentachlorophenol	ND		ug/l	0.80	--	1
Hexachlorobenzene	ND		ug/l	0.80	--	1
Hexachloroethane	ND		ug/l	0.80	--	1

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	40		21-120
Phenol-d6	28		10-120
Nitrobenzene-d5	77		23-120
2-Fluorobiphenyl	93		15-120
2,4,6-Tribromophenol	82		10-120
4-Terphenyl-d14	101		41-149

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 03/19/18 12:19
Analyst: RC

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:12

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1098175-1					
Acenaphthene	ND		ug/l	2.0	--
Benzidine	ND		ug/l	20	--
1,2,4-Trichlorobenzene	ND		ug/l	5.0	--
Hexachlorobenzene	ND		ug/l	2.0	--
Bis(2-chloroethyl)ether	ND		ug/l	2.0	--
2-Chloronaphthalene	ND		ug/l	2.0	--
1,2-Dichlorobenzene	ND		ug/l	2.0	--
1,3-Dichlorobenzene	ND		ug/l	2.0	--
1,4-Dichlorobenzene	ND		ug/l	2.0	--
3,3'-Dichlorobenzidine	ND		ug/l	5.0	--
2,4-Dinitrotoluene	ND		ug/l	5.0	--
2,6-Dinitrotoluene	ND		ug/l	5.0	--
Azobenzene	ND		ug/l	2.0	--
Fluoranthene	ND		ug/l	2.0	--
4-Chlorophenyl phenyl ether	ND		ug/l	2.0	--
4-Bromophenyl phenyl ether	ND		ug/l	2.0	--
Bis(2-chloroisopropyl)ether	ND		ug/l	2.0	--
Bis(2-chloroethoxy)methane	ND		ug/l	5.0	--
Hexachlorobutadiene	ND		ug/l	2.0	--
Hexachlorocyclopentadiene	ND		ug/l	20	--
Hexachloroethane	ND		ug/l	2.0	--
Isophorone	ND		ug/l	5.0	--
Naphthalene	ND		ug/l	2.0	--
Nitrobenzene	ND		ug/l	2.0	--
NDPA/DPA	ND		ug/l	2.0	--
n-Nitrosodi-n-propylamine	ND		ug/l	5.0	--
Bis(2-ethylhexyl)phthalate	ND		ug/l	3.0	--
Butyl benzyl phthalate	ND		ug/l	5.0	--
Di-n-butylphthalate	ND		ug/l	5.0	--

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 03/19/18 12:19
Analyst: RC

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:12

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1098175-1					
Di-n-octylphthalate	ND		ug/l	5.0	--
Diethyl phthalate	ND		ug/l	5.0	--
Dimethyl phthalate	ND		ug/l	5.0	--
Benzo(a)anthracene	ND		ug/l	2.0	--
Benzo(a)pyrene	ND		ug/l	2.0	--
Benzo(b)fluoranthene	ND		ug/l	2.0	--
Benzo(k)fluoranthene	ND		ug/l	2.0	--
Chrysene	ND		ug/l	2.0	--
Acenaphthylene	ND		ug/l	2.0	--
Anthracene	ND		ug/l	2.0	--
Benzo(ghi)perylene	ND		ug/l	2.0	--
Fluorene	ND		ug/l	2.0	--
Phenanthrene	ND		ug/l	2.0	--
Dibenzo(a,h)anthracene	ND		ug/l	2.0	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	2.0	--
Pyrene	ND		ug/l	2.0	--
Biphenyl	ND		ug/l	2.0	--
Aniline	ND		ug/l	2.0	--
4-Chloroaniline	ND		ug/l	5.0	--
1-Methylnaphthalene	ND		ug/l	2.0	--
2-Nitroaniline	ND		ug/l	5.0	--
3-Nitroaniline	ND		ug/l	5.0	--
4-Nitroaniline	ND		ug/l	5.0	--
Dibenzofuran	ND		ug/l	2.0	--
2-Methylnaphthalene	ND		ug/l	2.0	--
n-Nitrosodimethylamine	ND		ug/l	2.0	--
2,4,6-Trichlorophenol	ND		ug/l	5.0	--
p-Chloro-m-cresol	ND		ug/l	2.0	--
2-Chlorophenol	ND		ug/l	2.0	--

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 03/19/18 12:19
Analyst: RC

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:12

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1098175-1					
2,4-Dichlorophenol	ND		ug/l	5.0	--
2,4-Dimethylphenol	ND		ug/l	5.0	--
2-Nitrophenol	ND		ug/l	10	--
4-Nitrophenol	ND		ug/l	10	--
2,4-Dinitrophenol	ND		ug/l	20	--
4,6-Dinitro-o-cresol	ND		ug/l	10	--
Pentachlorophenol	ND		ug/l	10	--
Phenol	ND		ug/l	5.0	--
2-Methylphenol	ND		ug/l	5.0	--
3-Methylphenol/4-Methylphenol	ND		ug/l	5.0	--
2,4,5-Trichlorophenol	ND		ug/l	5.0	--
Benzoic Acid	ND		ug/l	50	--
Benzyl Alcohol	ND		ug/l	2.0	--
Carbazole	ND		ug/l	2.0	--
Pyridine	ND		ug/l	3.5	--

Tentatively Identified Compounds

Total TIC Compounds	12.3	J	ug/l
Unknown Organic Acid	6.69	J	ug/l
Aldol Condensates	5.65	J	ug/l

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 03/19/18 12:19
Analyst: RC

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:12

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1098175-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	55		21-120
Phenol-d6	41		10-120
Nitrobenzene-d5	80		23-120
2-Fluorobiphenyl	80		15-120
2,4,6-Tribromophenol	92		10-120
4-Terphenyl-d14	102		41-149

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 03/19/18 09:36
Analyst: KL

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:17

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1098176-1					
Acenaphthene	ND		ug/l	0.10	--
2-Chloronaphthalene	ND		ug/l	0.20	--
Fluoranthene	ND		ug/l	0.10	--
Hexachlorobutadiene	ND		ug/l	0.50	--
Naphthalene	ND		ug/l	0.10	--
Benzo(a)anthracene	ND		ug/l	0.10	--
Benzo(a)pyrene	ND		ug/l	0.10	--
Benzo(b)fluoranthene	ND		ug/l	0.10	--
Benzo(k)fluoranthene	ND		ug/l	0.10	--
Chrysene	ND		ug/l	0.10	--
Acenaphthylene	ND		ug/l	0.10	--
Anthracene	ND		ug/l	0.10	--
Benzo(ghi)perylene	ND		ug/l	0.10	--
Fluorene	ND		ug/l	0.10	--
Phenanthrene	ND		ug/l	0.10	--
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--
Pyrene	ND		ug/l	0.10	--
1-Methylnaphthalene	ND		ug/l	0.10	--
2-Methylnaphthalene	ND		ug/l	0.10	--
Pentachlorophenol	ND		ug/l	0.80	--
Hexachlorobenzene	ND		ug/l	0.80	--
Hexachloroethane	ND		ug/l	0.80	--

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 03/19/18 09:36
Analyst: KL

Extraction Method: EPA 3510C
Extraction Date: 03/18/18 09:17

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1098176-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	48		21-120
Phenol-d6	33		10-120
Nitrobenzene-d5	77		23-120
2-Fluorobiphenyl	84		15-120
2,4,6-Tribromophenol	82		10-120
4-Terphenyl-d14	129		41-149

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1098175-2 WG1098175-3								
Acenaphthene	76		91		37-111	18		30
Benzidine	20		18		10-75	11		30
1,2,4-Trichlorobenzene	70		80		39-98	13		30
Hexachlorobenzene	75		87		40-140	15		30
Bis(2-chloroethyl)ether	76		89		40-140	16		30
2-Chloronaphthalene	75		85		40-140	13		30
1,2-Dichlorobenzene	69		75		40-140	8		30
1,3-Dichlorobenzene	68		75		40-140	10		30
1,4-Dichlorobenzene	68		75		36-97	10		30
3,3'-Dichlorobenzidine	52		65		40-140	22		30
2,4-Dinitrotoluene	89		99		48-143	11		30
2,6-Dinitrotoluene	86		98		40-140	13		30
Azobenzene	84		94		40-140	11		30
Fluoranthene	85		102		40-140	18		30
4-Chlorophenyl phenyl ether	74		87		40-140	16		30
4-Bromophenyl phenyl ether	76		90		40-140	17		30
Bis(2-chloroisopropyl)ether	74		82		40-140	10		30
Bis(2-chloroethoxy)methane	82		95		40-140	15		30
Hexachlorobutadiene	60		72		40-140	18		30
Hexachlorocyclopentadiene	55		66		40-140	18		30
Hexachloroethane	66		74		40-140	11		30
Isophorone	89		103		40-140	15		30
Naphthalene	72		81		40-140	12		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1098175-2 WG1098175-3								
Nitrobenzene	78		90		40-140	14		30
NDPA/DPA	83		95		40-140	13		30
n-Nitrosodi-n-propylamine	87		101		29-132	15		30
Bis(2-ethylhexyl)phthalate	82		94		40-140	14		30
Butyl benzyl phthalate	88		110		40-140	22		30
Di-n-butylphthalate	88		110		40-140	22		30
Di-n-octylphthalate	89		119		40-140	29		30
Diethyl phthalate	82		89		40-140	8		30
Dimethyl phthalate	81		93		40-140	14		30
Benzo(a)anthracene	80		94		40-140	16		30
Benzo(a)pyrene	90		124		40-140	**32**	Q	30
Benzo(b)fluoranthene	87		124		40-140	**35**	Q	30
Benzo(k)fluoranthene	87		116		40-140	29		30
Chrysene	77		91		40-140	17		30
Acenaphthylene	82		92		45-123	11		30
Anthracene	80		112		40-140	**33**	Q	30
Benzo(ghi)perylene	85		101		40-140	17		30
Fluorene	79		93		40-140	16		30
Phenanthrene	77		93		40-140	19		30
Dibenzo(a,h)anthracene	86		104		40-140	19		30
Indeno(1,2,3-cd)pyrene	75		89		40-140	17		30
Pyrene	82		113		26-127	**32**	Q	30
Biphenyl	74		86		40-140	15		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1098175-2 WG1098175-3								
Aniline	**34**	Q	43		40-140	23		30
4-Chloroaniline	**34**	Q	53		40-140	**44**	Q	30
1-Methylnaphthalene	68		80		41-103	16		30
2-Nitroaniline	89		104		52-143	16		30
3-Nitroaniline	57		69		25-145	19		30
4-Nitroaniline	84		94		51-143	11		30
Dibenzofuran	75		84		40-140	11		30
2-Methylnaphthalene	74		86		40-140	15		30
n-Nitrosodimethylamine	51		56		22-74	9		30
2,4,6-Trichlorophenol	89		105		30-130	16		30
p-Chloro-m-cresol	87		**104**	Q	23-97	18		30
2-Chlorophenol	82		94		27-123	14		30
2,4-Dichlorophenol	87		102		30-130	16		30
2,4-Dimethylphenol	85		98		30-130	14		30
2-Nitrophenol	88		103		30-130	16		30
4-Nitrophenol	54		61		10-80	12		30
2,4-Dinitrophenol	81		102		20-130	23		30
4,6-Dinitro-o-cresol	94		108		20-164	14		30
Pentachlorophenol	74		85		9-103	14		30
Phenol	39		46		12-110	16		30
2-Methylphenol	76		87		30-130	13		30
3-Methylphenol/4-Methylphenol	71		83		30-130	16		30
2,4,5-Trichlorophenol	81		97		30-130	18		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1098175-2 WG1098175-3								
Benzoic Acid	37		51		10-164	**32**	Q	30
Benzyl Alcohol	76		89		26-116	16		30
Carbazole	89		110		55-144	21		30
Pyridine	28		17		10-66	**49**	Q	30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	58		66		21-120
Phenol-d6	41		47		10-120
Nitrobenzene-d5	82		92		23-120
2-Fluorobiphenyl	79		89		15-120
2,4,6-Tribromophenol	88		107		10-120
4-Terphenyl-d14	86		113		41-149

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1098176-2 WG1098176-3								
Acenaphthene	83		75		40-140	10		40
2-Chloronaphthalene	86		79		40-140	8		40
Fluoranthene	84		79		40-140	6		40
Hexachlorobutadiene	65		61		40-140	6		40
Naphthalene	78		72		40-140	8		40
Benzo(a)anthracene	81		74		40-140	9		40
Benzo(a)pyrene	97		92		40-140	5		40
Benzo(b)fluoranthene	90		88		40-140	2		40
Benzo(k)fluoranthene	90		84		40-140	7		40
Chrysene	75		70		40-140	7		40
Acenaphthylene	94		88		40-140	7		40
Anthracene	87		79		40-140	10		40
Benzo(ghi)perylene	107		94		40-140	13		40
Fluorene	86		79		40-140	8		40
Phenanthrene	79		75		40-140	5		40
Dibenzo(a,h)anthracene	115		103		40-140	11		40
Indeno(1,2,3-cd)pyrene	115		106		40-140	8		40
Pyrene	80		75		40-140	6		40
1-Methylnaphthalene	81		79		40-140	3		40
2-Methylnaphthalene	82		78		40-140	5		40
Pentachlorophenol	61		48		40-140	24		40
Hexachlorobenzene	86		74		40-140	15		40
Hexachloroethane	72		67		40-140	7		40

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1098176-2 WG1098176-3

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	50		45		21-120
Phenol-d6	35		32		10-120
Nitrobenzene-d5	84		77		23-120
2-Fluorobiphenyl	93		86		15-120
2,4,6-Tribromophenol	101		79		10-120
4-Terphenyl-d14	112		105		41-149

PCBS

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Lab Number: L1809146
Project Number: 129379-010
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA

Sample Depth:
Matrix: Water
Analytical Method: 5,608
Analytical Date: 03/20/18 19:28
Analyst: JW

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Extraction Method: EPA 608
Extraction Date: 03/20/18 00:51
Cleanup Method: EPA 3665A
Cleanup Date: 03/20/18
Cleanup Method: EPA 3660B
Cleanup Date: 03/20/18

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/l	0.250	--	1	A
Aroclor 1221	ND		ug/l	0.250	--	1	A
Aroclor 1232	ND		ug/l	0.250	--	1	A
Aroclor 1242	ND		ug/l	0.250	--	1	A
Aroclor 1248	ND		ug/l	0.250	--	1	A
Aroclor 1254	ND		ug/l	0.250	--	1	A
Aroclor 1260	ND		ug/l	0.200	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	75		30-150	A
Decachlorobiphenyl	97		30-150	A

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 5,608
Analytical Date: 03/20/18 18:14
Analyst: HT

Extraction Method: EPA 608
Extraction Date: 03/19/18 19:08
Cleanup Method: EPA 3665A
Cleanup Date: 03/19/18
Cleanup Method: EPA 3660B
Cleanup Date: 03/20/18

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1098545-1						
Aroclor 1016	ND		ug/l	0.250	--	A
Aroclor 1221	ND		ug/l	0.250	--	A
Aroclor 1232	ND		ug/l	0.250	--	A
Aroclor 1242	ND		ug/l	0.250	--	A
Aroclor 1248	ND		ug/l	0.250	--	A
Aroclor 1254	ND		ug/l	0.250	--	A
Aroclor 1260	ND		ug/l	0.200	--	A

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	71		30-150	A
Decachlorobiphenyl	100		30-150	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 Batch: WG1098545-2									
Aroclor 1016	90		-		30-150	-		30	A
Aroclor 1260	91		-		30-150	-		30	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	89				30-150	A
Decachlorobiphenyl	102				30-150	A

Matrix Spike Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098545-3 QC Sample: L1800003-96 Client ID: MS Sample													
Aroclor 1016	ND	3.12	2.60	83		-	-		40-126	-		30	A
Aroclor 1260	ND	3.12	2.51	80		-	-		40-127	-		30	A

Surrogate	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	82				30-150	A
Decachlorobiphenyl	85				30-150	A

Lab Duplicate Analysis
Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits	
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098545-4 QC Sample: L1800003-96 Client ID: DUP Sample							
Aroclor 1016	ND	ND	ug/l	NC		30	A
Aroclor 1221	ND	ND	ug/l	NC		30	A
Aroclor 1232	ND	ND	ug/l	NC		30	A
Aroclor 1242	ND	ND	ug/l	NC		30	A
Aroclor 1248	ND	ND	ug/l	NC		30	A
Aroclor 1254	ND	ND	ug/l	NC		30	A
Aroclor 1260	ND	ND	ug/l	NC		30	A

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	89		86		30-150	A
Decachlorobiphenyl	107		102		30-150	A

METALS

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Lab Number: L1809146
Project Number: 129379-010
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA
Sample Depth:
Matrix: Water

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Arsenic, Total	0.00453		mg/l	0.00100	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Chromium, Total	0.00110		mg/l	0.00100	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Copper, Total	0.00245		mg/l	0.00100	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Iron, Total	6.09		mg/l	0.050	--	1	03/19/18 10:05	03/21/18 09:00	EPA 3005A	19,200.7	LC
Lead, Total	ND		mg/l	0.00050	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	03/20/18 15:08	03/21/18 16:08	EPA 245.1	3,245.1	MG
Nickel, Total	ND		mg/l	0.00200	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Zinc, Total	0.01110		mg/l	0.01000	--	1	03/19/18 10:05	03/20/18 10:47	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	634		mg/l	0.660	NA	1	03/19/18 10:05	03/21/18 09:00	EPA 3005A	19,200.7	LC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		03/20/18 10:47	NA	107,-	

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1098306-1										
Iron, Total	ND		mg/l	0.050	--	1	03/19/18 10:05	03/21/18 06:05	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01 Batch: WG1098306-1										
Hardness	ND		mg/l	0.660	NA	1	03/19/18 10:05	03/21/18 06:05	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1098308-1										
Antimony, Total	ND		mg/l	0.00400	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Lead, Total	ND		mg/l	0.00050	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	03/19/18 10:05	03/20/18 10:20	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1098859-1										
Mercury, Total	ND		mg/l	0.0002	--	1	03/20/18 15:08	03/21/18 15:19	3,245.1	MG

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1098306-2								
Iron, Total	90		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1098306-2								
Hardness	89		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1098308-2								
Antimony, Total	98		-		85-115	-		
Arsenic, Total	109		-		85-115	-		
Cadmium, Total	109		-		85-115	-		
Chromium, Total	115		-		85-115	-		
Copper, Total	110		-		85-115	-		
Lead, Total	106		-		85-115	-		
Nickel, Total	112		-		85-115	-		
Selenium, Total	107		-		85-115	-		
Silver, Total	96		-		85-115	-		
Zinc, Total	108		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1098859-2								
Mercury, Total	107		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098306-3 QC Sample: L1808910-01 Client ID: MS Sample												
Iron, Total	0.954	1	1.88	93		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098306-3 QC Sample: L1808910-01 Client ID: MS Sample												
Hardness	88.1	66.2	146	88		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098306-7 QC Sample: L1809073-01 Client ID: MS Sample												
Iron, Total	2.48	1	1.95	**0**	Q	-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098306-7 QC Sample: L1809073-01 Client ID: MS Sample												
Hardness	77.3	66.2	119	**0**	Q	-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098308-3 QC Sample: L1809073-01 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.5626	112		-	-		70-130	-		20
Arsenic, Total	0.00571	0.12	0.1384	110		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05514	108		-	-		70-130	-		20
Chromium, Total	0.09040	0.2	0.3164	113		-	-		70-130	-		20
Copper, Total	0.01684	0.25	0.2837	107		-	-		70-130	-		20
Lead, Total	0.00450	0.51	0.5318	103		-	-		70-130	-		20
Nickel, Total	0.00497	0.5	0.5595	111		-	-		70-130	-		20
Selenium, Total	0.03886	0.12	0.1745	113		-	-		70-130	-		20
Silver, Total	ND	0.05	0.04483	90		-	-		70-130	-		20
Zinc, Total	0.05177	0.5	0.6052	111		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098859-3 QC Sample: L1808925-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.0052	103		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098859-5 QC Sample: L1808925-02 Client ID: MS Sample									
Mercury, Total	ND	0.005	0.0051	102	-	-	70-130	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098306-8 QC Sample: L1809073-01 Client ID: DUP Sample						
Iron, Total	2.48	1.05	mg/l	**81**	Q	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098308-4 QC Sample: L1809073-01 Client ID: DUP Sample						
Antimony, Total	ND	0.00444	mg/l	NC		20
Arsenic, Total	0.00571	0.00496	mg/l	14		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	0.09040	0.08409	mg/l	7		20
Copper, Total	0.01684	0.01513	mg/l	11		20
Lead, Total	0.00450	0.00396	mg/l	13		20
Nickel, Total	0.00497	0.00504	mg/l	1		20
Selenium, Total	0.03886	0.03878	mg/l	0		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.05177	0.04760	mg/l	8		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098859-4 QC Sample: L1808925-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1098859-6 QC Sample: L1808925-02 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010
Lab Number: L1809146
Report Date: 03/22/18

SAMPLE RESULTS

Lab ID: L1809146-01
Client ID: HA18-SCIENCE-NPDES_03/16/2018
Sample Location: ALLSTON, MA
Sample Depth:
Matrix: Water

Date Collected: 03/16/18 14:00
Date Received: 03/16/18
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	9.4		mg/l	5.0	NA	1	-	03/20/18 14:15	121,2540D	JT
Cyanide, Total	ND		mg/l	0.005	--	1	03/18/18 14:35	03/19/18 14:21	121,4500CN-CE	LH
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	03/16/18 23:19	121,4500CL-D	AS
Nitrogen, Ammonia	1.85		mg/l	0.075	--	1	03/17/18 15:14	03/19/18 20:38	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	--	1	03/17/18 08:00	03/17/18 10:00	74,1664A	KZ
Phenolics, Total	ND		mg/l	0.030	--	1	03/20/18 10:45	03/20/18 15:36	4,420.1	BR
Chromium, Hexavalent	ND		mg/l	0.010	--	1	03/17/18 02:46	03/17/18 03:21	1,7196A	UN
Anions by Ion Chromatography - Westborough Lab										
Chloride	1770		mg/l	25.0	--	50	-	03/19/18 22:23	44,300.0	JR

Project Name: SCIENCE DRIVE AND SOUTH OF SCI **Lab Number:** L1809146

Project Number: 129379-010 **Report Date:** 03/22/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1097951-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	03/16/18 23:19	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1097981-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	03/17/18 02:46	03/17/18 03:15	1,7196A	UN
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1098013-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	03/17/18 08:00	03/17/18 10:00	74,1664A	KZ
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1098066-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	03/17/18 15:14	03/19/18 20:08	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1098195-1										
Cyanide, Total	ND		mg/l	0.005	--	1	03/18/18 14:35	03/19/18 13:05	121,4500CN-CE	LH
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1098696-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	03/20/18 14:15	121,2540D	JT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1098850-1										
Phenolics, Total	ND		mg/l	0.030	--	1	03/20/18 10:45	03/20/18 15:32	4,420.1	BR
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1098938-1										
Chloride	ND		mg/l	0.500	--	1	-	03/19/18 20:35	44,300.0	JR

Lab Control Sample Analysis

Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI

Project Number: 129379-010

Lab Number: L1809146

Report Date: 03/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1097951-3								
Chlorine, Total Residual	101		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1097981-2								
Chromium, Hexavalent	94		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1098013-2								
TPH	78		-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1098066-2								
Nitrogen, Ammonia	101		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1098195-2								
Cyanide, Total	94		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1098850-2								
Phenolics, Total	84		-		70-130	-		
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1098938-2								
Chloride	101		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1097951-4 QC Sample: L1809146-01 Client ID: HA18-SCIENCE-NPDES_03/16/2018												
Chlorine, Total Residual	ND	0.248	ND	**0**	Q	-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1097981-4 QC Sample: L1809146-01 Client ID: HA18-SCIENCE-NPDES_03/16/2018												
Chromium, Hexavalent	ND	0.1	0.091	91		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098013-4 QC Sample: L1808922-01 Client ID: MS Sample												
TPH	ND	20	13.6	68		-	-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098066-4 QC Sample: L1808990-01 Client ID: MS Sample												
Nitrogen, Ammonia	ND	4	3.82	96		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098195-4 QC Sample: L1809073-02 Client ID: MS Sample												
Cyanide, Total	0.006	0.2	0.200	97		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098850-4 QC Sample: L1809146-01 Client ID: HA18-SCIENCE-NPDES_03/16/2018												
Phenolics, Total	ND	0.4	0.41	103		-	-		70-130	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098938-3 QC Sample: L1809001-01 Client ID: MS Sample												
Chloride	741	100	860	**119**	Q	-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1097951-2 QC Sample: L1809146-01 Client ID: HA18-SCIENCE-NPDES_03/16/2018						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1097981-3 QC Sample: L1809146-01 Client ID: HA18-SCIENCE-NPDES_03/16/2018						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098013-3 QC Sample: L1809143-01 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098066-3 QC Sample: L1808990-01 Client ID: DUP Sample						
Nitrogen, Ammonia	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098195-3 QC Sample: L1809073-01 Client ID: DUP Sample						
Cyanide, Total	0.007	0.007	mg/l	0		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098696-2 QC Sample: L1808916-02 Client ID: DUP Sample						
Solids, Total Suspended	57	54	mg/l	5		29
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098850-3 QC Sample: L1809146-01 Client ID: HA18-SCIENCE-NPDES_03/16/2018						
Phenolics, Total	ND	ND	mg/l	NC		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1098938-4 QC Sample: L1809001-01 Client ID: DUP Sample						
Chloride	741	738	mg/l	0		18

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1809146-01A	Vial HCl preserved	A	NA		2.9	Y	Absent		8260-SIM(14),8260(14)
L1809146-01B	Vial HCl preserved	A	NA		2.9	Y	Absent		8260-SIM(14),8260(14)
L1809146-01C	Vial HCl preserved	A	NA		2.9	Y	Absent		8260-SIM(14),8260(14)
L1809146-01D	Vial Na2S2O3 preserved	A	NA		2.9	Y	Absent		504(14)
L1809146-01E	Vial Na2S2O3 preserved	A	NA		2.9	Y	Absent		504(14)
L1809146-01F	Plastic 250ml HNO3 preserved	A	<2	<2	2.9	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),HARDU(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1809146-01G	Plastic 250ml HNO3 preserved	A	<2	<2	2.9	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1809146-01H	Amber 1000ml Na2S2O3	A	7	7	2.9	Y	Absent		PCB-608(7)
L1809146-01J	Amber 1000ml Na2S2O3	A	7	7	2.9	Y	Absent		PCB-608(7)
L1809146-01K	Amber 1000ml unpreserved	A	7	7	2.9	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1809146-01L	Amber 1000ml unpreserved	A	7	7	2.9	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1809146-01M	Plastic 950ml unpreserved	A	7	7	2.9	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1)
L1809146-01N	Plastic 500ml H2SO4 preserved	A	<2	<2	2.9	Y	Absent		NH3-4500(28)
L1809146-01P	Plastic 500ml NaOH preserved	A	>12	>12	2.9	Y	Absent		TCN-4500(14)
L1809146-01Q	Amber 1000ml HCl preserved	A	NA		2.9	Y	Absent		TPH-1664(28)
L1809146-01R	Amber 1000ml HCl preserved	A	NA		2.9	Y	Absent		TPH-1664(28)
L1809146-01S	Amber 1000ml H2SO4 preserved	A	<2	<2	2.9	Y	Absent		TPHENOL-420(28)
L1809146-01T	Plastic 950ml unpreserved	A	7	7	2.9	Y	Absent		TSS-2540(7)
L1809146-01U	Vial HCl preserved	A	NA		2.9	Y	Absent		SUB-ETHANOL(14)
L1809146-01V	Vial HCl preserved	A	NA		2.9	Y	Absent		SUB-ETHANOL(14)
L1809146-01W	Vial HCl preserved	A	NA		2.9	Y	Absent		SUB-ETHANOL(14)

*Values in parentheses indicate holding time in days

Project Name: SCIENCE DRIVE AND SOUTH OF SCI
Project Number: 129379-010

Lab Number: L1809146
Report Date: 03/22/18

Container Information

Container ID	*Container Type*	*Cooler*	*Initial pH*	*Final pH*	*Temp deg C*	*Pres*	*Seal*	*Frozen Date/Time*	*Analysis(*)*
L1809146-02A	Vial HCl preserved	A	NA		2.9	Y	Absent		8260(14)
L1809146-02A1	Vial HCl preserved	A	NA		2.9	Y	Absent		8260-SIM(14)
L1809146-02B	Vial HCl preserved	A	NA		2.9	Y	Absent		8260(14)
L1809146-02B1	Vial HCl preserved	A	NA		2.9	Y	Absent		8260-SIM(14)
L1809146-02C	Vial Na2S2O3 preserved	A	NA		2.9	Y	Absent		504(14)
L1809146-02D	Vial Na2S2O3 preserved	A	NA		2.9	Y	Absent		504(14)

*Values in parentheses indicate holding time in days

Project Name:	SCIENCE DRIVE AND SOUTH OF SCI	**Lab Number:**	L1809146
Project Number:	129379-010	**Report Date:**	03/22/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: Data Usability Report

Project Name:	SCIENCE DRIVE AND SOUTH OF SCI	**Lab Number:**	L1809146
Project Number:	129379-010	**Report Date:**	03/22/18

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	SCIENCE DRIVE AND SOUTH OF SCI	**Lab Number:**	L1809146
Project Number:	129379-010	**Report Date:**	03/22/18

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

4 Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. Revised March 1983.

5 Methods for the Organic Chemical Analysis of Municipal and Industrial Wastewater. Appendix A, Part 136, 40 CFR (Code of Federal Regulations).

14 Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. EPA/600/4-88/039, Revised July 1991.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.

74 Method 1664,Revision A: N-Hexane Extractable Material (HEM; Oil & Grease) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry, EPA-821-R-98-002, February 1999.

107 Alpha Analytical - In-house calculation method.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

ALPHA

Westborough, MA 01581 · 8 Walkup Dr. · TEL: 508-898-9220 · FAX: 508-898-9193

Mansfield, MA 02048 · 320 Forbes Blvd · TEL: 508-822-9300 · FAX: 508-822-3288

Service Centers: Brewer, ME 04412 · Portsmouth, NH 03801 · Mahwah, NJ 07430 · Albany, NY 12205 · Tonawanda, NY 14150 · Holmes, PA 19043

Page 1 of 1

Date Rec'd in Lab: 03/16/18

ALPHA Job #: L1809146

Project Information

- Project Name: Science Drive/South of Science
- Project Location: Allston, MA
- Project #: 129379-010
- (Use Project name as Project ☐)
- Project Manager: Beck Straley
- ALPHAQuote #:

Turn-Around Time

- Standard ☑ — Due Date:
- (only if pre approved) ☐ — # of Days:

Deliverables

- ☑ Email
- ☐ Fax
- ☑ EQuIS (1 File)
- ☐ EQuIS (4 File)
- ☐ Other:

Billing Information

- ☑ Same as Client Info
- PO #

Regulatory Requirements (Program/Criteria)

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility: ☐ NJ ☐ NY ☐ Other:

H&A Information

- H&A Client: Harvard
- H&A Address 465 Medford St, Boston, MA 0212-1400
- H&A Phone: 617-886-7400
- H&A Fax: lhoward@haleyaldrich.com
- H&A Email: bstraley@haleyaldrich.com

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

3. HOLD PACN & ACN   11. Dissolved Metals ON HOLD (Field Filtered)

Please sample per EPA Approved 2017 RGP Permit methods

Please specify Metals or TAL.

ANALYSIS

Analyses: 1. TSS - 2540; 2. TRC-4500; 3. TCN-4500 HOLD PACN & ACN; 4. 504; 5. 8260 & 8260 SIM for Dioxane; 6. HEXCR-3500 & Trivalent Chromium; 7. TPHENOL-420; 8. 8270TCL (including Diethylhexylphthalate); 9. 8270TCL-SIM; 10. CL-300; 11. Total Metals - Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Zn, Fe, Hg; 12. Ammonia; 13. Total Hardness; 14. A2-ALCOHOL (Ethanol); 15. TPH-1664; 16. PCB-608

Sample Filtration: ☒ Done ☐ Lab to do; Preservation: ☐ Lab to do (Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Sample Specific Comments	Total Bottles
09146-01	HA18-Science-NDPES_03/16/2018	3/16	1400	AQ	SJZP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		21
02	Trip blank								X	X													6
Container Type						P	P	P	V	V	P	A	A	A	P	P	P	P	V	A	A		
Preservative						A	A	E	H	B	A	D	A	A	A	C	D	C	B	B	A		

Preservative Code	Container Code
A = None	P = Plastic
B = HCl	A = Amber Glass
C = HNO_3	V = Vial
D = H_2SO_4	G = Glass
E = NaOH	B = Bacteria Cup
F = MeOH	C = Cube
G = $NaHSO_4$	O = Other
H = $Na_2S_2O_3$	E = Encore
K/E = Zn Ac/NaOH	D = BOD Bottle
O = Other	

Westboro: Certification No: MA935

Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
A. P[illegible]	3/16/18	M. [illegible]	3/16/18 1630
M. [illegible]	3/16/18 1630	[illegible]	AAL 3/16/18 1630
[illegible]	3/16/18 1850	Danielle Mott	3/16/18 18:50

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/28/2016)

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Test America (Nashville)
2960 Foster Creighton Drive
Nashville, TN 37204

Alpha Job Number
L1809146

Client Information

Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019

Phone: 603.319.5010
Email: mgulli@alphalab.com

Project Information

Project Location: MA
Project Manager: Melissa Gulli

Turnaround & Deliverables Information

Due Date: 03/29/18
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1809146

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	HA18-SCIENCE-NPDES_03/16/2018	03-16-18 14:00	WATER	Ethanol by EPA 1671 Revision A	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
Form No: AL_subcoc				

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Test America (Nashville)
2960 Foster Creighton Drive
Nashville, TN 37204

Alpha Job Number
L1809146

Client Information

Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019

Phone: 603.319.5010
Email: mgulli@alphalab.com

Project Information

Project Location: MA
Project Manager: Melissa Gulli

Turnaround & Deliverables Information

Due Date: 03/29/18
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:

Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1809146

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	HA18-SCIENCE-NPDES_03/16/2018	03-16-18 14:00	WATER	Ethanol by EPA 1671 Revision A	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
	[signature] AR	3/19/18		
Form No: AL_subcoc				

ANALYTICAL REPORT

Lab Number:	L1947882
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Mike Cronan
Phone:	(617) 886-7477
Project Name:	SOLDIER'S FIELD PARK BLDG 1
Project Number:	128513-008
Report Date:	10/17/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: SOLDIER'S FIELD PARK BLDG 1
Project Number: 128513-008

Lab Number: L1947882
Report Date: 10/17/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1947882-01	CHAR-SW	WATER	BOSTON, MA	10/11/19 14:50	10/11/19

Project Name:	SOLDIER'S FIELD PARK BLDG 1	**Lab Number:**	L1947882
Project Number:	128513-008	**Report Date:**	10/17/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Kelly Stenstrom

Title: Technical Director/Representative Date: 10/17/19

METALS

Project Name: SOLDIER'S FIELD PARK BLDG 1 **Lab Number:** L1947882

Project Number: 128513-008 **Report Date:** 10/17/19

SAMPLE RESULTS

Lab ID: L1947882-01 Date Collected: 10/11/19 14:50

Client ID: CHAR-SW Date Received: 10/11/19

Sample Location: BOSTON, MA Field Prep: Not Specified

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Copper, Total	0.00317		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Iron, Total	0.748		mg/l	0.050	--	1	10/15/19 18:48	10/16/19 17:19	EPA 3005A	19,200.7	MC
Lead, Total	0.00340		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	10/16/19 10:53	10/16/19 16:33	EPA 245.1	3,245.1	GD
Nickel, Total	ND		mg/l	0.00200	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Zinc, Total	0.01324		mg/l	0.01000	--	1	10/15/19 18:48	10/16/19 13:56	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	131		mg/l	0.660	NA	1	10/15/19 18:48	10/16/19 17:19	EPA 3005A	19,200.7	MC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		10/16/19 13:56	NA	107,-	

Project Name: SOLDIER'S FIELD PARK BLDG 1 **Lab Number:** L1947882

Project Number: 128513-008 **Report Date:** 10/17/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1296589-1										
Antimony, Total	ND		mg/l	0.00400	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Lead, Total	ND		mg/l	0.00100	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	10/15/19 18:48	10/16/19 12:46	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1296590-1										
Iron, Total	ND		mg/l	0.050	--	1	10/15/19 18:48	10/16/19 17:00	19,200.7	MC

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01 Batch: WG1296590-1										
Hardness	ND		mg/l	0.660	NA	1	10/15/19 18:48	10/16/19 17:00	19,200.7	MC

Prep Information

Digestion Method: EPA 3005A

Project Name: SOLDIER'S FIELD PARK BLDG 1 **Lab Number:** L1947882

Project Number: 128513-008 **Report Date:** 10/17/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1296862-1										
Mercury, Total	ND		mg/l	0.0002	--	1	10/16/19 10:53	10/16/19 15:47	3,245.1	GD

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1

Project Number: 128513-008

Lab Number: L1947882

Report Date: 10/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1296589-2								
Antimony, Total	91		-		85-115	-		
Arsenic, Total	101		-		85-115	-		
Cadmium, Total	104		-		85-115	-		
Chromium, Total	98		-		85-115	-		
Copper, Total	92		-		85-115	-		
Lead, Total	107		-		85-115	-		
Nickel, Total	94		-		85-115	-		
Selenium, Total	103		-		85-115	-		
Silver, Total	98		-		85-115	-		
Zinc, Total	101		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1296590-2								
Iron, Total	111		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1296590-2								
Hardness	107		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1296862-2								
Mercury, Total	97		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1
Project Number: 128513-008

Lab Number: L1947882
Report Date: 10/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296589-3 QC Sample: L1946243-01 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.4385	88		-	-		70-130	-		20
Arsenic, Total	ND	0.12	0.1174	98		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05414	106		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2022	101		-	-		70-130	-		20
Copper, Total	0.00401	0.25	0.2445	96		-	-		70-130	-		20
Lead, Total	ND	0.51	0.5484	108		-	-		70-130	-		20
Nickel, Total	0.0081	0.5	0.4913	97		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1300	108		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05048	101		-	-		70-130	-		20
Zinc, Total	0.0247	0.5	0.5481	105		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296589-5 QC Sample: L1947882-01 Client ID: CHAR-SW												
Antimony, Total	ND	0.5	0.4125	82		-	-		70-130	-		20
Arsenic, Total	ND	0.12	0.1191	99		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05461	107		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2036	102		-	-		70-130	-		20
Copper, Total	0.00317	0.25	0.2493	98		-	-		70-130	-		20
Lead, Total	0.00340	0.51	0.5479	107		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.4914	98		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1203	100		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05006	100		-	-		70-130	-		20
Zinc, Total	0.01324	0.5	0.5398	105		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1
Project Number: 128513-008

Lab Number: L1947882
Report Date: 10/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296590-3 QC Sample: L1947882-01 Client ID: CHAR-SW									
Iron, Total	0.748	1	1.83	108	-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296590-3 QC Sample: L1947882-01 Client ID: CHAR-SW									
Hardness	131	66.2	199	103	-	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296862-3 QC Sample: L1946749-21 Client ID: MS Sample									
Mercury, Total	ND	0.005	0.0047	94	-	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296862-5 QC Sample: L1946749-30 Client ID: MS Sample									
Mercury, Total	ND	0.005	0.0047	95	-	-	70-130	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1
Project Number: 128513-008

Lab Number: L1947882
Report Date: 10/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296589-4 QC Sample: L1946243-01 Client ID: DUP Sample						
Copper, Total	0.00401	0.00424	mg/l	6		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296589-6 QC Sample: L1947882-01 Client ID: CHAR-SW						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	ND	ND	mg/l	NC		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	ND	ND	mg/l	NC		20
Copper, Total	0.00317	0.00385	mg/l	19		20
Lead, Total	0.00340	0.00340	mg/l	0		20
Nickel, Total	ND	ND	mg/l	NC		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.01324	0.01247	mg/l	6		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296590-4 QC Sample: L1947882-01 Client ID: CHAR-SW						
Iron, Total	0.748	0.693	mg/l	8		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296590-4 QC Sample: L1947882-01 Client ID: CHAR-SW						
Hardness	131	129	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296862-4 QC Sample: L1946749-21 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1

Project Number: 128513-008

Lab Number: L1947882

Report Date: 10/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1296862-6 QC Sample: L1946749-30 Client ID: DUP Sample					
Mercury, Total	ND	ND	mg/l	NC	20

INORGANICS
&
MISCELLANEOUS

Project Name: SOLDIER'S FIELD PARK BLDG 1
Project Number: 128513-008
Lab Number: L1947882
Report Date: 10/17/19

SAMPLE RESULTS

Lab ID: L1947882-01
Client ID: CHAR-SW
Sample Location: BOSTON, MA
Sample Depth:
Matrix: Water

Date Collected: 10/11/19 14:50
Date Received: 10/11/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	7.2		SU	-	NA	1	-	10/11/19 22:05	121,4500H+-B	AS
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	10/12/19 20:38	10/15/19 22:31	121,4500NH3-BH	AT
Chromium, Hexavalent	ND		mg/l	0.010	--	1	10/12/19 05:00	10/12/19 05:51	1,7196A	JA

Project Name: SOLDIER'S FIELD PARK BLDG 1 **Lab Number:** L1947882

Project Number: 128513-008 **Report Date:** 10/17/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1295423-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	10/12/19 05:00	10/12/19 05:45	1,7196A	JA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1295595-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	10/12/19 20:38	10/15/19 22:15	121,4500NH3-BH	AT

Lab Control Sample Analysis

Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1

Project Number: 128513-008

Lab Number: L1947882

Report Date: 10/17/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1295352-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1295423-2								
Chromium, Hexavalent	92		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1295595-2								
Nitrogen, Ammonia	90		-		80-120	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1
Project Number: 128513-008

Lab Number: L1947882
Report Date: 10/17/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1295423-4 QC Sample: L1947882-01 Client ID: CHAR-SW												
Chromium, Hexavalent	ND	0.1	0.098	98		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1295595-4 QC Sample: L1947881-01 Client ID: MS Sample												
Nitrogen, Ammonia	1.84	4	5.28	86		-	-		80-120	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: SOLDIER'S FIELD PARK BLDG 1

Project Number: 128513-008

Lab Number: L1947882

Report Date: 10/17/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1295352-2 QC Sample: L1947375-01 Client ID: DUP Sample						
pH	7.2	7.1	SU	1		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1295423-3 QC Sample: L1947882-01 Client ID: CHAR-SW						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1295595-3 QC Sample: L1947881-01 Client ID: DUP Sample						
Nitrogen, Ammonia	1.84	1.84	mg/l	0		20

Project Name: SOLDIER'S FIELD PARK BLDG 1
Project Number: 128513-008

Lab Number: L1947882
Report Date: 10/17/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1947882-01A	Plastic 250ml HNO3 preserved	A	<2	<2	4.0	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),HARDU(180),AS-2008T(180),HG-U(28),AG-2008T(180),SE-2008T(180),CR-2008T(180),SB-2008T(180),PB-2008T(180)
L1947882-01B	Plastic 250ml unpreserved	A	7	7	4.0	Y	Absent		HEXCR-7196(1),PH-4500(.01)
L1947882-01C	Plastic 500ml H2SO4 preserved	A	<2	<2	4.0	Y	Absent		NH3-4500(28)

*Values in parentheses indicate holding time in days

Project Name:	SOLDIER'S FIELD PARK BLDG 1	**Lab Number:**	L1947882
Project Number:	128513-008	**Report Date:**	10/17/19

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	SOLDIER'S FIELD PARK BLDG 1	**Lab Number:**	L1947882
Project Number:	128513-008	**Report Date:**	10/17/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	SOLDIER'S FIELD PARK BLDG 1	**Lab Number:**	L1947882
Project Number:	128513-008	**Report Date:**	10/17/19

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

107 Alpha Analytical - In-house calculation method.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581 — 8 Walkup Dr. — TEL: 508-898-9220 — FAX: 508-898-9193

Mansfield, MA 02048 — 320 Forbes Blvd — TEL: 508-822-9300 — FAX: 508-822-3288

Service Centers
Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430 Albany, NY 12205
Tonawanda, NY 14150 Holmes, PA 19043

Page 1 of 1

Date Rec'd in Lab: 10/11/19

ALPHA Job #: L1947882

H&A Information

H&A Client: Harvard
H&A Address 465 Medford St
Boston, MA 02129-1400
H&A Phone: 617-886-7400
H&A Fax: kchatterton@haleyaldrich.com
H&A Email: echristmas@haleyaldrich.com

Project Information

Project Name: Soldiers Field Park Building 1
Project Location: Boston, MA
Project #: 128513-008
(Use Project name as Project #) ☐
Project Manager: Mike Cronan
ALPHAQuote #: HARVARD

Turn-Around Time
Standard ☑ Due Date:
(only if pre approved) ☐ # of Days: 5 Day

Deliverables

☑ Email ☐ Fax
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other:

Billing Information

☑ Same as Client Info
PO #

Regulatory Requirements (Program/Criteria)

MA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha [

Other project specific requirements/comments:

Please sample per EPA Approved 2017 RGP Permit methods
Note 1: Total Metals - Ag.As.Cd.Cr III.Cr VI.Cu.Ni.Pb.Sb.Se.Zn.Fe.Hg

ANALYSIS

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Ammonia	pH	Hardness	Total Metals (see note 1)	Total Bottles
47882-01	Char-SW	10/11/19	1450	AQ	JDR	X	X	X	X	3

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

Sample Specific Comments

Container Type																								
Preservative																								

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
Jacki Bittner	10/11/19 1615	[illegible]	10/11/19 1801
[illegible]	10/11/19 1858	[illegible]	10/11/19 1858

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/28/2016)