HALEY ALDRICH

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NPDES RGP APPLICATION FOR TEMPORARY CONSTRUCTION DEWATERING STADIUM ROAD AND ALLSTON DISTRIBUTION PACKAGE B 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. 129379-004
August 2017

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

28 August 2017
File No. 129379-004

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

Attention: Shelley Puleo

Subject: NPDES RGP Application for Temporary Construction Dewatering
Stadium Road and Allston Distribution Package B
140-156 Western Avenue
Harvard University
Allston, Massachusetts

Dear Ms. Puleo:

On behalf of our client, the President and Fellows of Harvard College acting by and through Harvard University Campus Services Capital Projects (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 during construction activities at the planned Stadium Road and Allston Distribution Package B Project, located between Rotterdam Street and Western Avenue in Allston, Massachusetts (herein referred to as the "Work Area"). A copy of the Notice of Intent (NOI) is included in Appendix A.

A. GENERAL SITE DESCRIPTION

The Work Area is currently a fenced area associated with the adjacent Harvard Science and Engineering Complex (SEC) construction site, which abuts the Work Area to the west. The Work Area is bound to the north by Western Avenue, to the east by the 114 Western Avenue building, and to the south by Rotterdam Street. The Project Location is shown on Figure 1, Project Locus.

The Stadium Road and Allston Distribution Package B Project involves the construction of utilities, a new roadway, landscaping improvements, bicycle storage structures, and other site improvements. Dewatering is anticipated to be required for construction of thermal distribution utilities and drainage improvements. Excavation for the thermal utilities, at the point of their connection to the SEC building, is anticipated to extend to approximately 21 feet below existing surface grade, or approximately 13-16 feet below the groundwater table. Other localized utility excavations within the Work Area are anticipated to extend up to approximately 10 feet below existing site grade, or approximately 2-5 feet below the groundwater table.

Additional water may also be generated from surface runoff from precipitation, groundwater seepage, and construction-generated water (e.g., wheel washes, decontamination activities). Temporary construction dewatering is anticipated to begin in November 2017 and is estimated to occur intermittently over a period of approximately 12 months.

The Stadium Road and Allston Distribution Package B Project will be constructed within the limits of the Disposal Site associated with Release Tracking Number (RTN) 3-26932, which is associated with lead, cadmium, arsenic, petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) in soil (typical urban fill constituents). Historically-impacted soils within the Work Area also contain or are presumed to contain asbestos-containing material (ACM) debris. 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 was recorded for the Disposal Site. In May 2015, a Permanent Solution Statement was submitted to MassDEP. A Post-Permanent Solution Release Abatement Measure (RAM) Plan was submitted to MassDEP on 3 June 2015. On 31 March 2017, the RAM was modified to include various enabling work associated with the Harvard SEC, including the Stadium Road and Allston Distribution Package B Project. A Non-Traditional Asbestos Abatement Work Plan (NTWP) will be submitted to and approved by MassDEP prior to the start of work.

B. RECEIVING WATER INFORMATION

Receiving water quality data, collected by others on 13 April 2017 for Harvard's use and provided to Haley & Aldrich by Harvard, was used in support of this NOI. The 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 1,350 feet upstream of 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 10 August 2017. 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 GP-SEC-36 on 5 July 2017. This well is located within the location of planned excavation below the groundwater table to construct the thermal utility connection into the SEC, as shown on Figure 2. This will be the activity requiring the most dewatering.

The groundwater samples were submitted to Alpha Analytical, Inc. of Westborough, Massachusetts (Alpha Analytical) for analysis of VOCs, SVOCs, total metals, hardness, ethanol, PCBs, chloride, total residual chlorine, total cyanide, ammonia nitrogen, total phenolics, total suspended solids (TSS) and total petroleum hydrocarbons (TPH). pH and temperature were measured in the field.

The source water quality data are summarized in Table I. Laboratory data reports are included in Appendix G.

D. DISCHARGE INFORMATION

Construction dewatering will include piping and discharging into storm drains located in Western Avenue near the Work Area that discharge into the Charles River. The proposed discharge route is shown on Figure 2. We anticipate effluent discharge rates to be about 50 gallons per minute (gpm) or less, with occasional peak flows of about 150 gpm during significant precipitation events. The temporary dewatering will take place in excavations and be conducted with sumps.

E. DEWATERING TREATMENT SYSTEM INFORMATION

An effluent treatment system will be designed and implemented by the Contractor to meet the applicable 2017 RGP Discharge Effluent Criteria. Prior to discharge, collected water is routed through a sedimentation tank and bag filters (5-micron bag filters are anticipated to be required by the DEP-approved NTWP) to remove suspended solids and undissolved chemical constituents, as shown on Figure 3. Additional treatment may include granulated activated carbon (GAC), ion exchange, and pH adjustment, if required.

F. TREATMENT CHEMICALS AND ADDITIVES INFORMATION

If necessary, additional treatment including GAC, ion exchange, and pH adjustment may be added to the treatment system to meet necessary effluent limits.

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. These systems may be mobilized if necessary to achieve necessary effluent limits. pH adjustment, if required, will be conducted using sulfuric acid (70-100%) that will be dosed to reduce 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 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 to reduce pH concentrations 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.

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. Copies of the permit applications are provided in Appendix F.

Owner and operation information are provided below for reference:

Owner:
President and Fellows of Harvard College
c/o E&U
46 Blackstone Street
Cambridge, MA 02139
Attn: Susyrati Bunanta, Principal Engineer

Operator:
Bond Brothers
145 Spring Street
Everett, MA 02149
Attn: John Harmon, Senior Project Manager

The President and Fellows of Harvard College and Bond Brothers 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.

Elizabeth J. Christmas, E.I.T. (NH)
Senior Environmental Engineer

Beck Straley
Project Manager

Katherine L. Dilawari, P.E., L.S.P. (MA)
Senior Associate

Enclosures:

- Table I – Summary of Source Water Quality Data
- Table II – Summary of Receiving Water Quality Data
- Figure 1 – Project Locus
- Figure 2 – Proposed Discharge Route
- Figure 3 – 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; Danny Rico
Harvard University E&U; Susyrati Bunanta
Harvard Environmental Health & Safety; Bree Carlson, Kelly McQueeney
Bond Brothers; Attn: John Harmon

TABLES

TABLE I
SUMMARY OF GROUNDWATER QUALITY DATA
STADIUM ROAD AND ALLSTON DISTRIBUTION PACKAGE B
ALLSTON, MA
FILE NO. 129379-004

Location Sample Date Sample Name Lab Sample ID	RCGW-2 Reportable Concentrations	2017 NPDES RGP Criteria	GP-SEC-36 07/05/2017 GP-SEC-36(OW)_07032017 L1722791-01 L1724404-01
Volatile Organic Compounds (ug/L)			
Ethyl Ether	NA	Report	ND (2.5)
SUM of BTEX	NA	100	ND
SUM of Volatile Organic Compounds	NA	NA	ND
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)			
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 (4800)
Inorganic Compounds (ug/L)			
Antimony	8000	206	ND (4)
Arsenic	900	104	2.82
Cadmium	4	10.2	ND (0.2)
Chromium	300	NA	4.2
Chromium III (Trivalent)	600	323	ND (10)
Chromium VI (Hexavalent)	300	323	ND (10)
Copper	100000	242	3.38
Cyanide	30	178000	6
Iron	NA	5000	1050
Lead	10	160	8.91
Mercury	20	0.739	ND (0.2)
Nickel	200	1450	5.56
Selenium	100	235.8	11.9
Silver	7	35.1	ND (0.4)
Zinc	900	420	ND (10)
Dissolved Inorganic Compounds (ug/L)			
Iron	NA	NA	375
Lead	10	NA	0.9
Pesticides (ug/L)			
1,2-Dibromo-3-chloropropane (DBCP)	NA	NA	ND (0.01)
1,2-Dibromoethane (Ethylene Dibromide)	2	0.05	ND (0.01)
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 of PCBs	NA	0.000064	ND
Other (ug/L)			
pH (SU)	NA	6.5 to 8.3	7.38
Temperature (°C)	NA	NA	19.4
Ammonia	NA	Report	401
Chloride	NA	Report	225000
Hardness	NA	NA	174000
Total Residual Chlorine	NA	200	ND (20)
Total phenols	NA	NA	ND (30)
Total Suspended Solids (TSS)	NA	30000	**100000**

ABBREVIATIONS:
NA: Not Applicable
ND (2.5): Not detected, number in parentheses is the laboratory reporting limit

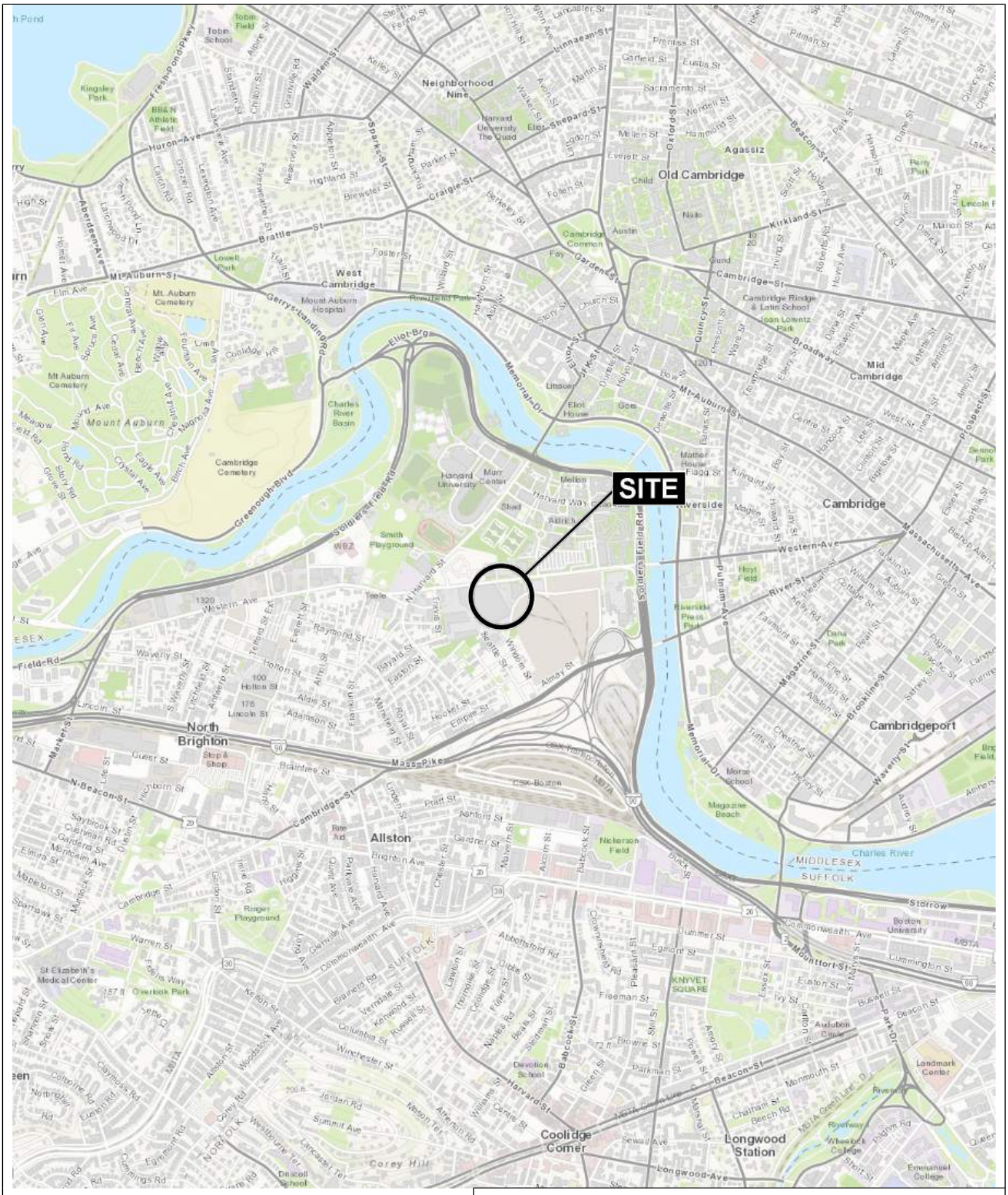
NOTES:
1. **Bold** values detected exceed the RCGW-2 criteria.
2. **Red Bold** values detected exceed NPDES RGP criteria.
3. Only compounds detected on the dates indicated for VOCs and SVOCs are shown.
4. Dilution factor of 74.6 used to establish applicable discharge criteria.
5. Temperature and pH were field measured on 7/5/2017.

TABLE II
SUMMARY OF RECEIVING WATER QUALITY DATA
STADIUM ROAD AND ALLSTON DISTRIBUTION PACKAGE B
ALLSTON, MA
FILE NO. 129379-004

LOCATION	**RIVER-041317**
SAMPLING DATE	**4/13/2017**
LAB SAMPLE ID	**L1711614-01**
Total Metals (ug/L)	
Antimony	ND(4)
Arsenic	ND(1)
Cadmium	ND(1)
Total Chromium	ND(1)
Trivalent Chromium	ND(10)
Hexavalent Chromium	3 J
Copper	ND(1)
Iron	542
Lead	ND(0.5)
Mercury	ND(0.2)
Nickel	ND(2)
Selenium	ND(5)
Silver	ND(1)
Zinc	ND(10)
Other	
Hardness (ug/L)	56,900
Ammonia Nitrogen (ug/L)	54 J
pH (SU)	7

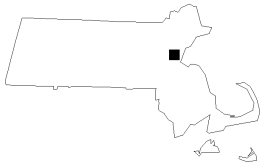
Notes & Abbreviations:
ug/L: micrograms per liter
ND (1.0): not detected, value is the reporting limit
J: Estimated value; analyte reported below laboratory reporting limit but above method detection limit.

FIGURES



MAP SOURCE: ESRI

SITE COORDINATES: 42°21'47"N, 71°7'30"W



HALEY ALDRICH

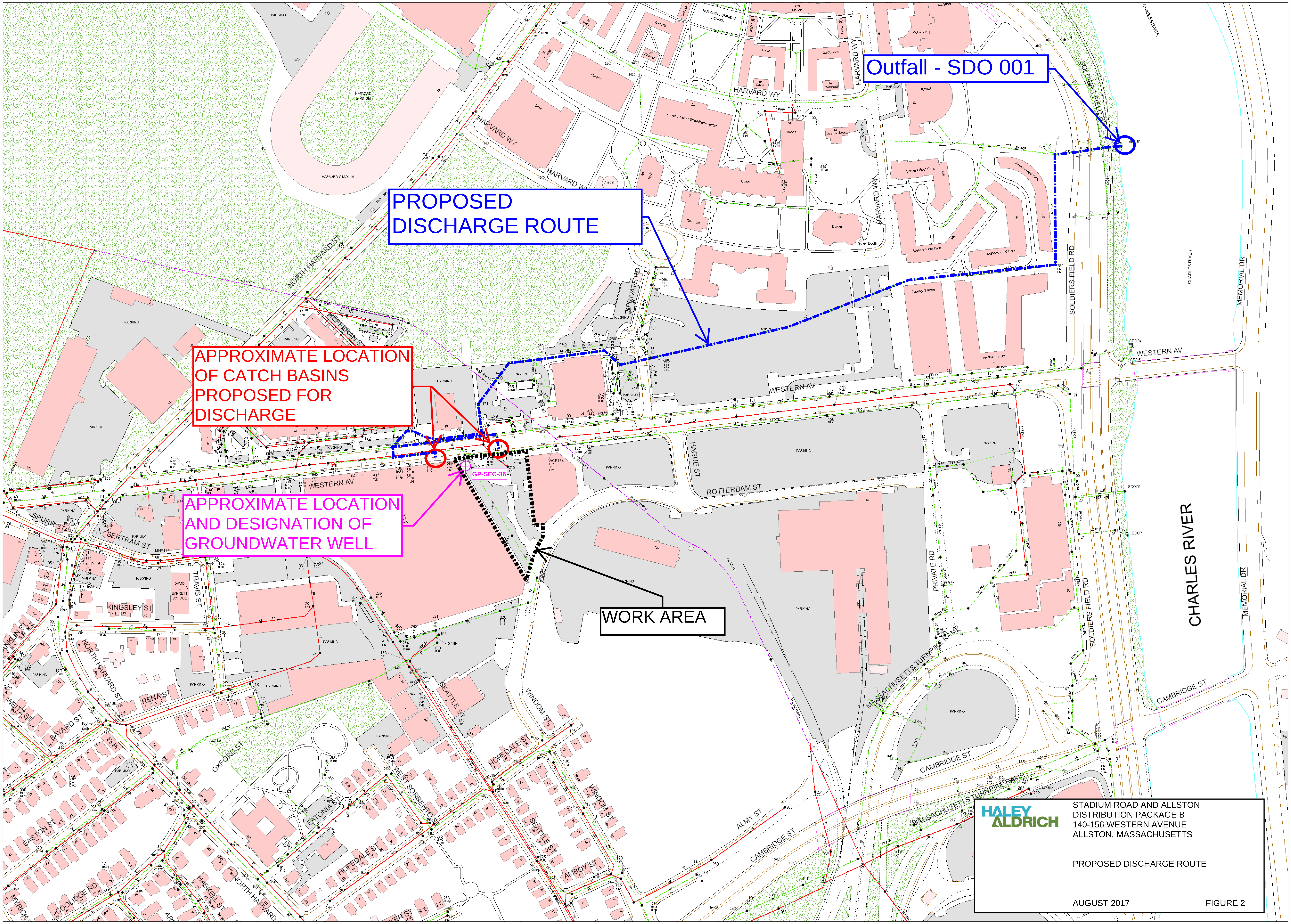
STADIUM ROAD AND ALLSTON DISTRIBUTION PACKAGE B
140-156 WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
AUGUST 2017

FIGURE 1

129379-004_1_LOCUS.PDF


Outfall - SDO 001
PROPOSED DISCHARGE ROUTE
APPROXIMATE LOCATION OF CATCH BASINS PROPOSED FOR DISCHARGE
APPROXIMATE LOCATION AND DESIGNATION OF GROUNDWATER WELL
GP-SEC-36
WORK AREA
CHARLES RIVER
WESTERN AV
SOLDIERS FIELD RD
NORTH HARVARD ST
HARVARD WY
PRIVATE RD
HAGUE ST
ROTTERDAM ST
WINDOM ST
SEATTLE ST
CAMBRIDGE ST
MASSACHUSETTS TURNPIKE RAMP
MEMORIAL DR
HARVARD STADIUM
TRAVIS ST
KINGSLEY ST
BERTRAM ST
SPURR ST
RENA ST
OXFORD ST
HOPEDALE ST
AMBOY ST
ALMY ST
WEST SORRENTO ST
EATONIA ST
EASTON ST
BAYARD ST
WEITZ ST
COOLIDGE RD
HASKELL ST
PARKING
N
W
E
S
1 inch = 100 feet

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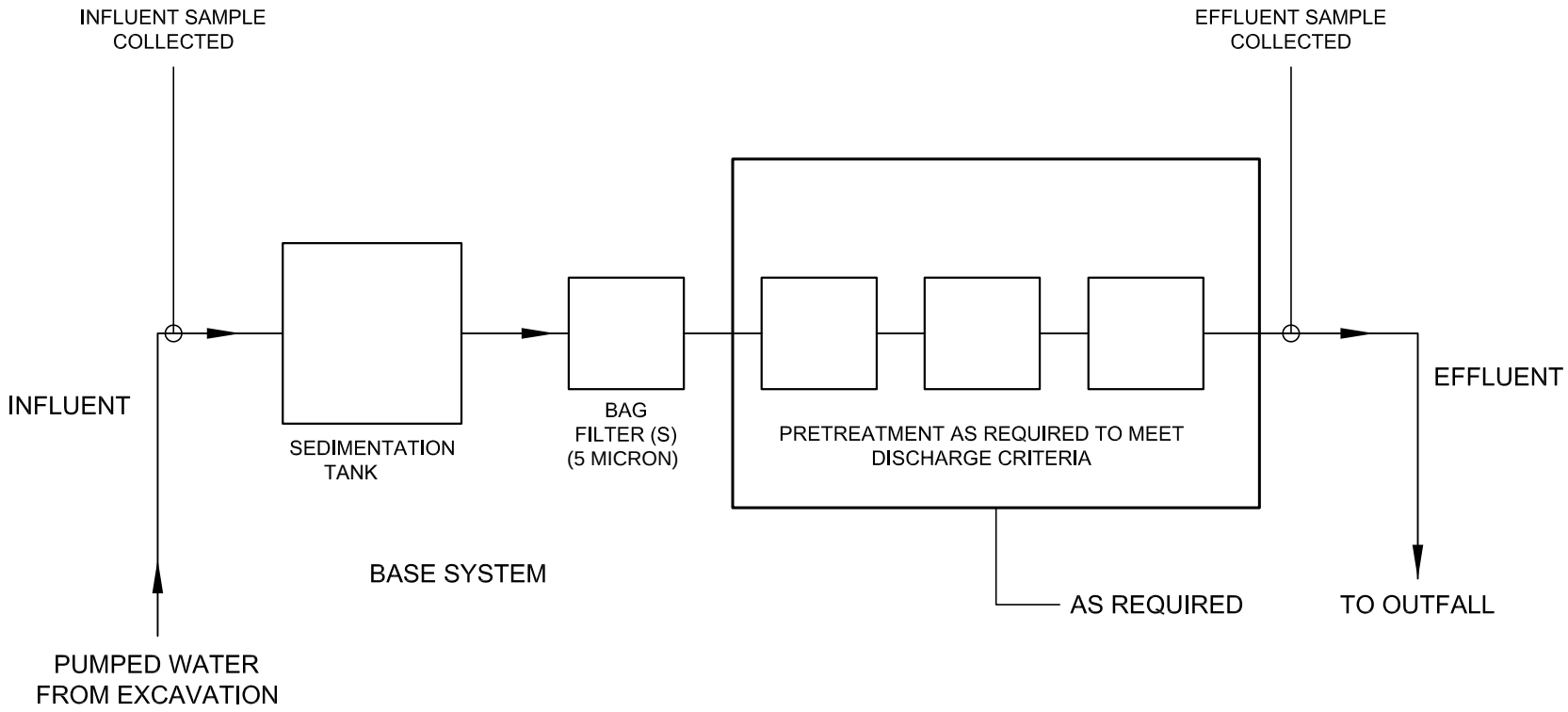
STADIUM ROAD AND ALLSTON
DISTRIBUTION PACKAGE B
140-156 WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROPOSED DISCHARGE ROUTE

AUGUST 2017 FIGURE 2

BOSTON WATER AND SEWER



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

STADIUM ROAD AND ALLSTON DISTRIBUTION
PACKAGE B
140-156 WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROPOSED TREATMENT SYSTEM SCHEMATIC

SCALE: NONE
AUGUST 2017

FIGURE 3

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:
Stadium Road and Allston Distribution Package B</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 Engineering and Utilities

Owner is (check one): ☐ Federal ☐ State/Tribal ☐ Private
■ Other; if so, specify: Institution</td><td colspan="3">Contact Person: Susyrati Bunanta</td></tr>
<tr><td colspan="2">Telephone: 617-496-1669</td><td>Email: susyrati_bunanta@harvard.edu</td></tr>
<tr><td colspan="3">Mailing address: 46 Blackstone Street
Street:</td></tr>
<tr><td>City: Cambridge</td><td>State: MA</td><td>Zip: 02139</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Bond Brothers</td><td colspan="3">Contact Person: John Harmon</td></tr>
<tr><td colspan="2">Telephone: 617-394-6295</td><td>Email: jharmon@bondbrothers.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 145 Spring Street</td></tr>
<tr><td>City: Everett</td><td>State: MA</td><td>Zip: 02149</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): 3-26392
☐ 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.	74.6

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: 8/11/2017

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: metals (As,Cr,Cu,Fe,Pb,Ni,Se), cyanide, ammonia nitrogen, chloride, total suspended solids below RCGW-2	
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	Outfall location(s): (Latitude, Longitude) 42.366467, -71.117628
Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ☐ Indirect discharge, if so, specify: ■ 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: 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): 11/2017 through 11/2018 Indicate if the discharge is expected to occur over a duration of: ■ less than 12 months ☐ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No	

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

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

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

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		✔	1	4500NH3	75	401	401	Report mg/L	---
Chloride		✔	1	300.0	50000	225000	225000	Report µg/l	---
Total Residual Chlorine	✔		1	4500CL-D	20	0	0	0.2 mg/L	821 ug/L
Total Suspended Solids		✔	1	2540D	5000	100000	100000	30 mg/L	---
Antimony	✔		1	200.8	4	0	0	206 µg/L	47,751 ug/L
Arsenic		✔	1	200.8	1	2.82	2.82	104 µg/L	746 ug/L
Cadmium	✔		1	200.8	0.2	0	0	10.2 µg/L	13.3571 ug/L
Chromium III		✔	1	200.8	1	4.2	4.2	323 µg/L	4143.1 ug/L
Chromium VI	✔		1	7196A	.10	0	0	323 µg/L	632.3 ug/L
Copper		✔	1	200.8	1	3.38	3.38	242 µg/L	440 ug/L
Iron		✔	1	200.7	50	1050	1050	5,000 µg/L	34714 ug/L
Lead		✔	1	200.8	0.5	8.91	8.91	160 µg/L	119.88 ug/L
Mercury	✔		1	245.1	0.2	0	0	0.739 µg/L	67.59 ug/L
Nickel		✔	1	200.8	2	5.56	5.56	1,450 µg/L	2471.7 ug/L
Selenium		✔	1	200.8	5	11.9	11.9	235.8 µg/L	373.1 ug/L
Silver	✔		1	200.8	0.4	0	0	35.1 µg/L	112.2 ug/L
Zinc	✔		1	200.8	10	0	0	420 µg/L	5673.3 ug/L
Cyanide		✔	1	4500CN	5	6	6	178 mg/L	388.0 ug/L
B. Non-Halogenated VOCs									
Total BTEX	✔		1	8260C	NA	0	0	100 µg/L	---
Benzene	✔		1	8260C	0.5	0	0	5.0 µg/L	---
1,4 Dioxane	✔		1	8260CSIM	3	0	0	200 µg/L	---
Acetone	✔		1	8260C	5	0	0	7.97 mg/L	---
Phenol	✔		1	8270D	5	0	0	1,080 µg/L	22,383 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
C. Halogenated VOCs									
Carbon Tetrachloride	✓		1	8260C	0.5	0	0	4.4 µg/L	119.4 ug/L
1,2 Dichlorobenzene	✓		1	8260C	2.5	0	0	600 µg/L	---
1,3 Dichlorobenzene	✓		1	8260C	2.5	0	0	320 µg/L	---
1,4 Dichlorobenzene	✓		1	8260C	2.5	0	0	5.0 µg/L	---
Total dichlorobenzene	✓							763 µg/L in NH	---
1,1 Dichloroethane	✓		1	8260C	0.75	0	0	70 µg/L	---
1,2 Dichloroethane	✓		1	8260C	0.5	0	0	5.0 µg/L	---
1,1 Dichloroethylene	✓		1	8260C	0.5	0	0	3.2 µg/L	---
Ethylene Dibromide	✓		1	8260C	2	0	0	0.05 µg/L	---
Methylene Chloride	✓		1	8260C	3	0	0	4.6 µg/L	---
1,1,1 Trichloroethane	✓		1	8260C	0.5	0	0	200 µg/L	---
1,1,2 Trichloroethane	✓		1	8260C	0.75	0	0	5.0 µg/L	---
Trichloroethylene	✓		1	8260C	0.5	0	0	5.0 µg/L	---
Tetrachloroethylene	✓		1	8260C	0.5	0	0	5.0 µg/L	246.2 ug/L
cis-1,2 Dichloroethylene	✓		1	8260C	0.5	0	0	70 µg/L	---
Vinyl Chloride	✓		1	8260C	1	0	0	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✓		1	8270D	NA	0	0	190 µg/L	
Diethylhexyl phthalate	✓		1	8270D	5	0	0	101 µg/L	164.1 ug/L
Total Group I PAHs	✓		1	8270DSIM	0.1	0	0	1.0 µg/L	---
Benzo(a)anthracene	✓		1	8270DSIM	0.1	0	0	As Total PAHs	0.2835 ug/L
Benzo(a)pyrene	✓		1	8270DSIM	0.1	0	0		0.2835 ug/L
Benzo(b)fluoranthene	✓		1	8270DSIM	0.1	0	0		0.2835 ug/L
Benzo(k)fluoranthene	✓		1	8270DSIM	0.1	0	0		0.2835 ug/L
Chrysene	✓		1	8270DSIM	0.1	0	0		0.2835 ug/L
Dibenzo(a,h)anthracene	✓		1	8270DSIM	0.1	0	0		0.2835 ug/L
Indeno(1,2,3-cd)pyrene	✓		1	8270DSIM	0.1	0	0		0.2835 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	8270DSIM	0.1	0	0	100 µg/L	---
Naphthalene	✔		1	8260C	0.8	0	0	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs	✔		1	608	0.250	0	0	0.000064 µg/L	---
Pentachlorophenol	✔		1	8270DSIM	0.80	0	0	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons	✔		1	1664A	4800	0	0	5.0 mg/L	---
Ethanol	✔		1	8260C	NA	NA	NA	Report mg/L	---
Methyl-tert-Butyl Ether	✔		1	8260C	1	0	0	70 µg/L	1,492 ug/L
tert-Butyl Alcohol	✔		1	8260C	10	0	0	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		1	8260C	2	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:									
pH		✔	1	4500H+	NA	7.38	7.38		
Hardness		✔	1	200.7	660	174000	174000		
Iron, dissolved		✔	1	6020A	50 ug/L	375	375		
Lead, dissolved		✔	1	6020A	0.5	0.9	0.9		

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 are required by the NTWP) 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:	250 gpm
Provide the proposed maximum effluent flow in gpm.	150 gpm
Provide the average effluent flow in gpm.	50 gpm
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:	NA

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 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.

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

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: Susyrati Bunanta Date: 8/29/2017

Print Name and Title: Susyrati Bunanta, Principal Engineer

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: Digitally signed by John M. Harmon
DN: cn=John M. Harmon, o=Bond Brothers, ou, email=jharmon@bondbrothers.com, c=US
Date: 2017.08.28 10:21:13 -04'00'

Date: 8/28/17

Print Name and Title: John Harmon, Senior Project Manager

APPENDIX B

Effluent Limitations Documentation

Dilution Factor	74.6					
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	821	µg/L	---	µg/L
Total Suspended Solids	**30**	mg/L	---			
Antimony	**206**	µg/L	47751	µg/L		
Arsenic	**104**	µg/L	746	µg/L		
Cadmium	**10.2**	µg/L	13.5671	µg/L		
Chromium III	**323**	µg/L	4143.1	µg/L		
Chromium VI	**323**	µg/L	632.3	µg/L		
Copper	**242**	µg/L	440.0	µg/L		
Iron	**5000**	µg/L	34714	µg/L		
Lead	**160**	µg/L	119.88	µg/L		
Mercury	**0.739**	µg/L	67.59	µg/L		
Nickel	**1450**	µg/L	2471.7	µg/L		
Selenium	**235.8**	µg/L	373.1	µg/L		
Silver	**35.1**	µg/L	112.2	µg/L		
Zinc	**420**	µg/L	5673.3	µg/L		
Cyanide	**178**	mg/L	388.0	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	22383	µg/L		
C. Halogenated VOCs						
Carbon Tetrachloride	**4.4**	µg/L	119.4	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	246.2	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	164.1	µg/L		
Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---			
Benzo(a)anthracene	**1.0**	µg/L	0.2835	µg/L	---	µg/L
Benzo(a)pyrene	**1.0**	µg/L	0.2835	µg/L	---	µg/L
Benzo(b)fluoranthene	**1.0**	µg/L	0.2835	µg/L	---	µg/L
Benzo(k)fluoranthene	**1.0**	µg/L	0.2835	µg/L	---	µg/L
Chrysene	**1.0**	µg/L	0.2835	µg/L	---	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.2835	µg/L	---	µg/L
Indeno(1,2,3-cd)pyrene	**1.0**	µg/L	0.2835	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	1492	µg/L		
tert-Butyl Alcohol	**120**	µg/L	---			
tert-Amyl Methyl Ether	**90**	µg/L	---			

Enter number values in green boxes below

Enter values in the units specified

↓

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

Enter a dilution factor, if other than zero

↓

74.6

Enter values in the units specified

↓

174	C_d = Enter influent hardness in **mg/L** $CaCO_3$
56.9	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

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

↓

7	pH in **Standard Units**
15	Temperature in **°C**
0.054	Ammonia in **mg/L**
56.9	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**
3	Chromium VI in **µg/L**
0	Copper in **µg/L**
542	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**

Enter **influent** concentrations in the units specified

↓

0	TRC in **µg/L**
0.401	Ammonia in **mg/L**
0	Antimony in **µg/L**
2.82	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
3.38	Copper in **µg/L**
1050	Iron in **µg/L**
8.91	Lead in **µg/L**
0	Mercury in **µg/L**
5.56	Nickel in **µg/L**
11.9	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**
6	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**

Notes:

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

Saltwater (estuarine and marine): only if approved by the State

Leave 0 if no entry

Freshwater only

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

if >1 sample, enter maximum

if >10 samples, may enter 95th percentile

Enter 0 if non-detect or testing not required

Christmas, Elizabeth

From: Ruan, Xiaodan (DEP) <xiaodan.ruan@state.ma.us>
Sent: Friday, August 11, 2017 12:15 PM
To: Christmas, Elizabeth
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Liz,

Thanks. I can confirm that the 7Q10 of 15.9 MGD (Charles River near Western Ave Bridge) and using a design flow of 0.216 MGD, the dilution factor is 74.6 are correct.
Please either attach this email to the NOI or add today's date where you indicate that you have consulted with MassDEP on the NOI. This will be helpful when EPA reviews the NOI. Since the Charles River is not listed as an Outstanding Resource Water, you are all set from MassDEP.

Thanks,
Xiaodan

From: Christmas, Elizabeth [mailto:EChristmas@haleyaldrich.com]
Sent: Friday, August 11, 2017 9:01 AM
To: Ruan, Xiaodan (DEP)
Cc: Vakalopoulos, Catherine (DEP); Straley, Beck
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Xiaodan,
The 150 gpm is the max flow for the system. We expect 50 gpm for the typical daily flow.
Thanks,
Liz

Elizabeth Christmas, E.I.T. (NH)
Haley & Aldrich, Inc.
C: (978) 621-9611

From: Ruan, Xiaodan (DEP) [mailto:Xiaodan.Ruan@MassMail.State.MA.US]
Sent: Thursday, August 10, 2017 4:36 PM
To: Christmas, Elizabeth <EChristmas@haleyaldrich.com>
Cc: Vakalopoulos, Catherine (DEP) <catherine.vakalopoulos@state.ma.us>; Straley, Beck <BStraley@haleyaldrich.com>
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Liz,

I have one question. Is the 150 GDM (0.216 MGD) the design flow of the system?

The design flow in the RGP is defined as flow though the component in the treatment system with the most restricted flow. This number is used to set the daily maximum flow limit and is also used in the DF calculation.

Thank you,

Xiaodan

From: Christmas, Elizabeth [mailto:EChristmas@haleyaldrich.com]
Sent: Thursday, August 10, 2017 11:13 AM
To: Ruan, Xiaodan (DEP)
Cc: Vakalopoulos, Catherine (DEP); Straley, Beck
Subject: FW: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Xiaodan,
I'm forwarding this to you based on Cathy's out of office response. Please see below and let me know if you have any questions.

Thank you,
Liz

Elizabeth Christmas, E.I.T. (NH)
Haley & Aldrich, Inc.
C: (978) 621-9611

From: Christmas, Elizabeth
Sent: Thursday, August 10, 2017 9:26 AM
To: 'Vakalopoulos, Catherine (DEP)' <Catherine.Vakalopoulos@MassMail.State.MA.US>
Cc: Straley, Beck <BStraley@haleyaldrich.com>
Subject: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Cathy,

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

Project:
Stadium Road and Allston Distribution Package B
Harvard University
Western Avenue
Allston, MA

7 Day 10 Year Low Flow value (from attached StreamStats Report) = 24.6 cfs or 15.9 MGD

Dilution Factor (from attached calculations) = 74.6

The latitude/longitude is slightly upstream from our proposed outfall location (SD001, just upstream of the Western Ave Bridge)
Can you please confirm if these values are appropriate for use for our project?

Thank you,

Elizabeth Christmas, E.I.T. (NH)
Senior Engineer – Environmental

Haley & Aldrich, Inc.

465 Medford Street | Suite 2200
Boston, MA 02129-1400

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HALEY & ALDRICH, INC.		**CALCULATIONS**	FILE NO.	129379-004	
			SHEET	1 of 1	
CLIENT	PRESIDENT AND FELLOWS OF HARVARD COLLEGE		DATE	10-Aug-17	
PROJECT	STADIUM ROAD AND ALLSTON DISTRIBUTION PACKAGE B		COMPUTED BY	EJC	
SUBJECT	DILUTION FACTOR CALCULATIONS		CHECKED BY	BS	

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 150 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)

$$Q_D = \frac{150\ gallons}{min} \times \frac{1{,}440\ min}{day} \times \frac{1\ MG}{1{,}000{,}000\ gallons}$$

Q_D = 0.216 MGD

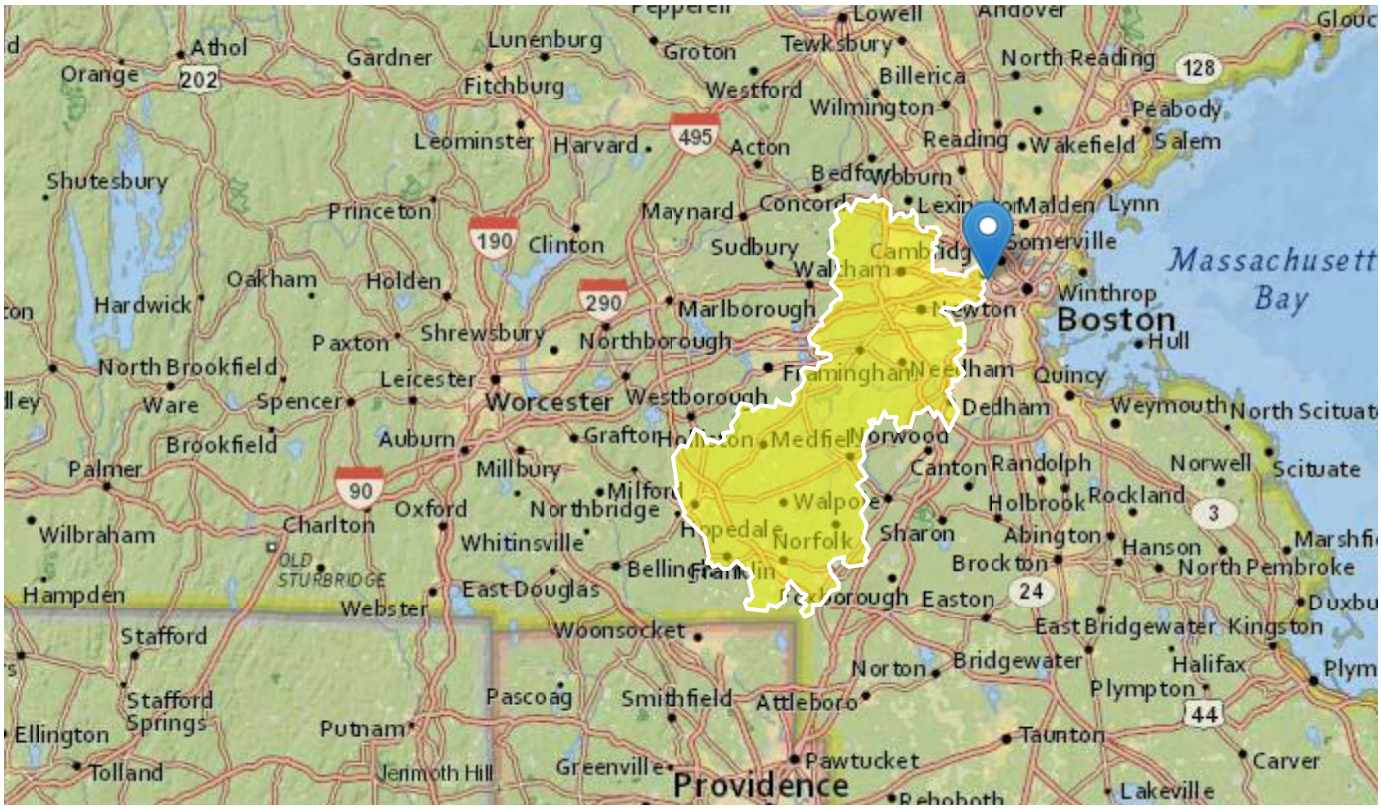
Dilution Factor (DF)

$$DF = \frac{Q_S + Q_D}{QD} = \frac{15.9\ MGD + 0.216\ MGD}{0.216\ MGD} = 74.6$$

CONCLUSION: The dilution factor for this project is calculated to be 74.6 based on the provided 7Q10 low flow value and discharge flowrate.

StreamStats Report - Stadium Road and Allston Distribution Package B

Region ID: MA
Workspace ID: MA20170810083535619000
Clicked Point (Latitude, Longitude): 42.36704, -71.11695
Time: 2017-08-10 08:36:37 -0400



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	2.334	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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
BSLDEM250	Mean Basin Slope from 250K DEM	2.334	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

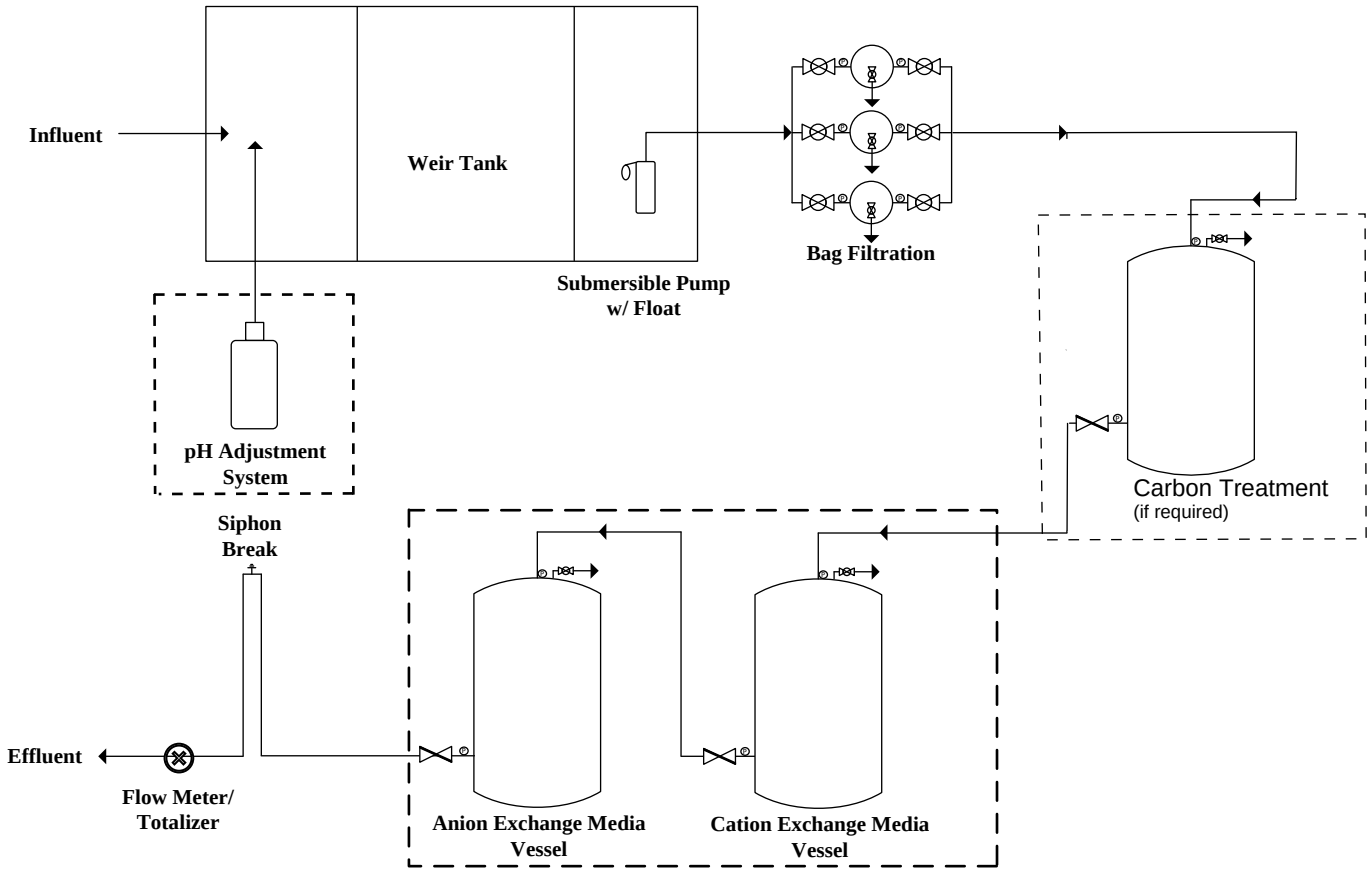
Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

APPENDIX C

Chemicals and Additives Information

HALEY ALDRICH

ADDITIONAL TREATMENT SYSTEMS SCHEMATIC LAYOUT



Notes:

1.) Figure is not to scale
2.) System is rated for 100 gallons per minute.
3.) Sampling ports located on all treatment system components

Key:
Piping/Hose
Contingency

Lockwood Remediation Technologies, LLC
89 Crawford Street
Leominster, MA 01453
Office: 774-450-7177

DESIGNED BY: LRT **DRAWN BY:** B. Watkins

CHECKED BY: **DATE:**

Figure 4 - Water Treatment System Schematic

PROJECT No. 2-1494

FIGURE No. 4

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.

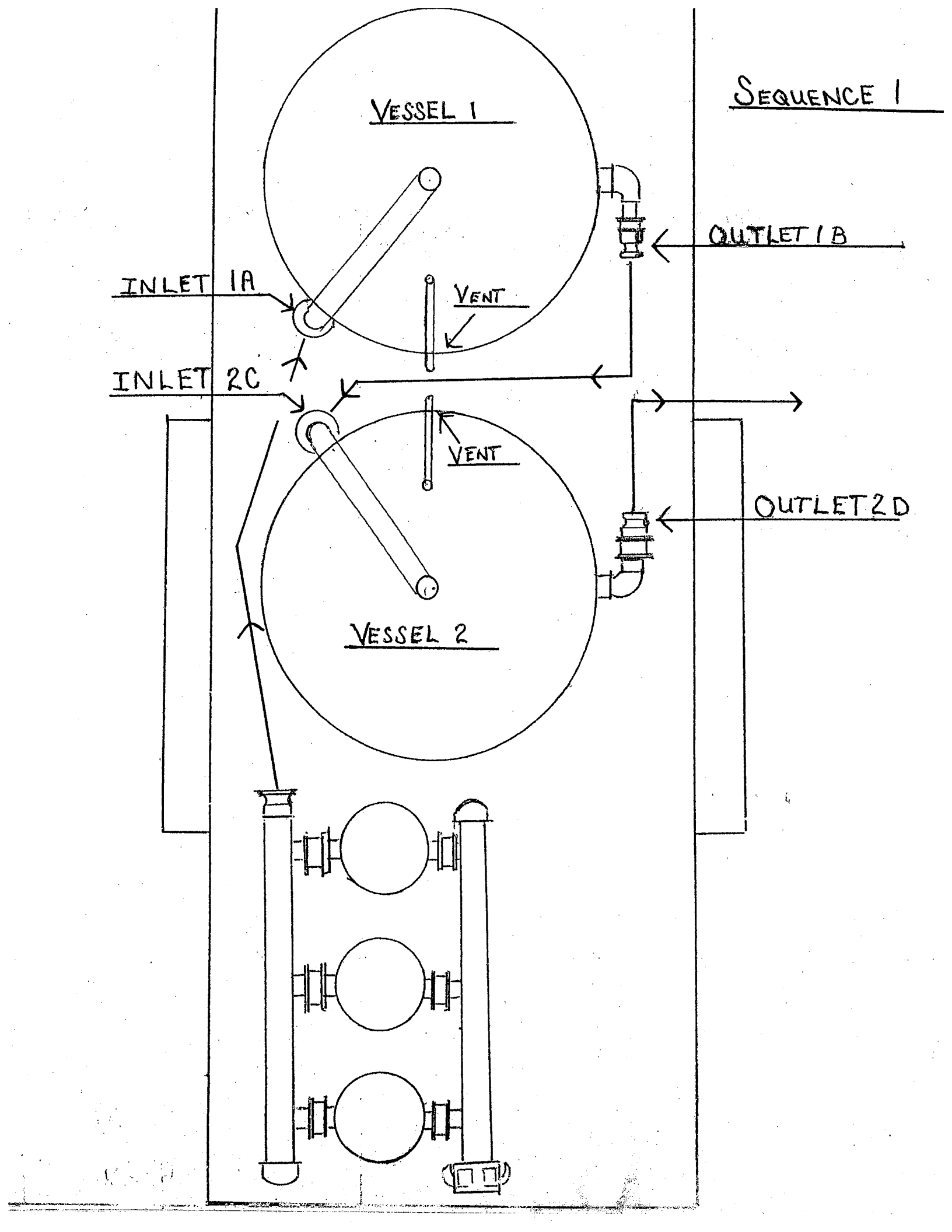
The system is mounted on a 12,230lb GVWR / 9600lb LC equipment hauler manufactured by Superior Trailers of Georgia. The main frame is 7" channel with two (2) 6000lb brake axles. There are four (4) 12000lb drop leg jackets with one mounted in each corner of the trailer. The combined dry weight of the 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

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.

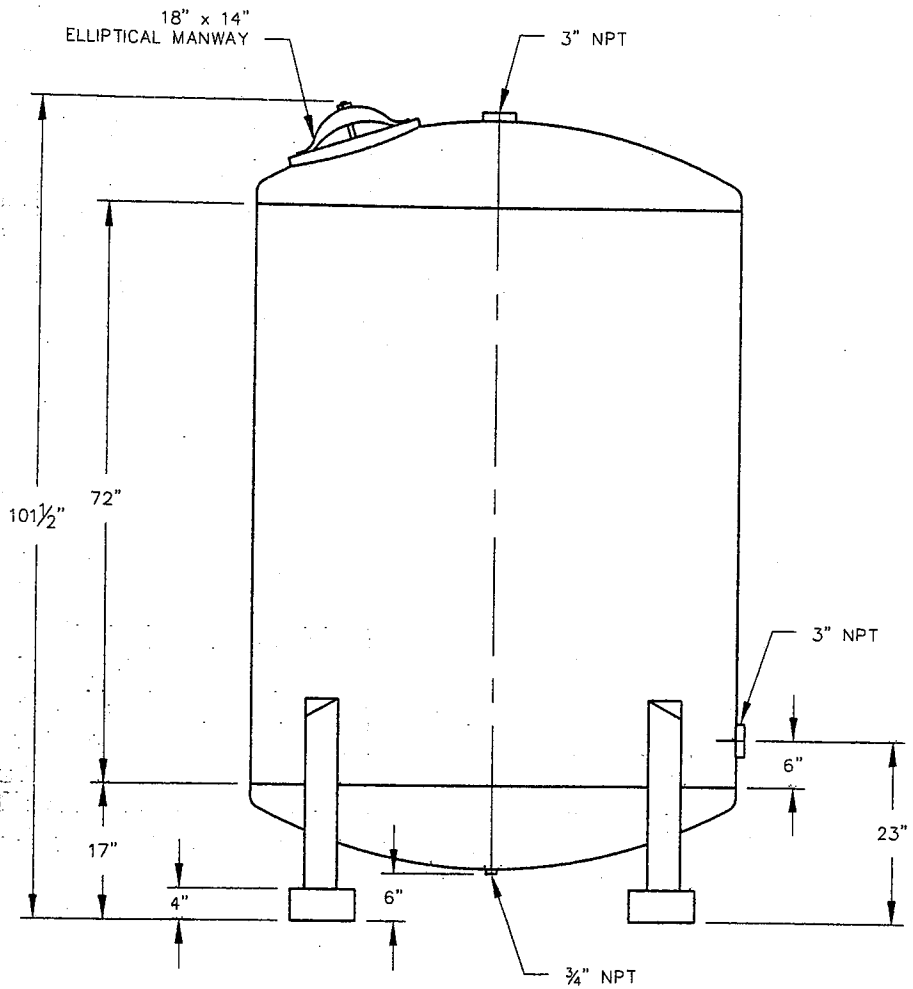
1) Superior Trailers 12,232lb GVWR trailer equipped with two (2) 6000lb AXIS Products brake axles.

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

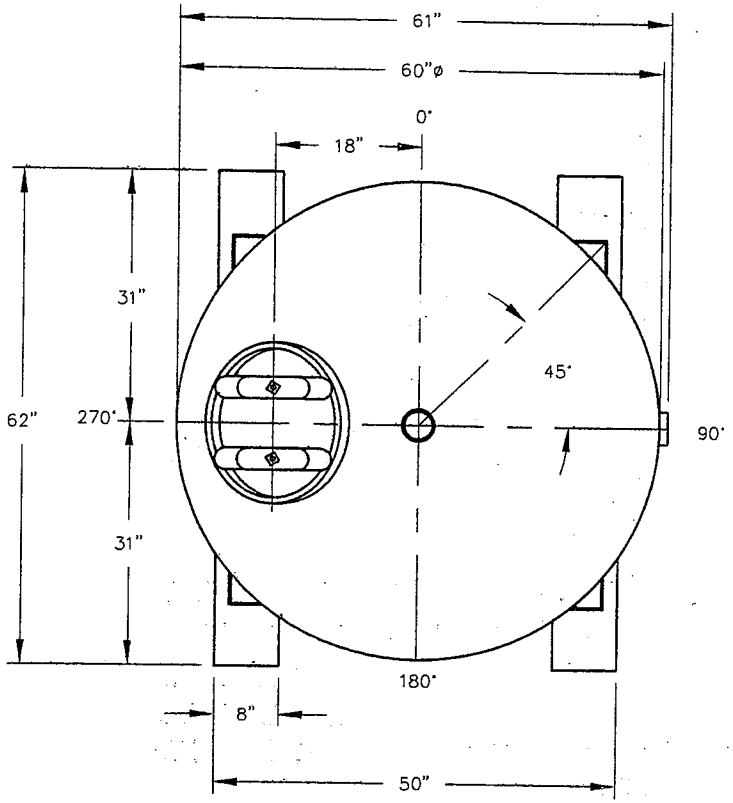
6) Legend Mfg. 2" Butterfly valves model T-335AB with EPDM seat, Aluminum/Bronze construction.

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

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.

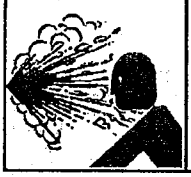
Once the desired service flow has been established, the filter will operate efficiently until dirty. However, under no circumstances should more than *15 PSI Differential Pressure* through the filter be obtained. Operating the filter unit with a high differential may cause filter bags to rupture and/or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

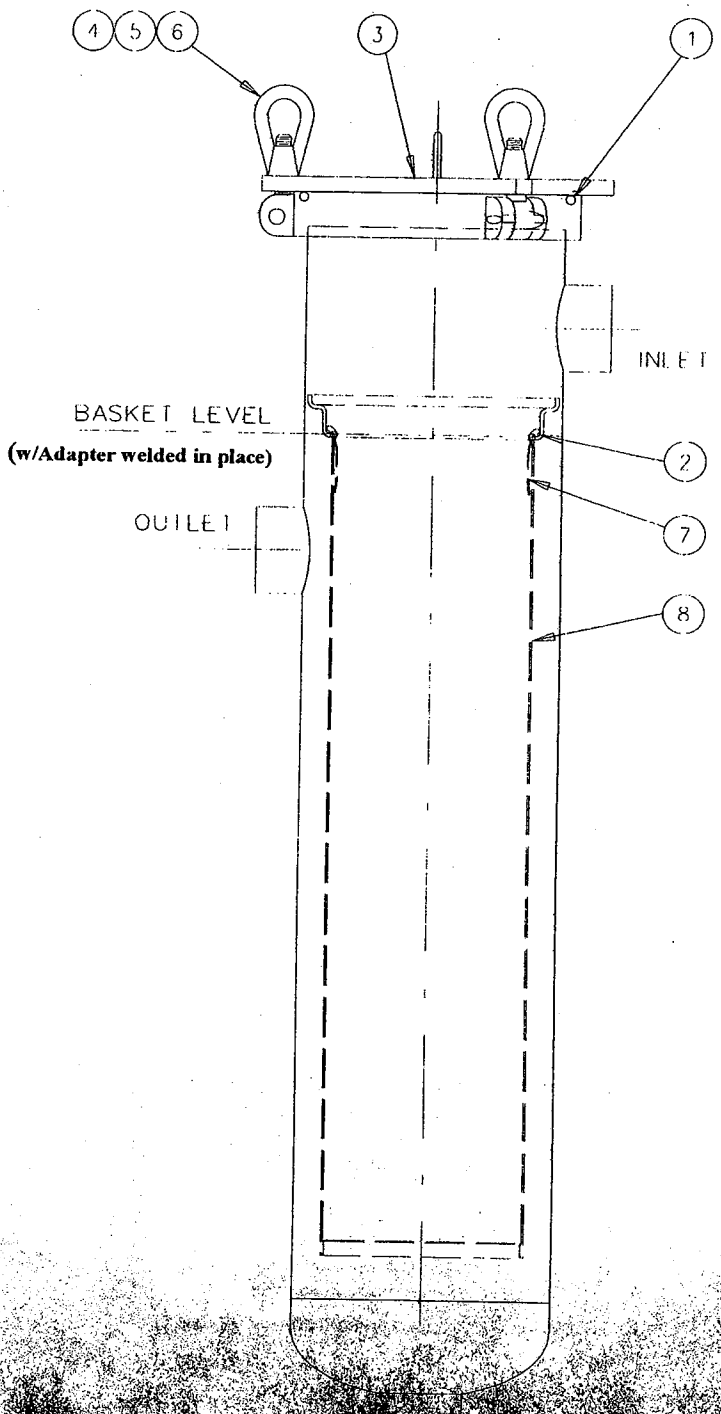
SPARE PARTS LIST			
Balloon	Description	Part Number	Time-Frame
1	Cover Seal	8150CG-*	as needed
2	Basket Seal	9BG-*	as needed
3	Cover	RCO8	as needed
4	Eye Nut	4ENNI	as needed
5	Rod End	4RENI	as needed
6	Clevis Pin Assembly	4CPNI	as needed
7	Filter Bag	(See Order)	as needed
8	Filter Basket	(See Order)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

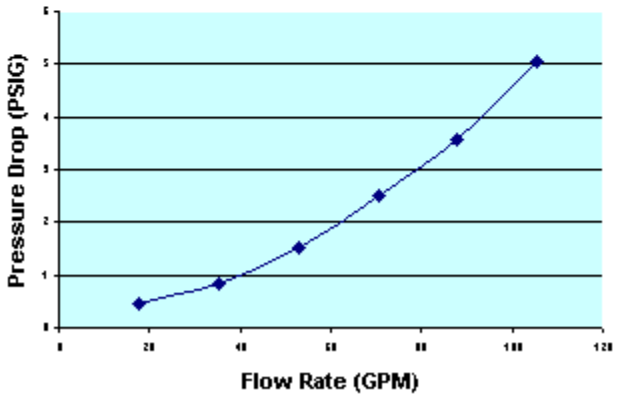
HPAF SERIES FILTERS
MODEL HPAF-2000

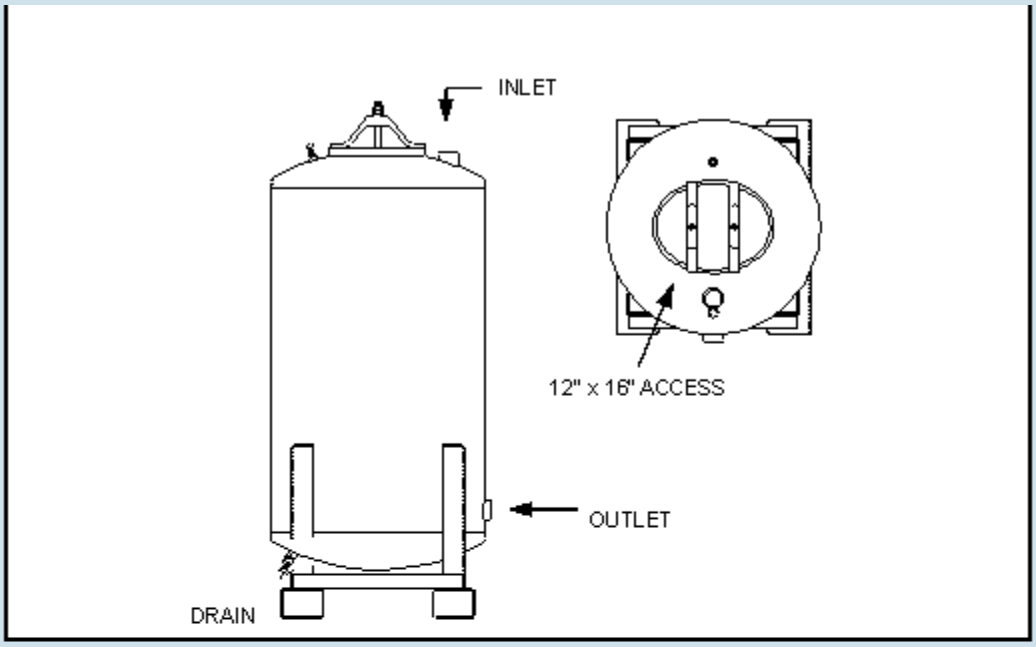
The HPAF-2000 filter is a media filter vessel designed to treat liquid streams. While the typical design application is a activated carbon adsorbtion unit, the filter can easily accommodate many medias. Some applications include:

- 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

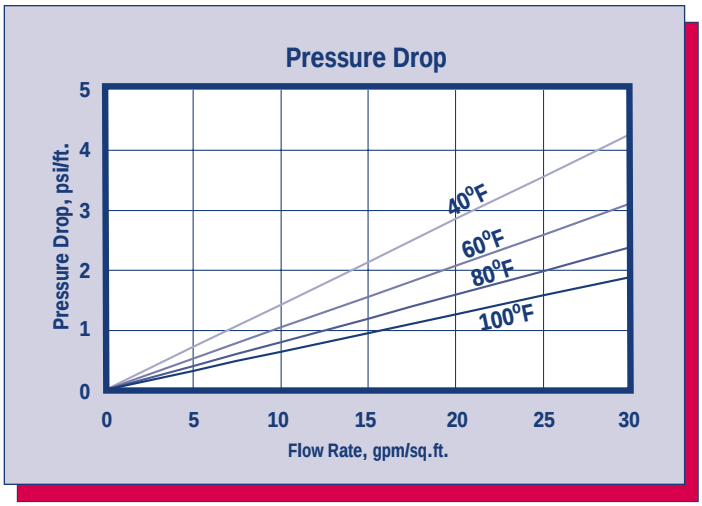
RESINTECH CGS is a high purity, light colored, high capacity, gel type sulfonated polystyrene cation resin supplied in the sodium form as moist, tough uniform spherical beads. *ResinTech CGS* specifically is intended for use in all water softening applications,including beverages, potable water and water 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.)

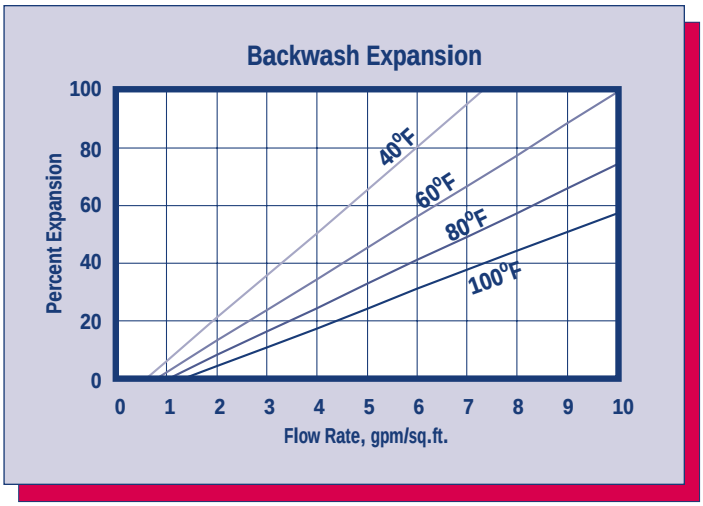
FEATURES & BENEFITS

- **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

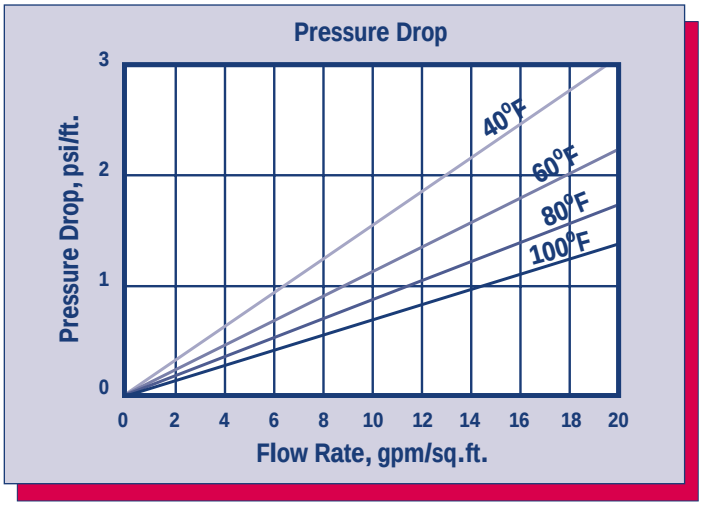
ResinTech SBG1 is a high capacity, shock resistant, gelular, Type 1, strongly basic anion exchange resin supplied in the chloride or hydroxide form as moist, tough, uniform, spherical beads. *ResinTech SBG1* is intended for use in all types of deionization systems and chemical processing applications. 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.

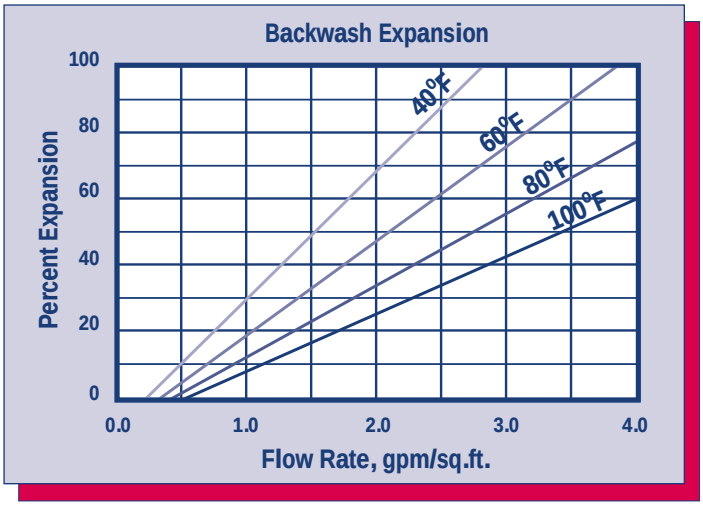
FEATURES & BENEFITS

- **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.

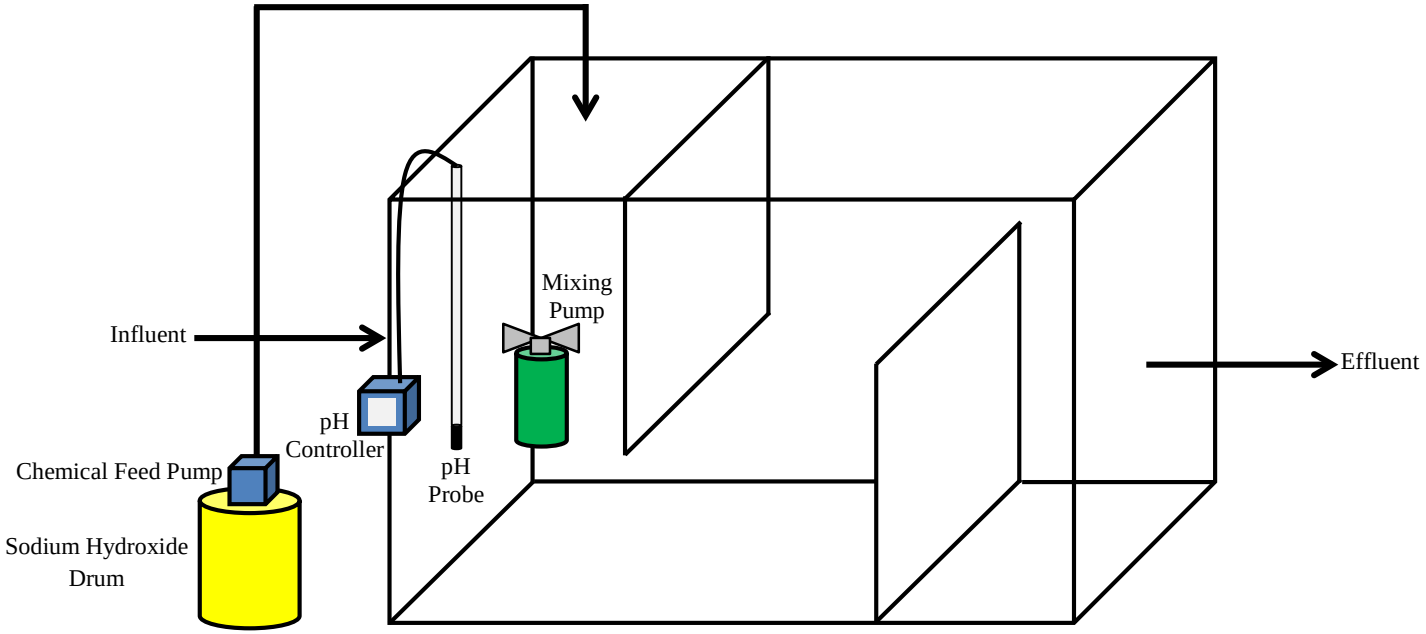
Section 15: Regulatory Information

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

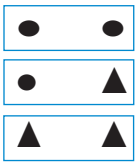
Choose from Hach's Broad Range of Digital and Analog Sensors

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	▲

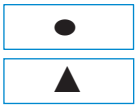
● = Digital ▲ = Analog

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



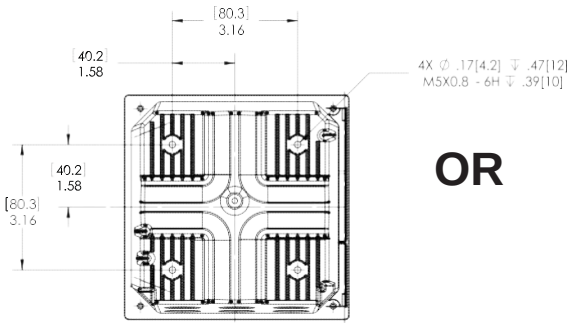
Specifications*

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.*

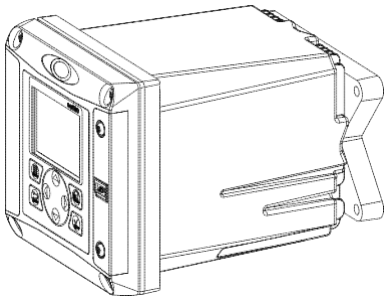
Dimensions

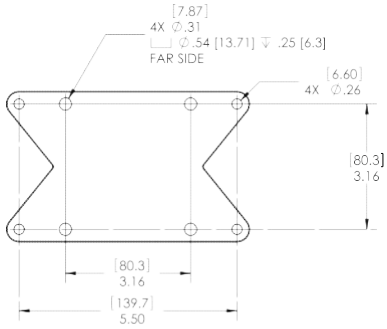
Surface Mounting Dimensions



Mounting Dimensions
(Rear View)

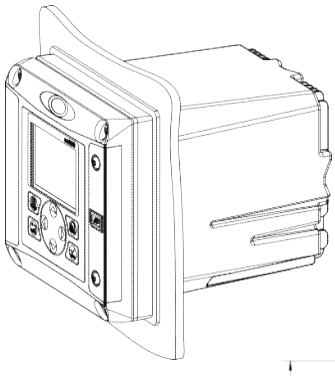
OR

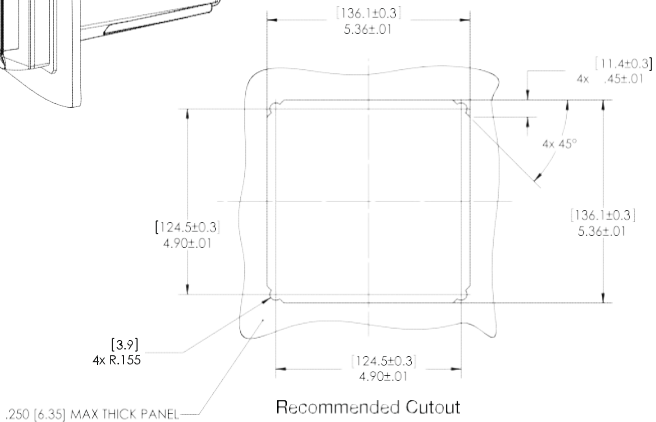




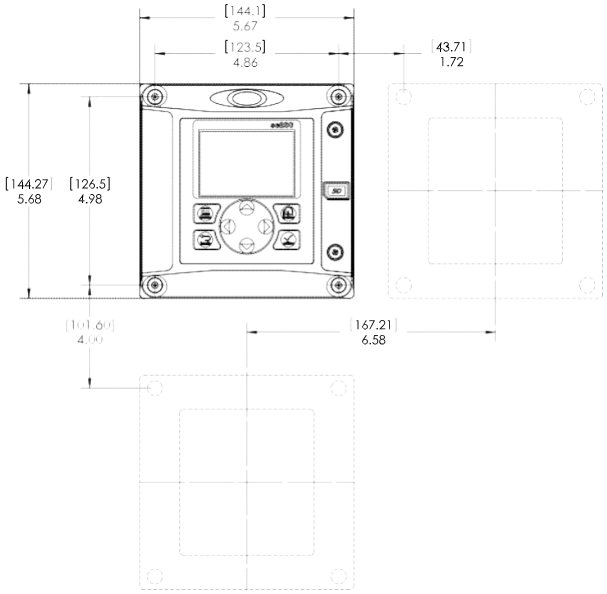
Bracket (supplied) for Surface Mounting
(Not compatible with Weather and Sun Shield
p/n 9220600 when surface mounting.)

Panel Mounting Dimensions



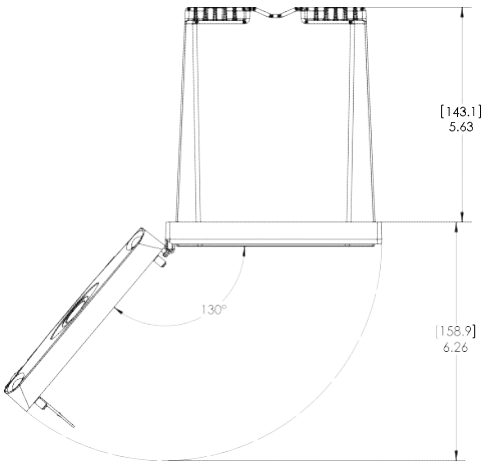


Recommended Cutout
for Panel Mounting

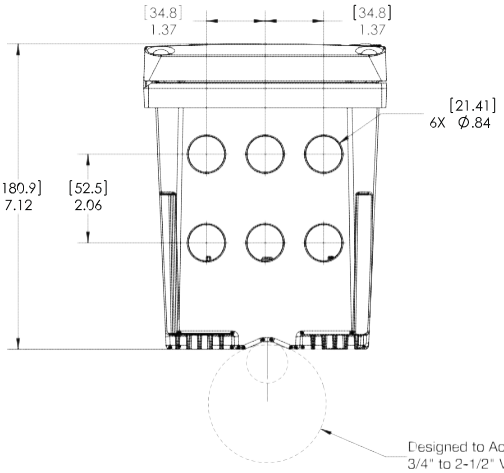


Minimum Spacing Dimensions
for Group Mounting

Top and Bottom Views



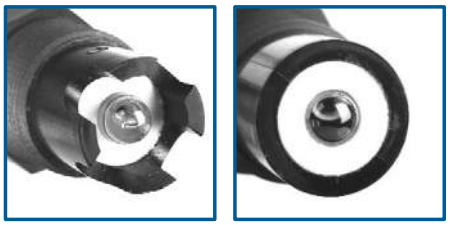
Door Opening Details



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.

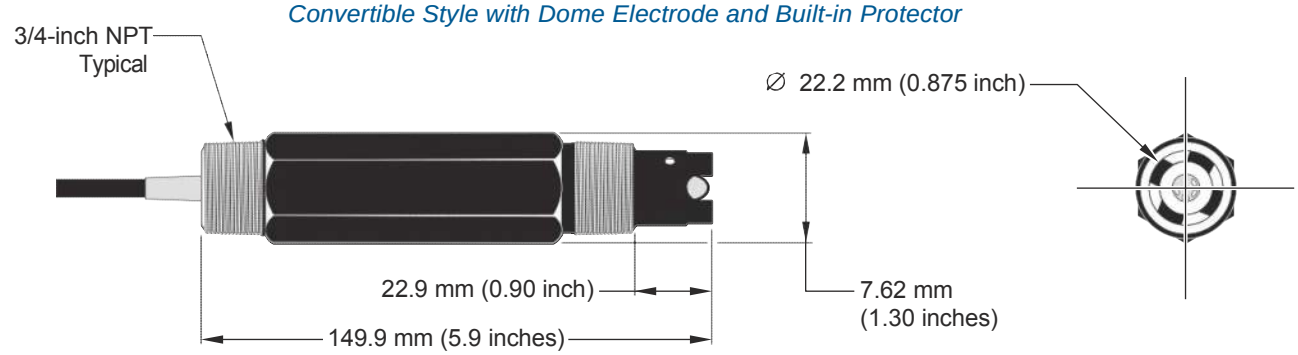
Insertion Style Sensor

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.

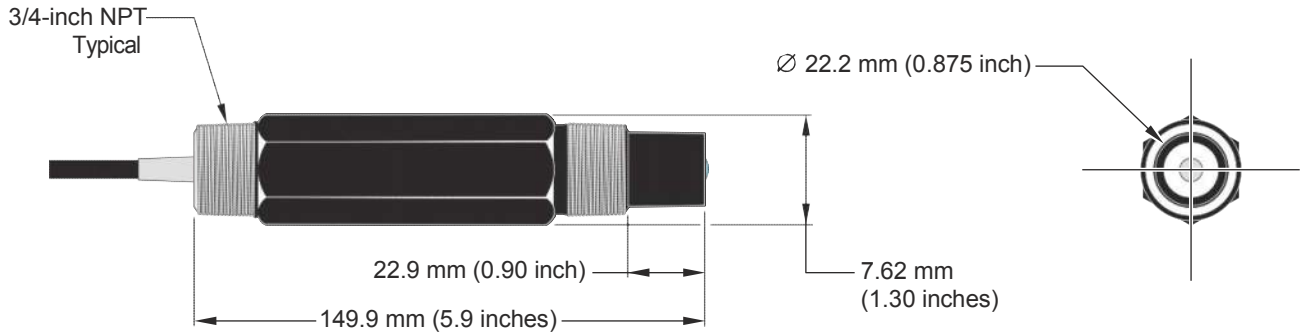
Sanitary Style Sensor

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 8' OD						3 8' D X 1 2' OD	1 4' D X 3 8' OD		
		Pioina	1 4' 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 capacity
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

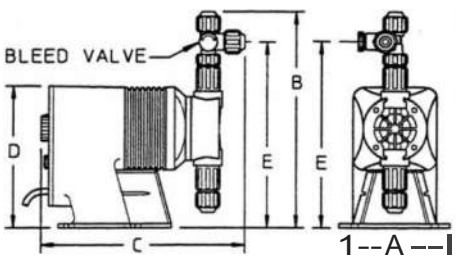
Pre-Engineered Systems

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."

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 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/m^3	(Vacated) TWA: 1 mg/m^3 TWA: 1 mg/m^3	IDLH: 15 mg/m^3 TWA: 1 mg/m^3	TWA: 1 mg/m^3

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 Assessment

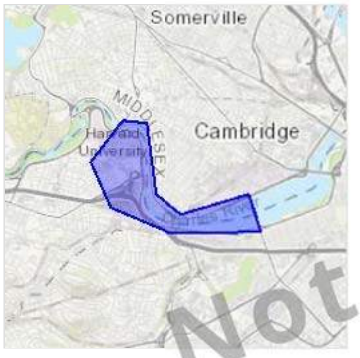
IPaC resource list

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] are managed by the Endangered Species Program of the U.S. Fish and Wildlife Service.

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.

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 activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service[3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

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
- Conservation measures for birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The migratory birds species listed below are species of particular conservation concern (e.g. Birds of Conservation Concern) that may be potentially affected by activities in this location. It is not a list of every bird species you may find in this location, nor a guarantee that all of the bird species on this list will be found on or near this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the AKN Histogram Tools and Other Bird Data Resources. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

NAME	SEASON(S)
American Bittern Botaurus lentiginosus https://ecos.fws.gov/ecp/species/6582	On Land: Breeding
American Oystercatcher Haematopus palliatus https://ecos.fws.gov/ecp/species/8935	On Land: Breeding
Bald Eagle Haliaeetus leucocephalus https://ecos.fws.gov/ecp/species/1626	On Land: Year-round
Black-billed Cuckoo Coccyzus erythropthalmus https://ecos.fws.gov/ecp/species/9399	On Land: Breeding
Blue-winged Warbler Vermivora pinus	On Land: Breeding
Canada Warbler Wilsonia canadensis	On Land: Breeding
Hudsonian Godwit Limosa haemastica	At Sea: Migrating
Least Bittern Ixobrychus exilis https://ecos.fws.gov/ecp/species/6175	On Land: Breeding
Olive-sided Flycatcher Contopus cooperi https://ecos.fws.gov/ecp/species/3914	On Land: Breeding

Peregrine Falcon Falco peregrinus https://ecos.fws.gov/ecp/species/8831	On Land: Breeding
Pied-billed Grebe Podilymbus podiceps	On Land: Breeding
Prairie Warbler Dendroica discolor	On Land: Breeding
Purple Sandpiper Calidris maritima	On Land: Wintering
Saltmarsh Sparrow Ammodramus caudacutus	On Land: Breeding
Seaside Sparrow Ammodramus maritimus	On Land: Breeding
Short-eared Owl Asio flammeus https://ecos.fws.gov/ecp/species/9295	On Land: Wintering
Snowy Egret Egretta thula	On Land: Breeding
Upland Sandpiper Bartramia longicauda https://ecos.fws.gov/ecp/species/9294	On Land: Breeding
Willow Flycatcher Empidonax traillii https://ecos.fws.gov/ecp/species/3482	On Land: Breeding
Wood Thrush Hylocichla mustelina	On Land: Breeding
Worm Eating Warbler Helmitheros vermivorum	On Land: Breeding

What does IPaC use to generate the list of migratory bird species potentially occurring in my specified location?

Landbirds:

Migratory birds that are displayed on the IPaC species list are based on ranges in the latest edition of the National Geographic Guide, Birds of North America (6th Edition, 2011 by Jon L. Dunn, and Jonathan Alderfer). Although these ranges are coarse in nature, a number of U.S. Fish and Wildlife Service migratory bird biologists agree that these maps are some of the best range maps to date. These ranges were clipped to a specific Bird Conservation Region (BCR) or USFWS Region/Regions, if it was indicated in the 2008 list of Birds of Conservation Concern (BCC) that a species was a BCC species only in a particular Region/Regions. Additional modifications have been made to some ranges based on more local or refined range information and/or information provided by U.S. Fish and Wildlife Service biologists with species expertise. All migratory birds that show in areas on land in IPaC are those that appear in the 2008 Birds of Conservation Concern report.

Atlantic Seabirds:

Ranges in IPaC for birds off the Atlantic coast are derived from species distribution models developed by the National Oceanic and Atmospheric Association (NOAA) National Centers for Coastal Ocean Science (NCCOS) using the best available seabird survey data for the offshore Atlantic Coastal region to date. NOAANCCOS assisted USFWS in developing seasonal species ranges from their models for specific use in IPaC. Some of these birds are not BCC species but were of interest for inclusion because they may occur in high abundance off the coast at different times throughout the year, which potentially makes them more susceptible to certain types of development and activities taking place in that area. For more refined details about the abundance and richness of bird species within your project area off the Atlantic Coast, see the Northeast Ocean Data Portal. The Portal also offers data and information about other types of taxa that may be helpful in your project review.

About the NOAANCCOS models: the models were developed as part of the NOAANCCOS project: Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf. The models resulting from this project are being used in a number of decision-support/mapping products in order to help guide decision-making on activities off the Atlantic Coast with the goal of reducing impacts to migratory birds. One such product is the Northeast Ocean Data Portal, which can be used to explore details about the relative occurrence and abundance of bird species in a particular area off the Atlantic Coast.

All migratory bird range maps within IPaC are continuously being updated as new and better information becomes available.

Can I get additional information about the levels of occurrence in my project area of specific birds or groups of birds listed in IPaC?

Landbirds:

The Avian Knowledge Network (AKN) provides a tool currently called the "Histogram Tool", which draws from the data within the AKN (latest,survey, point count, citizen science datasets) to create a view of relative abundance of species within a particular location over the course of the year. The results of the tool depict the frequency of detection of a species in survey events, averaged between multiple datasets within AKN in a particular week of the year. You may access the histogram tools through the Migratory Bird Programs AKN Histogram Tools webpage.

The tool is currently available for 4 regions (California, Northeast U.S., Southeast U.S. and Midwest), which encompasses the following 32 states: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North, Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

In the near future, there are plans to expand this tool nationwide within the AKN, and allow the graphs produced to appear with the list of trust resources generated by IPaC, providing you with an additional level of detail about the level of occurrence of the species of particular concern potentially occurring in your project area throughout the course of the year.

Atlantic Seabirds:

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 NOAANCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Facilities

Wildlife refuges

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

THERE ARE NO REFUGES 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.

This location overlaps the following wetlands:

LAKE

L1UBH

RIVERINE

R2UBH

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

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

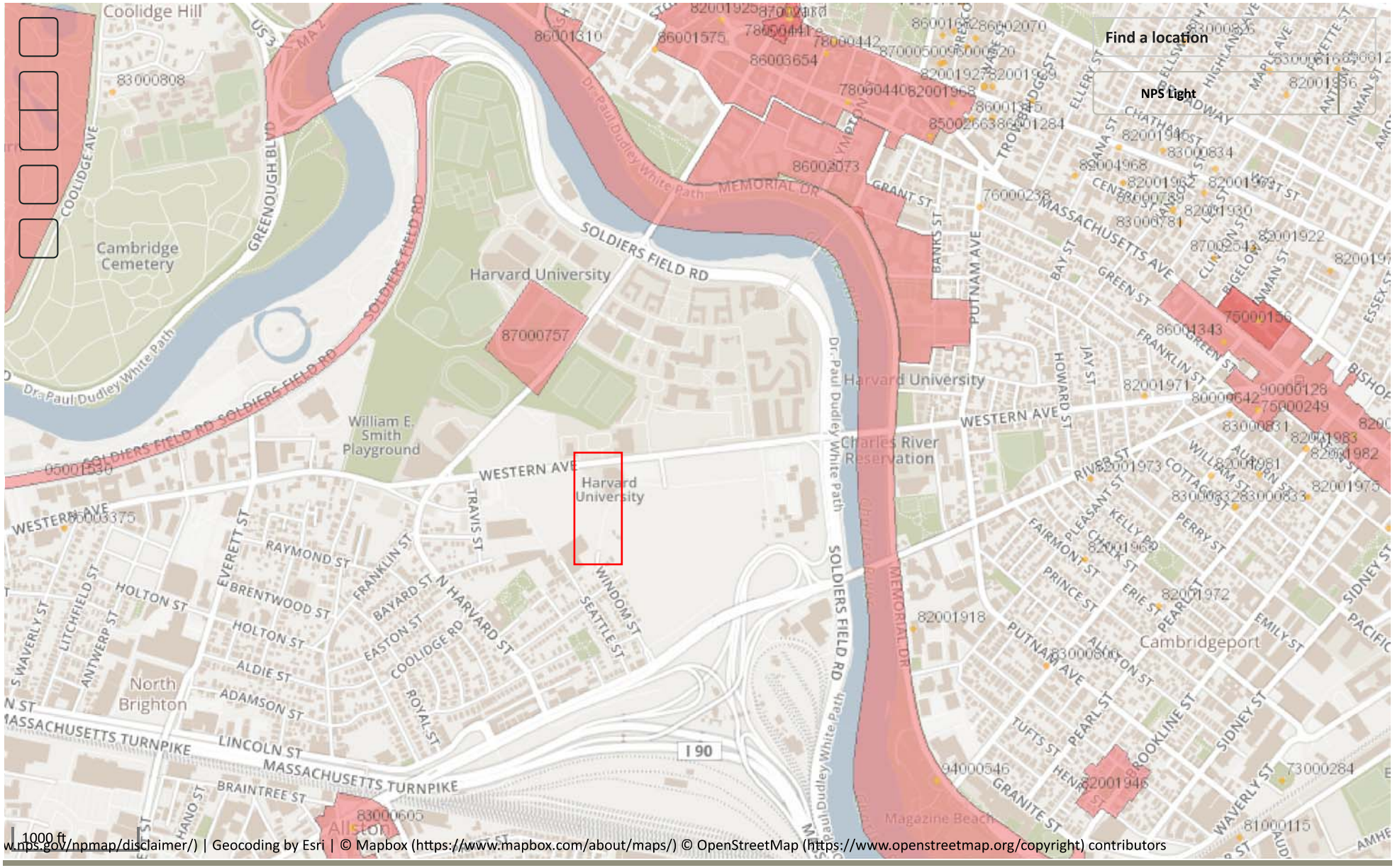
HALEY ALDRICH

APPROXIMATE LOCATION OF SITE

National Register of Historic Places

National Park Service
U.S. Department of the Interior

Public, non-restricted data depicting National Register spatial data processed by the Cultural Resources GIS facility. …



National Register of Historic Places
National Historic Landmarks Documentation
Note: Not all NHLs have been digitized yet

Reference Number	State	County	City	Resource Name	Address	Date Listed on NR
71000087	MASSACHUSETTS	Suffolk	Boston	African Meetinghouse	8 Smith St.	19711007
77001541	MASSACHUSETTS	Suffolk	Boston	Appleton, Nathan, Residence	39-40 Beacon St.	19771222
66000127	MASSACHUSETTS	Suffolk	Boston	Arnold Arboretum	22 Divinity Ave.	19661015
05000459	MASSACHUSETTS	Suffolk	Boston	Ayer, Frederick, Mansion	395 Commonwealth Avenue	20050405
66000130	MASSACHUSETTS	Suffolk	Boston	Beacon Hill Historic District	Bounded by Beacon St., the Charles River Embankment, and Pinckney, Revere, and Hancock Sts.	19661015
66000132	MASSACHUSETTS	Suffolk	Boston	Boston Athenaeum	10 1/2 Beacon St.	19661015
87000760	MASSACHUSETTS	Suffolk	Boston	Boston Common	Beacon, Park, Tremont, Boylston, and Charles St.	19870227
66000133	MASSACHUSETTS	Suffolk	Boston	Boston Light	Little Brewster Island, Boston Harbor	19661015
66000134	MASSACHUSETTS	Suffolk	Boston	Boston Naval Shipyard	E of Chelsea St., Charlestown	19661115
87000761	MASSACHUSETTS	Suffolk	Boston	Boston Public Garden	Beacon, Charles, Boylston, and Arlington Sts.	19870227
73000317	MASSACHUSETTS	Suffolk	Boston	Boston Public Library	Copley Sq.	19730506
66000141	MASSACHUSETTS	Suffolk	Boston	Brook Farm	670 Baker St.	19661015
66000138	MASSACHUSETTS	Suffolk	Boston	Bunker Hill Monument	Breed's Hill	19661015
85000317	MASSACHUSETTS	Suffolk	Boston	Dimock Community Health Center Complex	41 and 55 Dimock St.	19850221
66000366	MASSACHUSETTS	Suffolk	Boston	Ether Dome, Massachusetts General Hospital	Fruit St.	19661015
66000368	MASSACHUSETTS	Suffolk	Boston	Faneuil Hall	Dock Sq.	19661015
78000473	MASSACHUSETTS	Suffolk	Boston	Fenway Studios	30 Ipswich St.	19780913
70000540	MASSACHUSETTS	Suffolk	Boston	Fort Warren	Georges Island, Boston Harbor	19700829
66000653	MASSACHUSETTS	Suffolk	Boston	Garrison, William Lloyd, House	125 Highland St.	19661015
01001048	MASSACHUSETTS	Suffolk	Boston	Gibson House	137 Beacon St.	20010807
66000764	MASSACHUSETTS	Suffolk	Boston	Harding, Chester, House	16 Beacon St.	19661015
87000757	MASSACHUSETTS	Suffolk	Boston	Harvard Stadium	60 N. Harvard St.	19870227
66000765	MASSACHUSETTS	Suffolk	Boston	Headquarters House	55 Beacon St.	19661015
74002044	MASSACHUSETTS	Suffolk	Boston	Howe, Samuel Gridley and Julia Ward, House	13 Chestnut St.	19740913
74002045	MASSACHUSETTS	Suffolk	Boston	King's Chapel	Tremont and School Sts.	19740502
66000768	MASSACHUSETTS	Suffolk	Boston	Long Wharf and Customhouse Block	Foot of State St.	19661113
83004099	MASSACHUSETTS	Suffolk	Boston	LUNA (tugboat)	NDC Pier, Charles River	19831006
70000682	MASSACHUSETTS	Suffolk	Boston	Massachusetts General Hospital	Fruit Street	19701230
66000770	MASSACHUSETTS	Suffolk	Boston	Massachusetts Historical Society Building	1154 Boylston St.	19661015
66000771	MASSACHUSETTS	Suffolk	Boston	Massachusetts Statehouse	Beacon Hill	19661015
76001979	MASSACHUSETTS	Suffolk	Boston	Nell, William C., House	3 Smith Ct.	19760511
80000672	MASSACHUSETTS	Suffolk	Boston	New England Conservatory of Music	290 Huntington Ave.	19800514
70000687	MASSACHUSETTS	Suffolk	Boston	Old City Hall	School and Providence Sts.	19701230
66000776	MASSACHUSETTS	Suffolk	Boston	Old North Church	193 Salem St.	19661015
70000690	MASSACHUSETTS	Suffolk	Boston	Old South Church in Boston	645 Boylston St.	19701230
66000778	MASSACHUSETTS	Suffolk	Boston	Old South Meetinghouse	Milk and Washington Sts.	19661015
66000779	MASSACHUSETTS	Suffolk	Boston	Old State House	Washington and State Sts.	19661015
70000691	MASSACHUSETTS	Suffolk	Boston	Old West Church	131 Cambridge St.	19701230
70000539	MASSACHUSETTS	Suffolk	Boston	Otis, (First) Harrison Gray, House	141 Cambridge St.	19701230
66000782	MASSACHUSETTS	Suffolk	Boston	Parkman, Francis, House	50 Chestnut St.	19661015
68000042	MASSACHUSETTS	Suffolk	Boston	Pierce-Hichborn House	29 North Sq.	19681124

66000784	MASSACHUSETTS	Suffolk	Boston	Quincy Market	S. Market St.	19661113
03000642	MASSACHUSETTS	Suffolk	Revere	Revere Beach Reservation	Revere Beach Boulevard, Eliot Circle to Northern Circle	20030527
66000785	MASSACHUSETTS	Suffolk	Boston	Revere, Paul, House	19 North Sq.	19661015
92001874	MASSACHUSETTS	Suffolk	Jamaica Plain	Richards, Ellen H. Swallow, House	32 Eliot St.	19920331
97001278	MASSACHUSETTS	Suffolk	Boston	ROSEWAY (schooner)	Boston Harbor	19970925
70000731	MASSACHUSETTS	Suffolk	Boston	Sears, David, House	42 Beacon St.	19701230
66000787	MASSACHUSETTS	Suffolk	Roxbury	Shirley-Eustis House	31-37 Shirley St.	19661015
70000730	MASSACHUSETTS	Suffolk	Boston	St. Paul's Church	136 Tremont St.	19701230
73001953	MASSACHUSETTS	Suffolk	Boston	Sumner, Charles, House	20 Hancock St.	19731107
99000633	MASSACHUSETTS	Suffolk	Boston	Symphony Hall	301 Massachusetts Avenue	19990120
66000788	MASSACHUSETTS	Suffolk	Boston	Tremont Street Subway	Beneath Tremont, Boylston, and Washington Sts.	19661015
70000733	MASSACHUSETTS	Suffolk	Boston	Trinity Church	Copley Sq.	19700701
76002003	MASSACHUSETTS	Suffolk	Dorchester	Trotter, William Monroe, House	97 Sawyer Ave.	19760511
66000789	MASSACHUSETTS	Suffolk	Boston	U.S.S. CONSTITUTION	Boston Naval Shipyard	19661015
03000645	MASSACHUSETTS	Suffolk	Boston	Union Oyster House	41-43 Union Street	20030527
86000084	MASSACHUSETTS	Suffolk	Boston	USS CASSIN YOUNG (destroyer)	Charlestown Navy Yard	19860114

National Register of Historic Places: Listed Properties
As of July 2015

Note: Not all properties are digitized

Reference Number	State	County	City	Resource Name	Address	Listed Date
83000601	MASSACHUSETTS	Suffolk	Boston	Charles Street African Methodist Episcopal Church	551 Warren St.	19830901
83000602	MASSACHUSETTS	Suffolk	Boston	Codman Square District	Norfolk, Talbot, Epping, Lithgow, Centre, and Moultrie Sts.	19830623
83000603	MASSACHUSETTS	Suffolk	Boston	Gardner, Isabella Stewart, Museum	280 The Fenway	19830127
83000605	MASSACHUSETTS	Suffolk	Boston	Harvard Avenue Fire Station	16 Harvard Ave.	19830331
83000606	MASSACHUSETTS	Suffolk	Boston	Lawrence Model Lodging Houses	79, 89, 99 and 109 E. Canton St.	19830922
83000607	MASSACHUSETTS	Suffolk	Boston	Newspaper Row	322-328 Washington St., 5-23 Milk St., and 11 Hawley St.	19830707
82000486	MASSACHUSETTS	Suffolk	Boston	Wigglesworth Building	89-83 Franklin St.	19821021
83004098	MASSACHUSETTS	Suffolk	Boston	Leather District	Roughly bounded by Atlantic Ave., Kneeland, Lincoln, and Essex Sts.	19831221
83004285	MASSACHUSETTS	Suffolk	Boston	Baker, Sarah J., School	33 Perrin St.	19830707
79000370	MASSACHUSETTS	Suffolk	Boston	Washington Street Theatre District	511-559 Washington St.	19790319
85000318	MASSACHUSETTS	Suffolk	Boston	Dorchester Pottery Works	101-105 Victory Rd.	19850221
79000368	MASSACHUSETTS	Suffolk	Boston	Bedford Building	89-103 Bedford St.	19790821
80000442	MASSACHUSETTS	Suffolk	Boston	Wirth, Jacob, Buildings	31-39 Stuart St.	19801209
80000445	MASSACHUSETTS	Suffolk	Boston	Metropolitan Theatre	252-272 Tremont St.	19801209
80000446	MASSACHUSETTS	Suffolk	Boston	Hayden Building	681-683 Washington St.	19801209
80000448	MASSACHUSETTS	Suffolk	Boston	Dill Building	11-25 Stuart St.	19801209
80000450	MASSACHUSETTS	Suffolk	Boston	Boylston Building	2-22 Boylston St.	19801209
80000451	MASSACHUSETTS	Suffolk	Boston	Boston Young Men's Christian Union	48 Boylston St.	19801209
80000453	MASSACHUSETTS	Suffolk	Boston	Boston Edison Electric Illuminating Company	25-39 Boylston St.	19801209
80000455	MASSACHUSETTS	Suffolk	Boston	West Street District	West St.	19801209
80000460	MASSACHUSETTS	Suffolk	Boston	Liberty Tree District	Roughly bounded by Harrison Ave., Washington, Essex and Beach Sts.	19801209
80000462	MASSACHUSETTS	Suffolk	Boston	Beach-Knapp District	Roughly bounded by Harrison Ave., Washington, Kneeland, and Beach Sts.	19801209
80000465	MASSACHUSETTS	Suffolk	Boston	Oak Square School	35 Nonantum St.	19801110
66000127	MASSACHUSETTS	Suffolk	Boston	Arnold Arboretum	22 Divinity Ave.	19661015
73000313	MASSACHUSETTS	Suffolk	Boston	Arlington Street Church	Arlington and Boylston Sts.	19730504
73000322	MASSACHUSETTS	Suffolk	Boston	Old Corner Bookstore	NW corner of Washington and School Sts.	19730411
75000299	MASSACHUSETTS	Suffolk	Boston	South Station Headhouse	Atlantic Ave. and Summer St.	19750213
74000392	MASSACHUSETTS	Suffolk	Boston	Winthrop Building	7 Water St.	19740418
80000668	MASSACHUSETTS	Suffolk	Boston	United Shoe Machinery Corporation Building	138-164 Federal St.	19800819
75000300	MASSACHUSETTS	Suffolk	Boston	St. Stephen's Church	Hanover St. between Clark and Harris Sts.	19750414
80000669	MASSACHUSETTS	Suffolk	Boston	Union Wharf	295-353 Commercial St.	19800622
80000670	MASSACHUSETTS	Suffolk	Boston	Suffolk County Jail	215 Charles St.	19800423
80000674	MASSACHUSETTS	Suffolk	Boston	Garrison, William Lloyd, School	20 Hutchings St.	19800416
80001683	MASSACHUSETTS	Suffolk	Boston	Dillaway School	16-20 Kenilworth St.	19800409
66000366	MASSACHUSETTS	Suffolk	Boston	Ether Dome, Massachusetts General Hospital	Fruit St.	19661015
70000539	MASSACHUSETTS	Suffolk	Boston	Otis, (First) Harrison Gray, House	141 Cambridge St.	19701230
73000314	MASSACHUSETTS	Suffolk	Boston	Armory of the First Corps of Cadets	97-105 Arlington St. and 130 Columbus Ave.	19730522
73000315	MASSACHUSETTS	Suffolk	Boston	Blackstone Block Historic District	Area bound by Union, Hanover, Blackstone, and North Sts.	19730526
72000145	MASSACHUSETTS	Suffolk	Boston	Crowninshield House	164 Marlborough St.	19720223
72000146	MASSACHUSETTS	Suffolk	Boston	First Baptist Church	Commonwealth Ave. and Clarendon St.	19720223
74000391	MASSACHUSETTS	Suffolk	Boston	John Adams Courthouse	Pemberton Sq.	19740508
72000150	MASSACHUSETTS	Suffolk	Boston	Trinity Rectory	Clarendon and Newbury Sts.	19720223
74000385	MASSACHUSETTS	Suffolk	Boston	Copp's Hill Burial Ground	Charter, Snowhill, and Hull Sts.	19740418
74000393	MASSACHUSETTS	Suffolk	Boston	Youth's Companion Building	209 Columbus Ave.	19740502
66000764	MASSACHUSETTS	Suffolk	Boston	Harding, Chester, House	16 Beacon St.	19661015
74002044	MASSACHUSETTS	Suffolk	Boston	Howe, Samuel Gridley and Julia Ward, House	13 Chestnut St.	19740913
74002045	MASSACHUSETTS	Suffolk	Boston	King's Chapel	Tremont and School Sts.	19740502
70000682	MASSACHUSETTS	Suffolk	Boston	Massachusetts General Hospital	Fruit Street	19701230
80000678	MASSACHUSETTS	Suffolk	Boston	All Saints' Church	211 Ashmont St.	19800616
81000620	MASSACHUSETTS	Suffolk	Boston	Fields Corner Municipal Building	1 Arcadia St., 195 Adams St.	19811112
66000770	MASSACHUSETTS	Suffolk	Boston	Massachusetts Historical Society Building	1154 Boylston St.	19661015
66000771	MASSACHUSETTS	Suffolk	Boston	Massachusetts Statehouse	Beacon Hill	19661015
76001979	MASSACHUSETTS	Suffolk	Boston	Nell, William C., House	3 Smith Ct.	19760511
70000687	MASSACHUSETTS	Suffolk	Boston	Old City Hall	School and Providence Sts.	19701230
70000690	MASSACHUSETTS	Suffolk	Boston	Old South Church in Boston	645 Boylston St.	19701230
70000691	MASSACHUSETTS	Suffolk	Boston	Old West Church	131 Cambridge St.	19701230
66000782	MASSACHUSETTS	Suffolk	Boston	Parkman, Francis, House	50 Chestnut St.	19661015
80000444	MASSACHUSETTS	Suffolk	Boston	Shubert, Sam S., Theatre	263-265 Tremont St.	19801209

80000458	MASSACHUSETTS	Suffolk	Boston	Piano Row District	Boston Common, Park Sq., Boylston Pl. and Tremont St.	19801209
80000443	MASSACHUSETTS	Suffolk	Boston	Wilbur Theatre	244-250 Tremont St.	19801209
66000765	MASSACHUSETTS	Suffolk	Boston	Headquarters House	55 Beacon St.	19661015
68000042	MASSACHUSETTS	Suffolk	Boston	Pierce-Hichborn House	29 North Sq.	19681124
66000784	MASSACHUSETTS	Suffolk	Boston	Quincy Market	S. Market St.	19661113
70000730	MASSACHUSETTS	Suffolk	Boston	St. Paul's Church	136 Tremont St.	19701230
70000731	MASSACHUSETTS	Suffolk	Boston	Sears, David, House	42 Beacon St.	19701230
73001953	MASSACHUSETTS	Suffolk	Boston	Sumner, Charles, House	20 Hancock St.	19731107
66000130	MASSACHUSETTS	Suffolk	Boston	Beacon Hill Historic District	Bounded by Beacon St., the Charles River Embankment, and Pinckney, Revere, and Hancock Sts.	19661015
73001955	MASSACHUSETTS	Suffolk	Boston	Otis, (Second) Harrison Gray, House	85 Mt. Vernon St.	19730727
66000768	MASSACHUSETTS	Suffolk	Boston	Long Wharf and Customhouse Block	Foot of State St.	19661113
66000132	MASSACHUSETTS	Suffolk	Boston	Boston Athenaeum	10 1/2 Beacon St.	19661015
66000788	MASSACHUSETTS	Suffolk	Boston	Tremont Street Subway	Beneath Tremont, Boylston, and Washington Sts.	19661015
70000733	MASSACHUSETTS	Suffolk	Boston	Trinity Church	Copley Sq.	19700701
82004456	MASSACHUSETTS	Suffolk	Boston	Adams-Nervine Asylum	990-1020 Centre St.	19820601
79000369	MASSACHUSETTS	Suffolk	Boston	International Trust Company Building	39-47 Milk St.	19790910
74000388	MASSACHUSETTS	Suffolk	Boston	Eliot Burying Ground	Eustis and Washington Sts.	19740625
80000463	MASSACHUSETTS	Suffolk	Boston	Russia Wharf Buildings	518-540 Atlantic Ave., 270 Congress St. and 276-290 Congress St.	19801202
71000087	MASSACHUSETTS	Suffolk	Boston	African Meetinghouse	8 Smith St.	19711007
85002015	MASSACHUSETTS	Suffolk	Boston	Building at 138--142 Portland Street	138--142 Portland St.	19850905
84000421	MASSACHUSETTS	Suffolk	Boston	Vermont Building	6-12 Thacher St.	19841113
75000301	MASSACHUSETTS	Suffolk	Boston	Symphony and Horticultural Halls	Massachusetts and Huntington Aves.	19750530
73000324	MASSACHUSETTS	Suffolk	Boston	South End District	South Bay area between Huntington and Harrison Aves.	19730508
74000390	MASSACHUSETTS	Suffolk	Boston	Park Street District	Tremont, Park, and Beacon Sts.	19740501
73000319	MASSACHUSETTS	Suffolk	Boston	Fulton-Commercial Streets District	Fulton, Commercial, Mercantile, Lewis, and Richmond Sts.	19730321
84002875	MASSACHUSETTS	Suffolk	Boston	Fenway-Boylston Street District	Fenway, Boylston, Westland, and Hemenway Sts.	19840904
78000473	MASSACHUSETTS	Suffolk	Boston	Fenway Studios	30 Ipswich St.	19780913
73000318	MASSACHUSETTS	Suffolk	Boston	Cyclorama Building	543-547 Tremont St.	19730413
83004097	MASSACHUSETTS	Suffolk	Boston	Codman Building	55 Kilby St.	19831019
80000676	MASSACHUSETTS	Suffolk	Boston	Charles Playhouse	74-78 Warenton St.	19800616
74000382	MASSACHUSETTS	Suffolk	Boston	Ames Building	1 Court St.	19740426
77001541	MASSACHUSETTS	Suffolk	Boston	Appleton, Nathan, Residence	39-40 Beacon St.	19771222
66000134	MASSACHUSETTS	Suffolk	Boston	Boston Naval Shipyard	E of Chelsea St., Charlestown	19661115
66000050	MASSACHUSETTS	Suffolk	Boston	Dorchester Heights National Historic Site	South Boston	19661015
74002222	MASSACHUSETTS	Suffolk	Boston	Boston National Historical Park	Inner harbor at mouth of Charles River	19741026
66000785	MASSACHUSETTS	Suffolk	Boston	Revere, Paul, House	19 North Sq.	19661015
66000776	MASSACHUSETTS	Suffolk	Boston	Old North Church	193 Salem St.	19661015
66000778	MASSACHUSETTS	Suffolk	Boston	Old South Meetinghouse	Milk and Washington Sts.	19661015
66000368	MASSACHUSETTS	Suffolk	Boston	Faneuil Hall	Dock Sq.	19661015
66000779	MASSACHUSETTS	Suffolk	Boston	Old State House	Washington and State Sts.	19661015
85003074	MASSACHUSETTS	Suffolk	Boston	Dudley Station Historic District	Washington, Warren, and Dudley Sts.	19851205
86000140	MASSACHUSETTS	Suffolk	Boston	Christ Church	1220 River Rd.	19860130
73000317	MASSACHUSETTS	Suffolk	Boston	Boston Public Library	Copley Sq.	19730506
86001909	MASSACHUSETTS	Suffolk	Boston	Filene's Department Store	426 Washington St.	19860724
86001913	MASSACHUSETTS	Suffolk	Boston	Second Brazer Building	25--29 State St.	19860724
86001486	MASSACHUSETTS	Suffolk	Boston	Sears' Crescent and Sears' Block	38--68 and 70--72 Cornhill	19860809
86001504	MASSACHUSETTS	Suffolk	Boston	Richardson Block	113--151 Pearl and 109--119 High Sts.	19860809
85003375	MASSACHUSETTS	Suffolk	Boston	Engine House No. 34	444 Western Ave.	19851024
80000671	MASSACHUSETTS	Suffolk	Boston	Stearns, R. H., House	140 Tremont St.	19800616
86001911	MASSACHUSETTS	Suffolk	Boston	Locke--Ober Restaurant	3--4 Winter Pl.	19860724
80000677	MASSACHUSETTS	Suffolk	Boston	Berger Factory	37 Williams St.	19800409
85000316	MASSACHUSETTS	Suffolk	Boston	Bigelow School	350 W. 4th St.	19850221
84002890	MASSACHUSETTS	Suffolk	Boston	Moreland Street Historic District	Roughly bounded by Kearsarge, Blue Hill Aves., Warren, Waverly, and Winthrop Sts.	19840329
70000921	MASSACHUSETTS	Suffolk	Boston	Fort Independence	Castle Island	19701015
86000375	MASSACHUSETTS	Suffolk	Boston	Harriswood Crescent	60--88 Harold St.	19860313
66000789	MASSACHUSETTS	Suffolk	Boston	U.S.S. CONSTITUTION	Boston Naval Shipyard	19661015
87000757	MASSACHUSETTS	Suffolk	Boston	Harvard Stadium	60 N. Harvard St.	19870227
72000144	MASSACHUSETTS	Suffolk	Boston	Boston Common and Public Garden	Beacon, Park, Tremont, Boylston, and Arlington Sts.	19720712
87000760	MASSACHUSETTS	Suffolk	Boston	Boston Common	Beacon, Park, Tremont, Boylston, and Charles St.	19870227
87000761	MASSACHUSETTS	Suffolk	Boston	Boston Public Garden	Beacon, Charles, Boylston, and Arlington Sts.	19870227
87001128	MASSACHUSETTS	Suffolk	Boston	Monument Square Historic District	Monument Sq.	19870602
66000138	MASSACHUSETTS	Suffolk	Boston	Bunker Hill Monument	Breed's Hill	19661015
86000274	MASSACHUSETTS	Suffolk	Boston	Bulfinch Triangle Historic District	Roughly bounded by Canal, Market, Merrimac, and Causeway Sts.	19860227
80000675	MASSACHUSETTS	Suffolk	Boston	Dorchester-Milton Lower Mills Industrial District	Both sides of Neponset River	19800402
86000084	MASSACHUSETTS	Suffolk	Boston	USS CASSIN YOUNG (destroyer)	Charlestown Navy Yard	19860114
66000133	MASSACHUSETTS	Suffolk	Boston	Boston Light	Little Brewster Island, Boston Harbor	19661015
87001481	MASSACHUSETTS	Suffolk	Boston	Long Island Head Light	Long Island	19870615

87001394	MASSACHUSETTS	Suffolk	Boston	New Riding Club	52 Hemenway St.	19870820
87001396	MASSACHUSETTS	Suffolk	Boston	Congress Street Fire Station	344 Congress St.	19870903
87000885	MASSACHUSETTS	Suffolk	Boston	Abbotsford	300 Walnut Ave.	19870916
87001889	MASSACHUSETTS	Suffolk	Boston	Sumner Hill Historic District	Roughly bounded by Seaverns Ave., Everett St., Carolina Ave., & Newbern St.	19871022
87001771	MASSACHUSETTS	Suffolk	Boston	Bunker Hill School	65 Baldwin St.	19871015
87001398	MASSACHUSETTS	Suffolk	Boston	House at 17 Cranston Street	17 Cranston St.	19871120
87001399	MASSACHUSETTS	Suffolk	Boston	Hoxie, Timothy, House	135 Hillside St.	19871120
87001495	MASSACHUSETTS	Suffolk	Boston	Saint Augustine Chapel and Cemetery	Dorchester St. between W. Sixth and Tudor Sts.	19870918
87002549	MASSACHUSETTS	Suffolk	Boston	District 13 Police Station	28 Seaverns Ave.	19880210
85003323	MASSACHUSETTS	Suffolk	Boston	Boston Harbor Islands Archeological District	Address Restricted	19851221
82004448	MASSACHUSETTS	Suffolk	Boston	Roughan Hall	15-18 City Sq.	19820415
82004450	MASSACHUSETTS	Suffolk	Boston	McKay, Donald, House	78-80 White St.	19820602
82004453	MASSACHUSETTS	Suffolk	Boston	Haffenreffer Brewery	Germania St.	19820502
73000850	MASSACHUSETTS	Suffolk	Boston	Town Hill District	Bounded roughly by Rutherford Ave. and Main and Warren Sts.	19730511
74000907	MASSACHUSETTS	Suffolk	Boston	Phipps Street Burying Ground	Phipps St.	19740514
74000911	MASSACHUSETTS	Suffolk	Boston	Clapp Houses	199 and 195 Boston St.	19740502
74000915	MASSACHUSETTS	Suffolk	Boston	Dorchester North Burying Ground	Stroughton St. and Columbia Rd.	19740418
80004396	MASSACHUSETTS	Suffolk	Boston	Boston African American National Historic Site	Museum of Afro American History, Dudley Station, Box 5	19801010
66000141	MASSACHUSETTS	Suffolk	Boston	Brook Farm	670 Baker St.	19661015
73000856	MASSACHUSETTS	Suffolk	Boston	Roxbury High Fort	Beech Glen St. at Fort Ave.	19730423
73000855	MASSACHUSETTS	Suffolk	Boston	Kittredge, Alvah, House	12 Linwood St.	19730508
73000854	MASSACHUSETTS	Suffolk	Boston	John Eliot Square District	John Eliot Sq.	19730423
66000653	MASSACHUSETTS	Suffolk	Boston	Garrison, William Lloyd, House	125 Highland St.	19661015
72000544	MASSACHUSETTS	Suffolk	Boston	Loring-Greenough House	12 South St.	19720426
74000917	MASSACHUSETTS	Suffolk	Boston	Pierce House	24 Oakton Ave.	19740426
70000540	MASSACHUSETTS	Suffolk	Boston	Fort Warren	Georges Island, Boston Harbor	19700829
74002350	MASSACHUSETTS	Suffolk	Boston	Blake, James, House	735 Columbia Rd.	19740501
83000604	MASSACHUSETTS	Suffolk	Boston	Loring, Harrison, House	789 E. Broadway St.	19830901
88000908	MASSACHUSETTS	Suffolk	Boston	Goodwin, Ozias, House	7 Jackson Ave.	19880623
88000957	MASSACHUSETTS	Suffolk	Boston	Greek Orthodox Cathedral of New England	520 Parker St.	19880630
88000427	MASSACHUSETTS	Suffolk	Boston	Temple Place Historic District	11--55, 26--58 Temple Pl.	19880726
88000959	MASSACHUSETTS	Suffolk	Boston	Eliot Hall	7A Eliot St.	19880715
87001478	MASSACHUSETTS	Suffolk	Boston	Austin, Francis B., House	58 High St.	19881021
89000004	MASSACHUSETTS	Suffolk	Boston	Mount Pleasant Historic District	Roughly bounded by Forest St. and Mount Pleasant Ave.	19890209
89000147	MASSACHUSETTS	Suffolk	Boston	Roxbury Highlands Historic District	Roughly bounded by Dudley St., Washington St., and Columbus Ave.	19890222
73000325	MASSACHUSETTS	Suffolk	Boston	Hale, Edward Everett, House	12 Morley St.	19790321
83004099	MASSACHUSETTS	Suffolk	Boston	LUNA (tugboat)	NDC Pier, Charles River	19831006
89000974	MASSACHUSETTS	Suffolk	Boston	Massachusetts School of Art	364 Brookline Ave.	19890803
89001747	MASSACHUSETTS	Suffolk	Boston	Mission Hill Triangle Historic District	Roughly bounded by Smith St., Worthington St., Tremont St., and Huntington Ave.	19891106
89002169	MASSACHUSETTS	Suffolk	Boston	St. Joseph's Roman Catholic Church Complex	Bounded by Circuit, Regent, Hulbert, and Fenwick Sts.	19891228
89002251	MASSACHUSETTS	Suffolk	Boston	Bellevue Standpipe	On Bellevue Hill at Washington St. and Roxbury Pkwy.	19900118
88000955	MASSACHUSETTS	Suffolk	Boston	First Church of Jamaica Plain	6 Eliot St.	19880715
90000631	MASSACHUSETTS	Suffolk	Boston	Copp's Hill Terrace	Between Commercial and Charter Sts. W of Jackson Place	19900419
89002271	MASSACHUSETTS	Suffolk	Boston	Chestnut Hill Reservoir Historic District	Beacon St. and Commonwealth Ave.	19900118
90001095	MASSACHUSETTS	Suffolk	Boston	Calf Pasture Pumping Station Complex	435 Mount Vernon St.	19900802
90001145	MASSACHUSETTS	Suffolk	Boston	Bowditch School	80--82 Greene St.	19900803
90001536	MASSACHUSETTS	Suffolk	Boston	Monument Square Historic District	Roughly bounded by Jamaicaway, Pond, Centre and Eliot Sts.	19901011
90001537	MASSACHUSETTS	Suffolk	Boston	Upham's Corner Market	600 Columbia Rd.	19901011
89002125	MASSACHUSETTS	Suffolk	Boston	Roxbury Presbyterian Church	328 Warren St.	19910315
90001992	MASSACHUSETTS	Suffolk	Boston	Sears Roebuck and Company Mail Order Store	309 Park Dr. and 201 Brookline Ave.	19910115
92000356	MASSACHUSETTS	Suffolk	Boston	Trinity Neighborhood House	406 Meridian St.	19920414
73001948	MASSACHUSETTS	Suffolk	Boston	Back Bay Historic District	Roughly bounded by the Charles River, Arlington, Providence, Boylston and Newbury Sts., and Charlesgate East	19730814
90001757	MASSACHUSETTS	Suffolk	Boston	Textile District	Roughly, Essex St. from Phillips Sq. to Columbia St. and Chauncy St. from Phillips Sq. to Rowe Pl.	19901129
93001489	MASSACHUSETTS	Suffolk	Boston	Massachusetts Mental Health Center	74 Fenwood Rd.	19940121
93001573	MASSACHUSETTS	Suffolk	Boston	House at 1 Bay Street	1 Bay St.	19940209
93001587	MASSACHUSETTS	Suffolk	Boston	Eliot Congregational Church	56 Dale St., corner 118--120 Walnut St.	19940209
85000317	MASSACHUSETTS	Suffolk	Boston	Dimock Community Health Center Complex	41 and 55 Dimock St.	19850221
80000672	MASSACHUSETTS	Suffolk	Boston	New England Conservatory of Music	290 Huntington Ave.	19800514
94001494	MASSACHUSETTS	Suffolk	Boston	Lower Roxbury Historic District	Roughly, area surrounding Coventry, Cunard, and Walpole Sts.	19941209
94001492	MASSACHUSETTS	Suffolk	Boston	Faneuil, Peter, School	60 Joy St.	19941216
95001450	MASSACHUSETTS	Suffolk	Boston	Riviera, The	270 Huntington Ave.	19951207
73000321	MASSACHUSETTS	Suffolk	Boston	Custom House District	Between J.F.K. Expwy. and Kirby St. and S. Market and High and Batterymarch Sts.	19730511

96001063	MASSACHUSETTS	Suffolk	Boston	Douglass, Frederick, Square Historic District	Roughly bounded by Hammond St., Cobat St., Windsor St., and Westminister St., Lower Roxbury	19961003
97000969	MASSACHUSETTS	Suffolk	Boston	Charlestown Heights	Roughly bounded by St. Martin, Bunker Hill, Medford, and Sackville Sts.	19980108
97000920	MASSACHUSETTS	Suffolk	Boston	Brighton Evangelical Congregational Church	404-410 Washington St.	19970821
97000970	MASSACHUSETTS	Suffolk	Boston	Students House	96 The Fenway	19970911
97000971	MASSACHUSETTS	Suffolk	Boston	North Terminal Garage	600 Commercial St.	19970911
97001239	MASSACHUSETTS	Suffolk	Boston	Dorchester Temple Baptist Church	670 Washington St.	19980116
97001377	MASSACHUSETTS	Suffolk	Boston	Allston Congregational Church	31-41 Quint Ave.	19971107
97001472	MASSACHUSETTS	Suffolk	Boston	St. Luke's and St. Margaret's Church	5-7 St. Luke's Rd.	19971112
98000149	MASSACHUSETTS	Suffolk	Boston	Eagle Hill Historic District	Roughly bounded by Border, Lexington, Trenton, and Falcon Sts.	19980226
98001082	MASSACHUSETTS	Suffolk	Boston	Boston Young Men's Christian Association	312-320 Huntington Ave.	19980820
97001278	MASSACHUSETTS	Suffolk	Boston	ROSEWAY (schooner)	Boston Harbor	19970925
98001292	MASSACHUSETTS	Suffolk	Boston	St. Mary's Episcopal Church	14-16 Cushing Ave.	19981030
98001330	MASSACHUSETTS	Suffolk	Boston	Roslindale Baptist Church	52 Cummins Hwy.	19981105
98001361	MASSACHUSETTS	Suffolk	Boston	Cathedral of St. George Historic District	517-523-525 E. Broadway	19981125
98001381	MASSACHUSETTS	Suffolk	Boston	Baker Congregational Church	760 Saratoga St.	19981119
99000593	MASSACHUSETTS	Suffolk	Boston	Woodbourne Historic District	Roughly bounded by Walk Hill, Goodway, and Wachusett Sts.	19990604
99000633	MASSACHUSETTS	Suffolk	Boston	Symphony Hall	301 Massachusetts Avenue	19990120
99001302	MASSACHUSETTS	Suffolk	Boston	Mariner's House	11 North Square	19991112
99001304	MASSACHUSETTS	Suffolk	Boston	Congregation Adath Jeshurun	397 Blue Hill Ave.	19991112
99001308	MASSACHUSETTS	Suffolk	Boston	First Congregational Church of Hyde Park	6 Webster St.	19991112
99001614	MASSACHUSETTS	Suffolk	Boston	Church Green Buildings Historic District	101-113 Summer St.	19991230
00000160	MASSACHUSETTS	Suffolk	Boston	Fulton-Commercial Streets Historic District (Boundary Increase)	81-95 Richmond St.	20000303
00000415	MASSACHUSETTS	Suffolk	Boston	Harvard Avenue Historic District	Roughly bounded by Linden St., Commonwealth AVe., Harvard Ave., and Park Vale Ave.	20000428
00000871	MASSACHUSETTS	Suffolk	Boston	Dearborn School	25 Ambrose St.	20000802
01000088	MASSACHUSETTS	Suffolk	Boston	Brighton Center Historic District	Academy Hill R., Chestnut Hill Ave., Dighton, Elko, Henshaw, Leicester, Market, Washington, and Winship Sts.	20010220
01000872	MASSACHUSETTS	Suffolk	Boston	Peabody, The	195-197 Ashmont St.	20010808
01001048	MASSACHUSETTS	Suffolk	Boston	Gibson House	137 Beacon St.	20010807
01001557	MASSACHUSETTS	Suffolk	Boston	Boston Consumptives Hospital	249 River St.	20020207
02000081	MASSACHUSETTS	Suffolk	Boston	Frances and Isabella Apartments	430-432 and 434-436 Dudley St.	20020222
02000154	MASSACHUSETTS	Suffolk	Boston	Greenwood Memorial United Methodist Church	378A-380 Washington St.	20020308
02000548	MASSACHUSETTS	Suffolk	Boston	Bennington Street Burying Ground	Bennington St., bet. Swift and harmony Sts.	20020522
02001039	MASSACHUSETTS	Suffolk	Boston	Paine Furniture Building	75-81 Arlington St.	20020912
02001190	MASSACHUSETTS	Suffolk	Boston	Harrison Square Historic District	Bounded by MBTA Braintree line embankment, Park, Everett, Freeport, Mill, Asland, Blanche Sts., Victory Rd.	20021022
03000385	MASSACHUSETTS	Suffolk	Boston	Savin Hill Historic District	Roughly bounded by Savin Hill Ave., Morrissey Blvd., Dorchester Bay, and I-93	20030509
03000645	MASSACHUSETTS	Suffolk	Boston	Union Oyster House	41-43 Union Street	20030527
03000781	MASSACHUSETTS	Suffolk	Boston	Publicity Building	40-44 Bromfield St.	20030820
04000023	MASSACHUSETTS	Suffolk	Boston	Benedict Fenwick School	150 Magnolia St.	20040211
04000085	MASSACHUSETTS	Suffolk	Boston	Haskell, Edward H., Home for Nurses	220 Fisther Ave., 63 Parker Hill Ave.	20040226
04000119	MASSACHUSETTS	Suffolk	Boston	YWCA Boston	140 Clarendon St.	20040303
04000189	MASSACHUSETTS	Suffolk	Boston	Nix's Mate Daybeacon	Nubble Channel, The Narrows, Boston Harbor	20040318
04000426	MASSACHUSETTS	Suffolk	Boston	Nazing Court Apartments	224-236 Seaver St. and 1-8 Nazing Court	20040512
04000534	MASSACHUSETTS	Suffolk	Boston	Hibernian Hall	182-186 Dudley St.	20040602
04000959	MASSACHUSETTS	Suffolk	Boston	Fort Point Channel Historic District	Necco Court, Thomson Place, A, Binford, Congress, Farnsworth, Melcher, Midway, Sleeper, Stillings, Summer Sts.	20040910
04001219	MASSACHUSETTS	Suffolk	Boston	Forest Hills Cemetery	95 Forest Hills Ave.	20041117
04001430	MASSACHUSETTS	Suffolk	Boston	Truman Parkway--Metropolitan Park System of Greater Boston	Truman Parkway	20050105
04001432	MASSACHUSETTS	Suffolk	Boston	VFW Parkway, Metropolitan Park System of Greater Boston	VFW Parkway, bet. Spring And Centre Sts.	20050105
04001572	MASSACHUSETTS	Suffolk	Boston	Morton Street, Metropolitan Park System of Greater Boston	Morton St.	20050124
04001573	MASSACHUSETTS	Suffolk	Boston	Neponset Valley Parkway, Metorpolitan Park System of Greater Boston	Neponset Valley Parkway	20050124
05000459	MASSACHUSETTS	Suffolk	Boston	Ayer, Frederick, Mansion	395 Commonwealth Avenue	20050405
05000559	MASSACHUSETTS	Suffolk	Boston	Collins Building	213-217 Washington St.	20050608
05000879	MASSACHUSETTS	Suffolk	Boston	Home for Aged Couples	409, 419 Walnut Ave. and 2055 Columbus Ave.	20050811
05000936	MASSACHUSETTS	Suffolk	Boston	South Boston Boat Clubs Historic District	1793-1849 William J. Day Blvd.	20050901
05001509	MASSACHUSETTS	Suffolk	Boston	Stony Brook Reservation Parkways, Metropolitan Park System of Great Boston MPS	Dedham, Enneking, Turtle Pond Parkways, Smith Field, Reservation, W. Border Rds.	20060103
06000127	MASSACHUSETTS	Suffolk	Boston	East Boston High School, Old	127 Marion St.	20060315
01000304	MASSACHUSETTS	Suffolk	Boston	Dorchester--Milton Lower Mills Industrial District (Boundary Increase)	Roughly: Adams, River, Medway Sts., Millers Lane, Eliot and Adams Sts.	20010406
07000510	MASSACHUSETTS	Suffolk	Boston	Goldsmith Block	41 Ruggles St., 746-750 Shawmut Ave.	20070605
07000861	MASSACHUSETTS	Suffolk	Boston	Boston Transit Commission Building	15 Beacon St.	20070831
08000089	MASSACHUSETTS	Suffolk	Boston	Dorchester Park	Bounded by Dorchester Ave., Richmond, Adams & Richview Sts.	20080220

08000693	MASSACHUSETTS	Suffolk	Boston	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.	20080724
08000793	MASSACHUSETTS	Suffolk	Boston	Joshua Bates School	731 Harrison Ave.	20080822
08000795	MASSACHUSETTS	Suffolk	Boston	Ohabei Shalom Cemetery	147 Wordsworth St.	20080819
08001284	MASSACHUSETTS	Suffolk	Boston	Compton Building	159, 161-175 Devonshire St., 18-20 Arch St.	20081231
09000612	MASSACHUSETTS	Suffolk	Boston	Evergreen Cemetery	2060 Commonwealth Ave.	20090814
09000717	MASSACHUSETTS	Suffolk	Boston	Fairview Cemetery	45 Fairview Ave.	20090916
09000767	MASSACHUSETTS	Suffolk	Boston	Mount Hope Cemetery	355 Walk Hill St.	20090924
10000039	MASSACHUSETTS	Suffolk	Boston	EDNA G. shipwreck (Eastern Rig dragger)	Address Restricted	20101122
10000300	MASSACHUSETTS	Suffolk	Boston	Highland Spring Brewery Bottling and Storage Buildings	154-166 Terrace St	20100528
10000391	MASSACHUSETTS	Suffolk	Boston	Second Church in Boston	874, 876, 880 Beacon St	20100624
10000506	MASSACHUSETTS	Suffolk	Boston	Charles River Reservation (Speedway)--Upper Basin Headquarters	1420-1440 Soldiers Field Rd	20100719
10001066	MASSACHUSETTS	Suffolk	Boston	Egleston Substation	3025 Washington St	20101227
11000160	MASSACHUSETTS	Suffolk	Boston	United State Post Office, Courthouse, and Federal Building	5 Post Office Square	20110408
12000069	MASSACHUSETTS	Suffolk	Boston	Fenway Park	24, & 2-4 Yawkey Wy., 64-76 Brookline Ave., & 70-80 Lansdowne St.	20120307
12000099	MASSACHUSETTS	Suffolk	Boston	Terminal Storage Warehouse District	267-281 Medford St., 40 & 50 Terminal St.	20120312
12000783	MASSACHUSETTS	Suffolk	Boston	Saint Mark's Episcopal Church	73 Columbia Rd.	20140703
12000978	MASSACHUSETTS	Suffolk	Boston	Sherman Apartments Historic District	544-546 Washington, 4-6, 12-14, 18 Lyndhurst Sts.	20121128
12001012	MASSACHUSETTS	Suffolk	Boston	Central Congregational Church	67 Newbury St.	20121016
12001162	MASSACHUSETTS	Suffolk	Boston	Commonwealth Pier Five	165 Northern Ave.	19791010
13000621	MASSACHUSETTS	Suffolk	Boston	Roslindale Substation	4228 Washington St.	20130827
13000928	MASSACHUSETTS	Suffolk	Boston	Davidson, Sarah, Apartment Block	3 Gaylord St.	20131218
13000929	MASSACHUSETTS	Suffolk	Boston	Pilgrim Congregational Church	540-544 Columbia Rd.	20131218
13000930	MASSACHUSETTS	Suffolk	Boston	Walton and Roslin Halls	702-708 & 710-726 Washington St., 3-5 Walton St.	20131218
14000272	MASSACHUSETTS	Suffolk	Boston	Blake and Amory Building	59 Temple Pl.	20140602
14000365	MASSACHUSETTS	Suffolk	Boston	Dorchester South Burying Ground	2095 Dorchester Ave.	20140627
14000561	MASSACHUSETTS	Suffolk	Boston	Buildings at 825--829 Blue Hill Avenue	825-829 Blue Hill Ave.	20140910
14000698	MASSACHUSETTS	Suffolk	Boston	Almont Apartments	1439-1443 & 1447-1451 Blue Hill Ave.	20140922
14000974	MASSACHUSETTS	Suffolk	Boston	Gridley Street Historic District	Bounded by Congress, High, Pearl & Purchase Sts.	20141203
14000975	MASSACHUSETTS	Suffolk	Boston	Lyman, Theodore, School	30 Gove St.	20141202
14001095	MASSACHUSETTS	Suffolk	Boston	South End District (Boundary Increase)	200-224 Northampton St.	20141229
15000048	MASSACHUSETTS	Suffolk	Boston	Boston Police Station Number One--Traffic Tunnel Administration Building	128, 150 North & 130 -140 Richmond St.	20150303
15000195	MASSACHUSETTS	Suffolk	Boston	Boston National Historical Park	Charlestown Navy Yard	20150505
85002339	MASSACHUSETTS	Suffolk	Charlestown	Hoosac Stores 1 & 2-Hoosac Stores 3	25 and 115 Water St.	19850814
73000851	MASSACHUSETTS	Suffolk	Chelsea	Naval Hospital Boston Historic District	1 Broadway	19730814
82004464	MASSACHUSETTS	Suffolk	Chelsea	Kimball, C. Henry, House	295 Washington St.	19820415
74000908	MASSACHUSETTS	Suffolk	Chelsea	Bellingham-Cary House	34 Parker St.	19740906
85000030	MASSACHUSETTS	Suffolk	Chelsea	Bellingham Square Historic District	Roughly bounded by Broadway, Shawmut, Chestnut, and Shurtleff Sts.	19850103
88000718	MASSACHUSETTS	Suffolk	Chelsea	Downtown Chelsea Residential Historic District	Roughly bounded by Shurtleff, Marginal, and Division Sts. and Bellingham Sq.	19880622
93000283	MASSACHUSETTS	Suffolk	Chelsea	Congregation Agudath Shalom	145 Walnut St.	19930416
01000089	MASSACHUSETTS	Suffolk	Chelsea	Chelsea Garden Cemetery	70 Central Ave. (formerly Shawmut St.)	20010209
09000144	MASSACHUSETTS	Suffolk	Chelsea	Chelsea Square Historic District	Roughly area around Broadway, Medford. Tremont, Park, Cross and Winnisimmet Sts.	19820408
76002003	MASSACHUSETTS	Suffolk	Dorchester	Trotter, William Monroe, House	97 Sawyer Ave.	19760511
01001198	MASSACHUSETTS	Suffolk	Dorchester	Dorchester Heights Historic District	Roughly a one block area surrounding Telegraph Hill	20011101
92001874	MASSACHUSETTS	Suffolk	Jamaica Plain	Richards, Ellen H. Swallow, House	32 Eliot St.	19920331
82000485	MASSACHUSETTS	Suffolk	Revere	Ronan, Mary, T., School	154 Bradstreet Ave.	19821210
84000430	MASSACHUSETTS	Suffolk	Revere	Church of Christ	265 Beech St.	19841113
98000871	MASSACHUSETTS	Suffolk	Revere	Revere Beach Reservation Historic District	Roughly bounded by Eliot Circle, Revere Beach Blvd., Northern Circle, and Atlantic Ocean	19980715
01001559	MASSACHUSETTS	Suffolk	Revere	Immaculate Conception Rectory	108 Beach St.	20020211
03000642	MASSACHUSETTS	Suffolk	Revere	Revere Beach Reservation	Revere Beach Boulevard, Eliot Circle to Northern Circle	20030527
03001471	MASSACHUSETTS	Suffolk	Revere	Winthrop Parkway, Metropolitan Parkway System of Greater Boston	Winthrop Parkway	20040121
04000025	MASSACHUSETTS	Suffolk	Revere	Rumney Marsh Burying Ground	Butler St. at Elm and Bixby Sts.	20040211
09000709	MASSACHUSETTS	Suffolk	Revere	Slade Spice Mill	770 Revere Beach Parkway	19720630
12000070	MASSACHUSETTS	Suffolk	Revere	Revere City Hall and Police Station	281 Broadway & 23 Pleasant St.	20120307
91000925	MASSACHUSETTS	Suffolk	Roslindale	Roslindale Congregational Church	25 Cummins Hwy., at jct. with Summer Ave.	19910726
66000787	MASSACHUSETTS	Suffolk	Roxbury	Shirley-Eustis House	31-37 Shirley St.	19661015
86001378	MASSACHUSETTS	Suffolk	South Boston	US Post Office Garage	135 A St.	19860626
87001401	MASSACHUSETTS	Suffolk	West Roxbury	Westerly Burial Ground	Centre St.	19871120
90000162	MASSACHUSETTS	Suffolk	Winthrop	Winthrop, Deane, House	34 Shirley St. (formerly 40 Shirley St.)	19900309
97000878	MASSACHUSETTS	Suffolk	Winthrop	Newton, Edward B., School	131 Pauline St. (formerly 45 Pauline St.)	19970818

03001469	MASSACHUSETTS	Suffolk	Winthrop	Winthrop Shore Dr., Metropolitan Park System of Greater Boston	Winthrop Shore Dr.	20040121
07000144	MASSACHUSETTS	Suffolk	Winthrop	Fort Banks Mortar Battery	Kennedy Dr.	20070312
10000098	MASSACHUSETTS	Suffolk	Winthrop	Winthrop Center/Metcalf Square Historic District	roughly bounded by Lincoln, Winthrop Sts., Winthrop Cemetery, Buchanan, Fremont, Pauline, Hermon and Belcher Sts.	20100323

National Register of Historic Places: Multiple Nominations
As of July 2015

Note: not all multiples are digitized

State Code	Reference Number	Multiple Name
MA	64000269	Arlington MRA
MA	64000270	Arlington MRA (AD)
MA	64000271	Barnstable MRA
MA	64000272	Blue Hills and Neponset River Reservations MRA
MA	64000273	Boston Theatre MRA
MA	64000274	Brookline MRA
MA	64000275	Cambridge MRA
MA	64000276	Central Village, Ipswich, Massachusetts MRA
MA	64500250	Diners of Massachusetts MPS
MA	64501040	Downtown Architecture of H.M. Francis, Fitchburg, MA
MA	64000277	Downtown Salem MRA
MA	64000278	Downtown Springfield MRA
MA	64501019	Eastern Rig Dragger Fishing Vessel Shipwrecks in the Stellwagen Bank N
MA	64000279	Fall River MRA
MA	64000280	Fall River MRA (AD)
MA	64500919	Farms and Rural Retreats of Topsfield, Massachusetts MPS
MA	64000281	First Period Buildings of Eastern Massachusetts TR
MA	64500251	Gloucester MPS
MA	64501135	Granite Vessel Shipwrecks in the Stellwagen Bank NMS MPS
MA	64000282	Lighthouses of Massachusetts TR
MA	64000283	Lighthouses of Massachusetts TR (AD)
MA	64500252	Massachusetts State Hospitals And State Schools MPS
MA	64000284	Methuen MRA
MA	64500822	Metropolitan Park System of Greater Boston MPS
MA	64501197	Mid 20th Century Modern Residential Architecture on Outer Cape Cod
MA	64501163	Mid-Century Modern Houses of Lexington, Massachusetts MPS
MA	64000285	Newton MRA
MA	64000286	Newton MRA (AD)
MA	64000287	North Adams MRA
MA	64000288	North Adams MRA (AD)
MA	64000289	Quincy MRA
MA	64000290	Reading MRA
MA	64000291	Reading MRA (AD)
MA	64000292	Rehoboth MRA
MA	64000293	Sherborn MRA
MA	64500253	Somerville MPS
MA	64000294	Southbridge MRA
MA	64000295	Stoneham MRA
MA	64000296	Swansea MRA
MA	64000297	Taunton MRA

MA	64000298	Town of Andover MRA
MA	64500934	Underground Railroad in Massachusetts MPS
MA	64000299	Uxbridge MRA
MA	64000300	Wakefield MRA
MA	64000301	Waltham MRA
MA	64000302	Washington MRA
MA	64500254	Water Supply System of Metropolitan Boston MPS
MA	64000303	Winchester MRA
MA	64000304	Worcester MRA
MA	64000305	Worcester Three-Deckers TR

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.KP	Adamson Street, 1-87		Boston	
BOS.KQ	Aldie Street, 1-75		Boston	
BOS.SG	Allston Congregational Church		Boston	
BOS.KS	Ashford Street, 5-69		Boston	
BOS.KT	Athol Street, 4-71		Boston	
BOS.CA	Charles River Basin Historic District		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.LB	Franklin Street, 51-168		Boston	
BOS.LC	Gardner Street, 4-98		Boston	
BOS.KM	Hano Street Area		Boston	
BOS.KN	Harvard Avenue Historic District		Boston	
BOS.JL	Harvard Business School		Boston	
BOS.LF	Holton Street, 7-60 and Everett Street, 205		Boston	
BOS.LQ	Raymond Street, 1-98		Boston	
BOS.JM	Saint Anthony's Area		Boston	
BOS.VH	St. Anthony of Padua Roman Catholic Church Complex		Boston	
BOS.LU	Westford Street, 3-10		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	
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	58 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
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.15425	Boston University School of Law	765 Commonwealth Ave	Boston	1962
BOS.9549	Boston University School of Law Courtyard	765 Commonwealth Ave	Boston	r 1965
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
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
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
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.8236	Stinson, John D. Barn	8R Holton St	Boston	1889
BOS.8235	Stinson, John D. House	8 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.9609	Charles River Reservation - Birmingham Pkwy Marker	Leo Birmingham Pkwy	Boston	r 1920
BOS.9608	Charles River Reservation - Leo Birmingham Parkway	Leo Birmingham Pkwy	Boston	1936
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.8375	Harvard University - Blodgett Pool	North Beacon St	Boston	1978
BOS.9313	Harvard University Athletic Facility Fence	North Beacon St	Boston	c 1897
BOS.9611	North Beacon Street Bridge over Charles River	North Beacon St	Boston	r 1920
BOS.8283		19 North Beacon St	Boston	r 1810
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		82-84 Raymond St	Boston	
BOS.8302		86-88 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.9602	Charles River Reservation - Soldiers Field Road	Soldiers Field Rd	Boston	1899
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.8352	Harvard Business School - Burden Hall	Soldiers Field Rd	Boston	c 1969
BOS.8363	Harvard Business School - Chase Hall	Soldiers Field Rd	Boston	1926
BOS.8353	Harvard Business School - Cumnock Hall	Soldiers Field Rd	Boston	1969
BOS.8362	Harvard Business School - Dillon Hall	Soldiers Field Rd	Boston	1926
BOS.8370	Harvard Business School - Fowler Hall	Soldiers Field Rd	Boston	1926
BOS.8369	Harvard Business School - Gallatin Hall	Soldiers Field Rd	Boston	1926
BOS.8360	Harvard Business School - Glass Hall	Soldiers Field Rd	Boston	1926
BOS.8367	Harvard Business School - Hamilton Hall	Soldiers Field Rd	Boston	1926
BOS.8358	Harvard Business School - Humphrey Hall	Soldiers Field Rd	Boston	1926
BOS.8350	Harvard Business School - Kresge Hall	Soldiers Field Rd	Boston	1953

BOS.8372	Harvard Business School - Loeb Hall	Soldiers Field Rd	Boston	1926
BOS.8359	Harvard Business School - McCullough Hall	Soldiers Field Rd	Boston	1926
BOS.8361	Harvard Business School - Mellon Hall	Soldiers Field Rd	Boston	1926
BOS.8371	Harvard Business School - Morgan Hall	Soldiers Field Rd	Boston	1927
BOS.8373	Harvard Business School - Morris Hall	Soldiers Field Rd	Boston	1926
BOS.8355	Harvard Business School - Shadd Gymnasium	Soldiers Field Rd	Boston	c 1990
BOS.8374	Harvard Business School - Sherman Hall	Soldiers Field Rd	Boston	1926
BOS.8351	Harvard Business School - Teele Hall	Soldiers Field Rd	Boston	c 1968
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.8368	Harvard Business School Faculty Club	Soldiers Field Rd	Boston	1926
BOS.8364	Harvard Business School Students Club	Soldiers Field Rd	Boston	1926
BOS.8376	Harvard University - Briggs Cage	Soldiers Field Rd	Boston	1926
BOS.8379	Harvard University - Bright Hockey Center	Soldiers Field Rd	Boston	r 1950
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.8380	Harvard University Gordon Track and Tennis Center	Soldiers Field Rd	Boston	r 1950
BOS.8354	Soldiers Field Park Apartments	Soldiers Field Rd	Boston	c 1974
BOS.9606	Soldiers Field Road - North Beacon Street Oval	Soldiers Field Rd	Boston	c 1958
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.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.15896	Charles River Speedway - East Shed	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15895	Charles River Speedway - South Shed	1420-1440 Soldiers Field Rd	Boston	1899
BOS.9731	Charles River Speedway Courtyard	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15897	Charles River Speedway Garage	1420-1440 Soldiers Field Rd	Boston	c 1940
BOS.15893	Charles River Speedway Headquarters and Stable	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15898	Charles River Speedway Maintenance Garage	1420-1440 Soldiers Field Rd	Boston	c 1940
BOS.8064	Charles River Speedway Superintendent's Residence	1420-1440 Soldiers Field Rd	Boston	1899
BOS.15894	Metropolitan District Commission Police Station	1420-1440 Soldiers Field Rd	Boston	1904
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
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

APPENDIX F

Copies of Construction Dewatering Permit Applications

HALEY ALDRICH

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

28 August 2017
File No. 129379-004

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

Attention: Matthew Tuttle

Subject: Request for Approval of Temporary Construction Dewatering
Stadium Road and Allston Distribution Package B Project
140-156 Western Avenue
Harvard University
Allston, Massachusetts

Dear Mr. Tuttle:

On behalf of our client, The President and Fellows of Harvard College, acting by and through Harvard Engineering and Utilities (E&U), this letter submits the Dewatering Discharge Permit Application in support of the planned Stadium Road and Allston Distribution Package B construction.

Dewatering is necessary to enable construction in-the-dry, and is anticipated to begin in November 2017 and continue for up to 12 months. Prior to discharge, collected water will be routed through at minimum a sedimentation tank and 5-micron bag filter to remove suspended solids and un-dissolved 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 Figure 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 – Site Locus
Figure 2 – Proposed Discharge Route
Copy of NPDES RGP Application

G:\129379 - Harvard Science and Engineering Complex Env\Scope 3- Stadium Road\NPDES RGP\BWSC Permit Application\2017-0828 HAI Stadium Road BWSC Letter F.docx

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 E&U Address: 46 Blackstone Street, Cambridge, MA 02139

Phone Number: 617-496-1434 Fax number: 617-496-1669

Contact person name: Susyrati Bunanta Title: Principal Engineer

Cell number: _____ Email address: susyrati_bunanta@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. SDO001 Receiving Waters Charles River

Temporary Discharges (Provide Anticipated Dates of Discharge): From November 2017 To November 2018

☐ 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: _____ Date: 8/29/2017

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

28 August 2017
File No. 129379-004

Department of Conservation & Recreation
Permit Section
251 Causeway Street, Suite 600
Boston, MA 02114-2119

Subject: Request for Approval of Temporary Construction Dewatering
Stadium Road and Allston Distribution Package B 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 Engineering and Utilities (E&U), this letter submits the Permit Application for Construction for temporary construction dewatering in support of the planned Stadium Road and Allston Distribution Package B Project. The Work Area location is shown on Figure 1.

Dewatering is necessary to enable construction in-the-dry, and is anticipated to begin in November 2017 and continue for up to 12 months. Prior to discharge, collected water will be routed through at minimum a sedimentation tank and 5 micron bag filter to remove suspended solids and un-dissolved chemical constituents. Other pre-treatment may be conducted as necessary to comply with National Pollution Discharge Elimination System (NPDES) discharge criteria. Proposed dewatering discharge routes are 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. 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:
Permit Application for Construction and/or Associated Access to DCR Park Lands and Roadways and $50.00 Application Fee
Figure 1 – Site Locus
Figure 2 – Proposed Discharge Route
Copy of NPDES RGP Permit Application

dcr Massachusetts

Department of Conservation & Recreation
251 Causeway Street, Suite 600
Boston MA 02114-2119

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Matthew A. Beaton, Secretary Executive Office of Energy & Environmental,
Leo Roy, Commissioner, Department of Conservation & Recreation

PERMIT APPLICATION FOR CONSTRUCTION &/OR ASSOCIATED ACCESS TO DCR PARK LANDS & ROADWAYS

Application DATE: 8/21/17 Permit Requested by The President and Fellows of Harvard College through Harvard E&U

PROPOSED Construction Start Date: 11/1/2017 Completion Date: 11/1/2018 See next page for instructions.

PLEASE USE ADDITIONAL SHEETS AS NECESSARY

1. PROJECT LOCATION: Future Stadium Road Address: Street 140-156 Western Avenue
   DCR Property: Charles River Reservation + DCR owned drain lines Town /City Allston

2. PROJECT DESCRIPTION: Attach a locus plan of the area + a minimum of 3 photos of the existing work location conditions, taken from different angles.

   Temporary construction dewatering in support of the of utility construction in future Stadium Road. DCR-owned pipes below and near the Charles River Reservation will be used for discharge of construction dewatering effluent to the Charles River at the outfall shown on the attached plan.

3. PROJECT IMPLEMENTATION INFORMATION: **how** performed; implemented, within, and short term and long term impacts to DCR property. Submit one full size set of construction engineering plans (+ e-data) additional copies shall be submitted upon request .Either clearly mark drawings relevant to DCR property or remove all drawings not relevant to DCR.

   The construction dewatering effluent from the proposed Stadium Road Project will be piped and directly discharged to storm drains located in Western Ave. along the proposed discharge route shown on Figure 2. Refer to the attached EPA NPDES RGP permit application for proposed treatment of dewatering discharge.

4. TIME FRAME: Desired project start date & how long it will take to complete planning and construction

   Project duration is estimated to run from November 2017 to November 2018.

5. AREA USED AND OR IMPACTED: Length width and depth of DCR area being used and or altered:

   Dewatering effluent will be routed to the Charles River via catch basins and storm drains as shown on Figure 2. The proposed route includes storm drains owned by DCR.

6. DCR restricted **roadways access**: provide proposed travel route, schedule for roadway usage and vehicle proportions (**weight, height, & length**)

   Not applicable

7. Material transportation and or temporary placement of equipment and/or vehicles (lay down area) on or over DCR property provide specifications on travel route and vehicle specifications (loaded weight and dimensions and Cargo description)

   Not applicable

8. Traffic Management Plan (TMP) is required and shall conform to current Federal Highway Standards; certified by a Traffic Engineer or Traffic Control Technician. **please** submit a full size set (24"x36") copies; Not applicable _____ **# of pages/ plans attached**

9. Dig Safe # To be obtained

10. List OTHER PERMIT:& LICENSES Dewatering permit applications are being submitted to the EPA and BWSC simultaneously

11. Applicant Information (**Permit Signatory**, Proponent, Property Owner, Consultant, primary contact)

12. On site contact (Contractor, engineer, installer, utility, management co....):
    X Check here if second signatory on permit.

Contact Name	President & Fellows of Harvard College c/o E&U	Contact Name	BOND Brothers
Print Name	Susyrati Bunanta	Print Name	John Harmon
Corporate Title	Principal Engineer	Corporate Title	Senior Project Manager
Mailing Address	Harvard E&U 46 Blackstone Street Boston, MA 02139	Mailing Address	145 Spring Street Everett, MA 02149
Telephone #	617-496-1434	Telephone #	617-394-6295
Cell Phone #		Cell Phone #	617-438-8530
Fax #r	617-496-1669	Fax #	617-202-5702
E- Mail	susyrati_bunanta@harvard.edu	E- Mail	jharmon@bondbrothers.com
*Signature	Susyrati	*Signature	John M. Harmon Digitally signed by John M. Harmon DN: cn=John M. Harmon, o=Bond Brothers, ou, email=jharmon@bondbrothers.com, c=US Date: 2017.08.28 10:28:28 -04'00'

***Signature denotes acceptance of the conditions of the DCR Construction/Access Permit**

Return completed application; with the $50.00 application fee to:
DCR: PERMIT SECTION, 251 Causeway Street, 7th Fl. Boston, MA 02114, attn Construction/Access Permits

For Office Use Only Do Not Write Below This Line

Application #		Permit Issued		EIR-EOEA Cert		Stormwater	
Date received:		Plans returned:		Local Con Com		Water Resource	
App. complete		Revision submitted		Mass Historic		Gates	
		Permit Denied		TMP		Dams	
Fee amount		Paid date		Roadway const		St. Light	
Permit Writer		MEPA required		Planning		21E	

Instructions for Completing

Application for Construction &/or Associated Access Permit to DCR Park Lands & Roadways

General Information

M.G.L. C.132A§7, C.92§33, 801CMR11.06 and all other enabling powers grant DCR the authority to issue Construction and Access Permits.
Access is defined as:

I. Use by motor vehicles and/or construction equipment entry and/or exit to any DCR property including roads, parkway, parkland, structures and/or facility from abutting properties.

II. Any physical work (i.e. curb cuts, trench work, street openings) performed on under and or within DCR owned land including parklands, reservations, roadways, parkways…

Application, Mitigation and / or Restoration Fees

The non refundable **$50** Administrative Application Fee shall accompany this form. All check shall be payable to the Massachusetts, Department of Conservation and Recreation.

Include a minimum of 3 existing conditions photographs, taken from 3 or 4 angles, a locus plan of the area and a sketch which indicates lot size, DCR parkway frontage, proposed work location and details, property lines, building location(s), related to proposed physical work with respect to DCR Property baseline. Traffic Management Plan in accordance with current Federal Highway Administration MUTCD requirements. **All documents should be relevant to the work on DCR properties/issues**; if off the point information documents are included in the application package please clearly mark ALL relative information.

III. Application for all non-residential and residential developments greater than 5 units must include engineered access plans (minimum of 4 copies) at an appropriate scale (1 inch = 20 or 40 feet) which clearly show all proposed work and:

- DCR Property Layout line and baseline
- Location and dimensions of proposed work
- Location of existing structures, trees, and utilities
- Complete details of existing and proposed drainage.
- Information on over weight equipment and routes to access site

Please note: activities such as camping, or DCR park facilities use require a reservation, work related to Dam Safety and Water Supply issues are permitted by those sections, please see DCR web site at: http://www.mass.gov/dcr/

Specific Instructions (print or type)

Line 1 Project location: Name the DCR property or properties; Park and/or Parkway, plus specific location and municipality the access and/or construction is sought, address of work site.

Line 2 Project Description: Description of work to be done; Type of access sought, briefly describe facility for which access is sought. Ownership Plan showing property lines

Example 1: Single family residential driveway at 10 DCR Parkway (80' north of the intersection of X road) proposed drive frontage will be 12' wide.

Example 2: 500,000 s.f. shopping mall off of DCR XX parkway and Route XYZ in Anytown MA, bordering XXX Park; roadway geometry modified to accommodate left-turn lane, relocation of lights, traffic signals, remove and replace 15 mature trees, installation of drainage, & utilities (see plans, Environmental, Conservation Commission, MA Historical permits, Fish and Wildlife).

Line 3 Project Implementation and effects: Include DCR property impacts:
Temporary impacts + how they will be rectified
Permanent impacts – how they will be minimized
Environmental impacts (including copies of permits)
Flora and Fauna impacts and replacement plan
Short explanation of the need for the permit
Short description of the whole construction project
Specific details on all components, phases, construction schedule and Timelines that will directly impact DCR property.
Details on components of the job that will indirectly impact DCR property
Details on the project benefit to DCR, the public, and/or the community
(Attach additional sheets if necessary).

Mitigation (note Access and Excavation Fees will be charged: Mitigation in the form of improvement to the Project area may not amount to less than the total of the access and excavation fees)

Example 1: Remove 50 ft of existing granite curb on south side of Property to construct driveway access & modify the roadway geometry to accommodate left-turn lane. Three day project starting July 1, 20XX

Example 2: Excavate 10 x 10 ft section of roadway at Station 100+00 in westbound lanes in order to install residential water service to 100 DCR Parkway on heavily traveled roadway therefore permittee will provide 2 police details and use 4 days; plus additional signage.

Line 4 Time Frames: Planning, Design and Construction

Line 5 Usage Area: DCR property usage size (length and width) including excavation dimensions, sizes of components installed.

For projects with permanent installation: O&M requirements, duration and financial responsibility.

Line 6: DCR restricted roadways access

Line 7: Material transportation

Line 8: Traffic Management for motor vehicles, pedestrians, and bicycles in accordance with the most recent MUTCD

Submit a full size (24"x36") plan(s) certified by a Traffic Engineer or Traffic Control Technician.

1. Detours for motor vehicles, pedestrians, and bicycles.
2. Logistics and effects on: procurement, maintenance, and transportation …
   a. Items of concern – i.e. schools, playgrounds, handicapped children, and elderly housing

Line 9: Dig Safe # must be obtained by calling 1-888-DIG-SAFE.

Line 10: Other Permit & licenses: List all permits; including application dates and status; enclose 1 copies of each application/permit. Including DCR permits issued for this work location.

Line 11 & 12: Contact information for the applicant and or their contractors Proponent, Owner, Permittee name(s) must be the name of the person or entity responsible for funding the construction and/or the property or facility owner (other than DCR), for the construction activity being permitted: NOT an agent. Contact may be the owner's agent and may be an additional signatory.

Individual or business making application must complete the required information, including date of application and signature

- Contact names and business title(s)
- Addresses (location and E-mail)
- Phone numbers (office, cell, and fax)
- Name and title of the individual who will accept permit conditions for the permittee

Return completed permit application along with Fee

to: Director of Permits
Department of Conservation and Recreation ("DCR")
Permit Section, 251 Causeway Street, 7th Floor,
Boston, MA 02114

APPENDIX G

Laboratory Data Reports

HALEY ALDRICH

ANALYTICAL REPORT

Lab Number:	L1711614
Client:	GZA GeoEnvironmental, Inc. 249 Vanderbilt Ave Norwood, MA 02062
ATTN:	Neal Carey
Phone:	(781) 278-5831
Project Name:	HARVARD UNIVERSITY
Project Number:	173073.00
Report Date:	04/20/17

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).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1711614-01	RIVER-041317	WATER	HARVARD UNIVERSITY	04/13/17 10:05	04/13/17

Project Name:	HARVARD UNIVERSITY	**Lab Number:**	L1711614
Project Number:	173073.00	**Report Date:**	04/20/17

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:	HARVARD UNIVERSITY	**Lab Number:**	L1711614
Project Number:	173073.00	**Report Date:**	04/20/17

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

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: Michelle M. Morris

Title: Technical Director/Representative Date: 04/20/17

METALS

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00
Lab Number: L1711614
Report Date: 04/20/17

SAMPLE RESULTS

Lab ID: L1711614-01
Client ID: RIVER-041317
Sample Location: HARVARD UNIVERSITY
Matrix: Water
Date Collected: 04/13/17 10:05
Date Received: 04/13/17
Field Prep: Not Specified

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	0.00042	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Arsenic, Total	ND		mg/l	0.00100	0.00016	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Cadmium, Total	ND		mg/l	0.00100	0.00005	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Chromium, Total	ND		mg/l	0.00100	0.00017	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Copper, Total	ND		mg/l	0.00100	0.00038	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Iron, Total	0.542		mg/l	0.050	0.009	1	04/17/17 10:10	04/18/17 23:25	EPA 3005A	19,200.7	AB
Lead, Total	ND		mg/l	0.00050	0.00034	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Mercury, Total	ND		mg/l	0.00020	0.00006	1	04/19/17 12:14	04/19/17 19:10	EPA 245.1	3,245.1	EA
Nickel, Total	ND		mg/l	0.00200	0.00055	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Selenium, Total	ND		mg/l	0.00500	0.00173	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Silver, Total	ND		mg/l	0.00100	0.00026	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Zinc, Total	ND		mg/l	0.01000	0.00341	1	04/17/17 10:10	04/18/17 14:45	EPA 3005A	3,200.8	BV
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	56.9		mg/l	0.660	NA	1	04/17/17 10:10	04/18/17 23:25	EPA 3005A	19,200.7	AB
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	0.010	1		04/18/17 14:45	NA	107,-	

Project Name: HARVARD UNIVERSITY **Lab Number:** L1711614

Project Number: 173073.00 **Report Date:** 04/20/17

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: WG994826-1										
Antimony, Total	ND		mg/l	0.00400	0.00042	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Arsenic, Total	ND		mg/l	0.00100	0.00016	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Cadmium, Total	ND		mg/l	0.00100	0.00005	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Chromium, Total	0.00020	J	mg/l	0.00100	0.00017	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Copper, Total	ND		mg/l	0.00100	0.00038	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Lead, Total	ND		mg/l	0.00050	0.00034	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Nickel, Total	ND		mg/l	0.00200	0.00055	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Selenium, Total	ND		mg/l	0.00500	0.00173	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Silver, Total	ND		mg/l	0.00100	0.00026	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV
Zinc, Total	ND		mg/l	0.01000	0.00341	1	04/17/17 10:10	04/18/17 13:33	3,200.8	BV

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: WG994828-1										
Iron, Total	ND		mg/l	0.050	0.009	1	04/17/17 10:10	04/18/17 20:28	19,200.7	AB

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: WG994828-1										
Hardness	ND		mg/l	0.660	NA	1	04/17/17 10:10	04/18/17 20:28	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00
Lab Number: L1711614
Report Date: 04/20/17

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: WG995602-1										
Mercury, Total	ND		mg/l	0.00020	0.00006	1	04/19/17 12:14	04/19/17 19:06	3,245.1	EA

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG994826-2								
Antimony, Total	94		-		85-115	-		
Arsenic, Total	101		-		85-115	-		
Cadmium, Total	105		-		85-115	-		
Chromium, Total	103		-		85-115	-		
Copper, Total	104		-		85-115	-		
Lead, Total	100		-		85-115	-		
Nickel, Total	96		-		85-115	-		
Selenium, Total	110		-		85-115	-		
Silver, Total	98		-		85-115	-		
Zinc, Total	98		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG994828-2								
Iron, Total	99		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG994828-2								
Hardness	106		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG995602-2								
Mercury, Total	107		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

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: WG994826-3 QC Sample: L1711749-01 Client ID: MS Sample												
Antimony, Total	0.00333J	0.5	0.5567	111		-	-		70-130	-		20
Arsenic, Total	0.00635	0.12	0.1407	112		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05667	111		-	-		70-130	-		20
Chromium, Total	0.00182	0.2	0.2160	107		-	-		70-130	-		20
Copper, Total	0.00823	0.25	0.2859	111		-	-		70-130	-		20
Lead, Total	ND	0.51	0.5350	105		-	-		70-130	-		20
Nickel, Total	0.00192J	0.5	0.5057	101		-	-		70-130	-		20
Selenium, Total	0.0036J	0.12	0.1385	115		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05201	104		-	-		70-130	-		20
Zinc, Total	ND	0.5	0.5280	106		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG994828-3 QC Sample: L1711749-01 Client ID: MS Sample												
Iron, Total	0.063	1	1.04	98		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG994828-3 QC Sample: L1711749-01 Client ID: MS Sample												
Hardness	284.	66.2	332	**72**	Q	-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG995602-3 QC Sample: L1711614-01 Client ID: RIVER-041317												
Mercury, Total	ND	0.005	0.00512	102		-	-		70-130	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG994826-4 QC Sample: L1711749-01 Client ID: DUP Sample						
Antimony, Total	0.00333J	0.00241J	mg/l	NC		20
Arsenic, Total	0.00635	0.00686	mg/l	8		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	0.00182	0.00189	mg/l	4		20
Copper, Total	0.00823	0.00845	mg/l	3		20
Lead, Total	ND	ND	mg/l	NC		20
Nickel, Total	0.00192J	0.00192J	mg/l	NC		20
Zinc, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG994828-4 QC Sample: L1711749-01 Client ID: DUP Sample						
Iron, Total	0.063	0.066	mg/l	5		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG995602-4 QC Sample: L1711614-01 Client ID: RIVER-041317						
Mercury, Total	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

SAMPLE RESULTS

Lab ID: L1711614-01
Client ID: RIVER-041317
Sample Location: HARVARD UNIVERSITY
Matrix: Water

Date Collected: 04/13/17 10:05
Date Received: 04/13/17
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)	7.0		SU	-	NA	1	-	04/13/17 18:00	1,9040C	AS
Nitrogen, Ammonia	0.054	J	mg/l	0.075	0.022	1	04/18/17 16:12	04/19/17 20:00	121,4500NH3-BH	AT
Chromium, Hexavalent	0.003	J	mg/l	0.010	0.003	1	04/14/17 03:16	04/14/17 03:45	1,7196A	KA

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00
Lab Number: L1711614
Report Date: 04/20/17

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: WG994156-1										
Chromium, Hexavalent	ND		mg/l	0.010	0.003	1	04/14/17 03:16	04/14/17 03:44	1,7196A	KA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG995272-1										
Nitrogen, Ammonia	0.036	J	mg/l	0.075	0.022	1	04/18/17 16:12	04/19/17 19:50	121,4500NH3-BH	AT

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG994052-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG994156-2								
Chromium, Hexavalent	102		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG995272-2								
Nitrogen, Ammonia	91		-		80-120	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

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: WG994156-4 QC Sample: L1711614-01 Client ID: RIVER-041317												
Chromium, Hexavalent	0.003J	0.1	0.103	103		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG995272-4 QC Sample: L1711914-09 Client ID: MS Sample												
Nitrogen, Ammonia	34.0	4	35.6	**40**	Q	-	-		80-120	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG994052-2 QC Sample: L1711529-07 Client ID: DUP Sample						
pH	6.6	6.7	SU	2		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG994156-3 QC Sample: L1711614-01 Client ID: RIVER-041317						
Chromium, Hexavalent	0.003J	0.003J	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG995272-3 QC Sample: L1711914-09 Client ID: DUP Sample						
Nitrogen, Ammonia	34.0	33.7	mg/l	1		20

Project Name: HARVARD UNIVERSITY
Project Number: 173073.00

Lab Number: L1711614
Report Date: 04/20/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information Custody Seal

Cooler	
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1711614-01A	Plastic 250ml unpreserved	A	7	3.1	Y	Absent	HEXCR-7196(1),PH-9040(1)
L1711614-01B	Plastic 250ml HNO3 preserved	A	<2	3.1	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)
L1711614-01C	Plastic 500ml H2SO4 preserved	A	<2	3.1	Y	Absent	NH3-4500(28)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD UNIVERSITY	**Lab Number:**	L1711614
Project Number:	173073.00	**Report Date:**	04/20/17

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

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.

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.

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 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

Report Format: DU Report with 'J' Qualifiers

Project Name:	HARVARD UNIVERSITY	**Lab Number:**	L1711614
Project Number:	173073.00	**Report Date:**	04/20/17

Data Qualifiers

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. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name: HARVARD UNIVERSITY **Lab Number:** L1711614

Project Number: 173073.00 **Report Date:** 04/20/17

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: 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: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
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: 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, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **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.**

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca**. EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL**. EPA 245.1** Hg.

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

PAGE 1 OF 1

Date Rec'd in Lab: 4/13/17

ALPHA Job #: L1711614

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: GZA
Address: 249 Vanderbilt Avenue, Norwood, MA
Phone:
Email: neal.carey@gza.com

Additional Project Information:

Project Information

Project Name: Harvard University
Project Location: Harvard University
Project #: 173073.00
Project Manager: Neal Carey
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due:

Report Information - Data Deliverables

☐ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☒ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC: ☐ 8260 ☐ 624 ☐ 524.2	SVOC: ☐ ABN ☐ PAH	Total Antimony, Total Cadmium, Total Chromium, Total Copper, Total Lead, Total Nickel, Total Selenium, Total Silver & Total Zinc (Hardness)	EPH: ☐ Ranges & Targets ☐ Ranges Only	VPH: ☐ Ranges & Targets ☐ Ranges Only	☐ PCB ☐ PEST	TPH: ☐ Quant Only ☐ Fingerprint	pH, Temp, Hardness	Ammonia	Total Chromium VI	Sample Comments	TOTAL # BOTTLES
11614-1	RIVER-041317	4/13/17	1005	SW	MV			X X					X	X	X		3

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H= $Na_2S_2O_3$
I= Ascorbic Acid
J= NH_4Cl
K= Zn Acetate
O= Other

Container Type			P	P			P	P	P
Preservative			C	C			A	D	A

Relinquished By:	Date/Time	Received By:	Date/Time
Michael Ostrowski MCM	4/13/17 1700		4/13/17 1302
	4/13/17 1700		4/13/17 1700

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L1722791
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Beck Straley
Phone:	(617) 886-7400
Project Name:	HARVARD STADIUM ROAD
Project Number:	129379-004
Report Date:	07/18/17

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).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1722791-01	GP-SEC-36(OW)_07032017	WATER	ALLSTON, MA	07/05/17 14:45	07/05/17
L1722791-02	TRIP BLANKS	WATER	ALLSTON, MA	06/27/17 00:00	07/05/17

Project Name:	HARVARD STADIUM ROAD	**Lab Number:**	L1722791
Project Number:	129379-004	**Report Date:**	07/18/17

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:	HARVARD STADIUM ROAD	**Lab Number:**	L1722791
Project Number:	129379-004	**Report Date:**	07/18/17

Case Narrative (continued)

Report Submission

This final report replaces the partial report issued July 11, 2017, and includes the results of all requested analyses.

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.

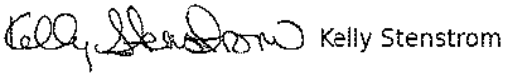
Semivolatile Organics

The WG1019906-2 LCS recoveries, associated with L1722791-01 (GP-SEC-36(OW)_07032017), are below the acceptance criteria for benzidine (1%) and pyridine (0%); however, they have been identified as "difficult" analytes. The results of the associated sample are reported.

Total Metals

The WG1020951-2 LCS recovery, associated with L1722791-01 (GP-SEC-36(OW)_07032017), is above the acceptance criteria for cadmium (125%); however, the associated sample is non-detect to the RL for this target analyte. The results of the original analysis are reported.

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: 07/18/17

ORGANICS

VOLATILES

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 07/07/17 07:31
Analyst: MM

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
Trichloroethene	ND		ug/l	0.50	--	1

Project Name: HARVARD STADIUM ROAD **Lab Number:** L1722791

Project Number: 129379-004 **Report Date:** 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01 Date Collected: 07/05/17 14:45

Client ID: GP-SEC-36(OW)_07032017 Date Received: 07/05/17

Sample Location: ALLSTON, MA Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
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
p-Isopropyltoluene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	2.5	--	1

Project Name: HARVARD STADIUM ROAD
Lab Number: L1722791
Project Number: 129379-004
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA
Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
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	111		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	114		70-130

Project Name: HARVARD STADIUM ROAD
Lab Number: L1722791
Project Number: 129379-004
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)

Matrix: Water
Analytical Method: 1,8260C-SIM(M)
Analytical Date: 07/07/17 07:31
Analyst: MM

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: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA

Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 07/09/17 20:02
Analyst: SL

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)
Extraction Method: EPA 504.1
Extraction Date: 07/09/17 15:09

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: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C-SIM(M)
Analytical Date: 07/07/17 06:40
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1020433-5					
1,4-Dioxane	ND		ug/l	3.0	--

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 07/07/17 06:40
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1020434-5					
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: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 07/07/17 06:40
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1020434-5					
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: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 07/07/17 06:40
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1020434-5					
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	--

Tentatively Identified Compounds

No Tentatively Identified Compounds ND ug/l

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 07/07/17 06:40
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1020434-5					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	107		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	99		70-130
Dibromofluoromethane	112		70-130

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 07/09/17 15:51
Analyst: SL

Extraction Method: EPA 504.1
Extraction Date: 07/09/17 13:40

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01 Batch: WG1020858-1						
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: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

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 Batch: WG1020433-3 WG1020433-4								
1,4-Dioxane	86		78		70-130	10		25

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1020434-3 WG1020434-4								
Methylene chloride	100		96		70-130	4		20
1,1-Dichloroethane	99		92		70-130	7		20
Chloroform	110		100		70-130	10		20
Carbon tetrachloride	110		100		63-132	10		20
1,2-Dichloropropane	90		84		70-130	7		20
Dibromochloromethane	100		96		63-130	4		20
1,1,2-Trichloroethane	110		98		70-130	12		20
Tetrachloroethene	110		100		70-130	10		20
Chlorobenzene	90		87		75-130	3		25
Trichlorofluoromethane	99		91		62-150	8		20
1,2-Dichloroethane	100		96		70-130	4		20
1,1,1-Trichloroethane	110		100		67-130	10		20
Bromodichloromethane	110		100		67-130	10		20
trans-1,3-Dichloropropene	98		93		70-130	5		20
cis-1,3-Dichloropropene	92		87		70-130	6		20
1,1-Dichloropropene	88		85		70-130	3		20
Bromoform	96		91		54-136	5		20
1,1,2,2-Tetrachloroethane	97		94		67-130	3		20
Benzene	99		94		70-130	5		25
Toluene	100		94		70-130	6		25
Ethylbenzene	98		92		70-130	6		20
Chloromethane	**62**	Q	**58**	Q	64-130	7		20
Bromomethane	98		97		39-139	1		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1020434-3 WG1020434-4								
Vinyl chloride	81		74		55-140	9		20
Chloroethane	94		86		55-138	9		20
1,1-Dichloroethene	95		94		61-145	1		25
Trichloroethene	110		100		70-130	10		25
1,2-Dichlorobenzene	96		93		70-130	3		20
1,3-Dichlorobenzene	100		98		70-130	2		20
1,4-Dichlorobenzene	98		95		70-130	3		20
Methyl tert butyl ether	84		82		63-130	2		20
p/m-Xylene	100		95		70-130	5		20
o-Xylene	100		90		70-130	11		20
cis-1,2-Dichloroethene	99		94		70-130	5		20
Dibromomethane	100		97		70-130	3		20
1,4-Dichlorobutane	89		84		70-130	6		20
1,2,3-Trichloropropane	97		92		64-130	5		20
Styrene	105		100		70-130	5		20
Dichlorodifluoromethane	81		75		36-147	8		20
Acetone	91		84		58-148	8		20
Carbon disulfide	99		92		51-130	7		20
2-Butanone	83		77		63-138	8		20
Vinyl acetate	86		82		70-130	5		20
4-Methyl-2-pentanone	73		69		59-130	6		20
2-Hexanone	74		69		57-130	7		20
Ethyl methacrylate	73		71		70-130	3		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1020434-3 WG1020434-4								
Acrylonitrile	86		76		70-130	12		20
Bromochloromethane	120		110		70-130	9		20
Tetrahydrofuran	83		80		58-130	4		20
2,2-Dichloropropane	110		100		63-133	10		20
1,2-Dibromoethane	99		95		70-130	4		20
1,3-Dichloropropane	96		90		70-130	6		20
1,1,1,2-Tetrachloroethane	120		110		64-130	9		20
Bromobenzene	93		92		70-130	1		20
n-Butylbenzene	98		94		53-136	4		20
sec-Butylbenzene	97		94		70-130	3		20
tert-Butylbenzene	90		86		70-130	5		20
o-Chlorotoluene	100		97		70-130	3		20
p-Chlorotoluene	97		95		70-130	2		20
1,2-Dibromo-3-chloropropane	84		82		41-144	2		20
Hexachlorobutadiene	99		94		63-130	5		20
Isopropylbenzene	88		85		70-130	3		20
p-Isopropyltoluene	90		88		70-130	2		20
Naphthalene	72		71		70-130	1		20
n-Propylbenzene	95		91		69-130	4		20
1,2,3-Trichlorobenzene	83		81		70-130	2		20
1,2,4-Trichlorobenzene	80		81		70-130	1		20
1,3,5-Trimethylbenzene	98		95		64-130	3		20
1,2,4-Trimethylbenzene	97		92		70-130	5		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1020434-3 WG1020434-4								
trans-1,4-Dichloro-2-butene	90		86		70-130	5		20
Ethyl ether	90		85		59-134	6		20
Tert-Butyl Alcohol	80		76		70-130	5		20
Tertiary-Amyl Methyl Ether	87		83		66-130	5		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	105		98		70-130
Toluene-d8	102		101		70-130
4-Bromofluorobenzene	93		93		70-130
Dibromofluoromethane	109		108		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab Associated sample(s): 01 Batch: WG1020858-2									
1,2-Dibromoethane	82		-		70-130	-			A
1,2-Dibromo-3-chloropropane	78		-		70-130	-			A

Matrix Spike Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

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 QC Batch ID: WG1020858-3 WG1020858-4 QC Sample: L1721709-01 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.257	0.224	87		0.258	101		65-135	14		20	A
1,2-Dibromo-3-chloropropane	ND	0.257	0.206	80		0.242	95		65-135	16		20	A

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 QC Batch ID: WG1020858-5 WG1020858-6 QC Sample: L1721709-03 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.256	0.257	101		0.244	96		65-135	5		20	A
1,2-Dibromo-3-chloropropane	ND	0.256	0.238	93		0.220	87		65-135	8		20	A

SEMIVOLATILES

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA

Matrix: Water
Analytical Method: 1,8270D
Analytical Date: 07/07/17 00:23
Analyst: KV

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)
Extraction Method: EPA 3510C
Extraction Date: 07/05/17 23:41

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
2-Nitroaniline	ND		ug/l	5.0	--	1

Project Name: HARVARD STADIUM ROAD **Lab Number:** L1722791

Project Number: 129379-004 **Report Date:** 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01 Date Collected: 07/05/17 14:45

Client ID: GP-SEC-36(OW)_07032017 Date Received: 07/05/17

Sample Location: ALLSTON, MA Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
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	51		21-120
Phenol-d6	36		10-120
Nitrobenzene-d5	89		23-120
2-Fluorobiphenyl	84		15-120
2,4,6-Tribromophenol	105		10-120
4-Terphenyl-d14	91		41-149

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA

Matrix: Water
Analytical Method: 1,8270D-SIM
Analytical Date: 07/07/17 21:33
Analyst: KL

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)
Extraction Method: EPA 3510C
Extraction Date: 07/05/17 23:44

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: HARVARD STADIUM ROAD
Lab Number: L1722791
Project Number: 129379-004
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Semivolatile Organics by GC/MS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	53		21-120
Phenol-d6	39		10-120
Nitrobenzene-d5	86		23-120
2-Fluorobiphenyl	75		15-120
2,4,6-Tribromophenol	105		10-120
4-Terphenyl-d14	71		41-149

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 07/06/17 21:44
Analyst: KV

Extraction Method: EPA 3510C
Extraction Date: 07/05/17 23:41

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1019906-1					
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: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 07/06/17 21:44
Analyst: KV

Extraction Method: EPA 3510C
Extraction Date: 07/05/17 23:41

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1019906-1					
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: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 07/06/17 21:44
Analyst: KV

Extraction Method: EPA 3510C
Extraction Date: 07/05/17 23:41

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1019906-1					
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	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	48		21-120
Phenol-d6	32		10-120
Nitrobenzene-d5	83		23-120
2-Fluorobiphenyl	76		15-120
2,4,6-Tribromophenol	93		10-120
4-Terphenyl-d14	87		41-149

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 07/07/17 20:07
Analyst: KL

Extraction Method: EPA 3510C
Extraction Date: 07/05/17 23:44

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1019909-1					
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: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 07/07/17 20:07
Analyst: KL

Extraction Method: EPA 3510C
Extraction Date: 07/05/17 23:44

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1019909-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	48		21-120
Phenol-d6	34		10-120
Nitrobenzene-d5	78		23-120
2-Fluorobiphenyl	69		15-120
2,4,6-Tribromophenol	90		10-120
4-Terphenyl-d14	74		41-149

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

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: WG1019906-2 WG1019906-3								
Acenaphthene	69		72		37-111	4		30
Benzidine	**1**	Q	40		10-75	**188**	Q	30
1,2,4-Trichlorobenzene	55		60		39-98	9		30
Hexachlorobenzene	81		83		40-140	2		30
Bis(2-chloroethyl)ether	69		72		40-140	4		30
2-Chloronaphthalene	65		69		40-140	6		30
1,2-Dichlorobenzene	54		58		40-140	7		30
1,3-Dichlorobenzene	53		57		40-140	7		30
1,4-Dichlorobenzene	54		58		36-97	7		30
3,3'-Dichlorobenzidine	64		59		40-140	8		30
2,4-Dinitrotoluene	100		103		48-143	3		30
2,6-Dinitrotoluene	92		97		40-140	5		30
Azobenzene	73		73		40-140	0		30
Fluoranthene	80		82		40-140	2		30
4-Chlorophenyl phenyl ether	72		74		40-140	3		30
4-Bromophenyl phenyl ether	77		80		40-140	4		30
Bis(2-chloroisopropyl)ether	64		68		40-140	6		30
Bis(2-chloroethoxy)methane	73		76		40-140	4		30
Hexachlorobutadiene	50		55		40-140	10		30
Hexachlorocyclopentadiene	40		44		40-140	10		30
Hexachloroethane	52		58		40-140	11		30
Isophorone	70		74		40-140	6		30
Naphthalene	59		65		40-140	10		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

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: WG1019906-2 WG1019906-3								
Nitrobenzene	70		77		40-140	10		30
NDPA/DPA	77		79		40-140	3		30
n-Nitrosodi-n-propylamine	67		71		29-132	6		30
Bis(2-ethylhexyl)phthalate	88		85		40-140	3		30
Butyl benzyl phthalate	89		90		40-140	1		30
Di-n-butylphthalate	81		84		40-140	4		30
Di-n-octylphthalate	89		90		40-140	1		30
Diethyl phthalate	78		80		40-140	3		30
Dimethyl phthalate	76		80		40-140	5		30
Benzo(a)anthracene	75		76		40-140	1		30
Benzo(a)pyrene	80		81		40-140	1		30
Benzo(b)fluoranthene	80		82		40-140	2		30
Benzo(k)fluoranthene	80		80		40-140	0		30
Chrysene	77		78		40-140	1		30
Acenaphthylene	71		76		45-123	7		30
Anthracene	76		78		40-140	3		30
Benzo(ghi)perylene	79		81		40-140	3		30
Fluorene	75		77		40-140	3		30
Phenanthrene	75		77		40-140	3		30
Dibenzo(a,h)anthracene	77		80		40-140	4		30
Indeno(1,2,3-cd)pyrene	79		80		40-140	1		30
Pyrene	79		81		26-127	3		30
Biphenyl	66		71		40-140	7		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

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: WG1019906-2 WG1019906-3								
Aniline	**31**	Q	50		40-140	**47**	Q	30
4-Chloroaniline	44		48		40-140	9		30
1-Methylnaphthalene	59		64		41-103	8		30
2-Nitroaniline	98		101		52-143	3		30
3-Nitroaniline	80		78		25-145	3		30
4-Nitroaniline	84		88		51-143	5		30
Dibenzofuran	73		75		40-140	3		30
2-Methylnaphthalene	61		65		40-140	6		30
n-Nitrosodimethylamine	40		44		22-74	10		30
2,4,6-Trichlorophenol	78		84		30-130	7		30
p-Chloro-m-cresol	74		77		23-97	4		30
2-Chlorophenol	70		73		27-123	4		30
2,4-Dichlorophenol	77		80		30-130	4		30
2,4-Dimethylphenol	75		78		30-130	4		30
2-Nitrophenol	89		95		30-130	7		30
4-Nitrophenol	56		57		10-80	2		30
2,4-Dinitrophenol	96		104		20-130	8		30
4,6-Dinitro-o-cresol	105		107		20-164	2		30
Pentachlorophenol	82		84		9-103	2		30
Phenol	35		38		12-110	8		30
2-Methylphenol	64		69		30-130	8		30
3-Methylphenol/4-Methylphenol	60		64		30-130	6		30
2,4,5-Trichlorophenol	83		82		30-130	1		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

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: WG1019906-2 WG1019906-3								
Benzoic Acid	25		24		10-164	4		30
Benzyl Alcohol	63		65		26-116	3		30
Carbazole	78		80		55-144	3		30
Pyridine	**0**	Q	35		10-66	NC		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	49		51		21-120
Phenol-d6	35		36		10-120
Nitrobenzene-d5	78		84		23-120
2-Fluorobiphenyl	72		75		15-120
2,4,6-Tribromophenol	90		90		10-120
4-Terphenyl-d14	78		79		41-149

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

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: WG1019909-2 WG1019909-3								
Acenaphthene	88		81		37-111	8		40
2-Chloronaphthalene	77		70		40-140	10		40
Fluoranthene	86		82		40-140	5		40
Hexachlorobutadiene	63		56		40-140	12		40
Naphthalene	92		68		40-140	30		40
Benzo(a)anthracene	86		81		40-140	6		40
Benzo(a)pyrene	74		72		40-140	3		40
Benzo(b)fluoranthene	92		88		40-140	4		40
Benzo(k)fluoranthene	78		76		40-140	3		40
Chrysene	82		77		40-140	6		40
Acenaphthylene	86		78		40-140	10		40
Anthracene	90		85		40-140	6		40
Benzo(ghi)perylene	109		105		40-140	4		40
Fluorene	91		86		40-140	6		40
Phenanthrene	79		75		40-140	5		40
Dibenzo(a,h)anthracene	109		105		40-140	4		40
Indeno(1,2,3-cd)pyrene	116		112		40-140	4		40
Pyrene	85		80		26-127	6		40
1-Methylnaphthalene	81		74		40-140	9		40
2-Methylnaphthalene	81		73		40-140	10		40
Pentachlorophenol	102		96		9-103	6		40
Hexachlorobenzene	76		74		40-140	3		40
Hexachloroethane	68		60		40-140	13		40

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

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: WG1019909-2 WG1019909-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	55		49		21-120
Phenol-d6	40		36		10-120
Nitrobenzene-d5	88		80		23-120
2-Fluorobiphenyl	77		69		15-120
2,4,6-Tribromophenol	98		92		10-120
4-Terphenyl-d14	78		74		41-149

PCBS

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA

Matrix: Water
Analytical Method: 5,608
Analytical Date: 07/07/17 08:05
Analyst: HT

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)
Extraction Method: EPA 608
Extraction Date: 07/06/17 04:23
Cleanup Method: EPA 3665A
Cleanup Date: 07/06/17
Cleanup Method: EPA 3660B
Cleanup Date: 07/06/17

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	77		30-150	A
Decachlorobiphenyl	76		30-150	A

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 5,608
Analytical Date: 07/06/17 15:56
Analyst: HT

Extraction Method: EPA 608
Extraction Date: 07/06/17 04:23
Cleanup Method: EPA 3665A
Cleanup Date: 07/06/17
Cleanup Method: EPA 3660B
Cleanup Date: 07/06/17

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1019939-1						
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	64		30-150	A
Decachlorobiphenyl	67		30-150	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

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: WG1019939-2									
Aroclor 1016	83		-		30-150	-		30	A
Aroclor 1260	81		-		30-150	-		30	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	68				30-150	A
Decachlorobiphenyl	66				30-150	A

Matrix Spike Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

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: WG1019939-3 QC Sample: L1722744-01 Client ID: MS Sample													
Aroclor 1016	ND	3.12	2.69	86		-	-		40-126	-		30	A
Aroclor 1260	ND	3.12	2.85	91		-	-		40-127	-		30	A

Surrogate	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	72				30-150	A
Decachlorobiphenyl	73				30-150	A

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits	
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1019939-4 QC Sample: L1722791-01 Client ID: GP-SEC-36(OW)_07032017							
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	77		69		30-150	A
Decachlorobiphenyl	76		57		30-150	A

METALS

Project Name: HARVARD STADIUM ROAD
Lab Number: L1722791
Project Number: 129379-004
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA
Matrix: Water
Date Collected: 07/05/17 14:45
Date Received: 07/05/17
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	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Arsenic, Total	0.00282		mg/l	0.00100	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Cadmium, Total	ND		mg/l	0.00020	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Chromium, Total	0.00420		mg/l	0.00100	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Copper, Total	0.00338		mg/l	0.00100	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Iron, Total	1.05		mg/l	0.050	--	1	07/10/17 10:15	07/10/17 16:34	EPA 3005A	19,200.7	PS
Lead, Total	0.00891		mg/l	0.00050	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Mercury, Total	ND		mg/l	0.00020	--	1	07/06/17 14:22	07/07/17 20:04	EPA 245.1	3,245.1	MG
Nickel, Total	0.00556		mg/l	0.00200	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Selenium, Total	0.0119		mg/l	0.00500	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Silver, Total	ND		mg/l	0.00040	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Zinc, Total	ND		mg/l	0.0100	--	1	07/10/17 10:15	07/11/17 12:54	EPA 3005A	3,200.8	BV
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	174		mg/l	0.660	NA	1	07/10/17 10:15	07/10/17 16:34	EPA 3005A	19,200.7	PS
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		07/11/17 12:54	NA	107,-	

Project Name: HARVARD STADIUM ROAD **Lab Number:** L1722791

Project Number: 129379-004 **Report Date:** 07/18/17

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: WG1020143-1										
Mercury, Total	ND		mg/l	0.00020	--	1	07/06/17 14:22	07/07/17 19:38	3,245.1	MG

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 Batch: WG1020951-1										
Antimony, Total	ND		mg/l	0.00400	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Arsenic, Total	ND		mg/l	0.00100	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Cadmium, Total	ND		mg/l	0.00020	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Chromium, Total	ND		mg/l	0.00100	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Copper, Total	ND		mg/l	0.00100	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Lead, Total	ND		mg/l	0.0010	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Nickel, Total	ND		mg/l	0.00200	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Selenium, Total	ND		mg/l	0.00500	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Silver, Total	ND		mg/l	0.00040	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV
Zinc, Total	ND		mg/l	0.01000	--	1	07/10/17 10:15	07/11/17 13:27	3,200.8	BV

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: WG1020954-1										
Iron, Total	ND		mg/l	0.050	--	1	07/10/17 10:15	07/10/17 15:42	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

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 Batch: WG1020954-1										
Hardness	ND		mg/l	0.660	NA	1	07/10/17 10:15	07/10/17 15:42	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1020143-2								
Mercury, Total	103		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1020951-2								
Antimony, Total	97		-		85-115	-		
Arsenic, Total	102		-		85-115	-		
Cadmium, Total	114		-		85-115	-		
Chromium, Total	103		-		85-115	-		
Copper, Total	107		-		85-115	-		
Lead, Total	103		-		85-115	-		
Nickel, Total	106		-		85-115	-		
Selenium, Total	102		-		85-115	-		
Silver, Total	103		-		85-115	-		
Zinc, Total	112		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1020954-2								
Iron, Total	106		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1020954-2								
Hardness	99		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

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: WG1020143-3 QC Sample: L1722194-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00108	**22**	Q	-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1020951-3 QC Sample: L1722688-01 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.534	107		-	-		70-130	-		20
Arsenic, Total	ND	0.12	0.132	110		-	-		70-130	-		20
Cadmium, Total	0.0005	0.051	0.06061	118		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.222	111		-	-		70-130	-		20
Copper, Total	0.106	0.25	0.368	105		-	-		70-130	-		20
Lead, Total	ND	0.51	0.566	111		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.553	111		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.127	106		-	-		70-130	-		20
Silver, Total	ND	0.05	0.0529	106		-	-		70-130	-		20
Zinc, Total	0.442	0.5	1.02	116		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

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: WG1020951-5 QC Sample: L1722903-01 Client ID: MS Sample										
Antimony, Total	0.03043	0.5	0.3029	**54**	Q	-	-	70-130	-	20
Arsenic, Total	0.1131	0.12	0.2412	107		-	-	70-130	-	20
Cadmium, Total	0.00656	0.051	0.06229	109		-	-	70-130	-	20
Chromium, Total	0.1014	0.2	0.3692	**134**	Q	-	-	70-130	-	20
Copper, Total	0.5527	0.25	0.9019	**140**	Q	-	-	70-130	-	20
Lead, Total	0.9419	0.51	1.611	**131**	Q	-	-	70-130	-	20
Nickel, Total	0.08601	0.5	0.6110	105		-	-	70-130	-	20
Selenium, Total	0.06692	0.12	0.2020	112		-	-	70-130	-	20
Silver, Total	0.00694	0.05	0.05199	90		-	-	70-130	-	20
Zinc, Total	1.387	0.5	2.003	123		-	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1020954-3 QC Sample: L1722903-01 Client ID: MS Sample										
Iron, Total	78.3	1	76.8	**0**	Q	-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1020954-3 QC Sample: L1722903-01 Client ID: MS Sample										
Hardness	1330	66.2	1320	**0**	Q	-	-	75-125	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1020143-4 QC Sample: L1722194-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1020951-4 QC Sample: L1722688-01 Client ID: DUP Sample						
Copper, Total	0.106	0.108	mg/l	2		20
Lead, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1020951-6 QC Sample: L1722903-01 Client ID: DUP Sample						
Antimony, Total	0.03043	0.03180	mg/l	4		20
Arsenic, Total	0.1131	0.1116	mg/l	1		20
Cadmium, Total	0.00656	0.00675	mg/l	3		20
Chromium, Total	0.1014	0.09839	mg/l	3		20
Copper, Total	0.5527	0.5413	mg/l	2		20
Lead, Total	0.9419	0.9216	mg/l	2		20
Nickel, Total	0.08601	0.08628	mg/l	0		20
Selenium, Total	0.06692	0.06789	mg/l	1		20
Silver, Total	0.00694	0.00660	mg/l	5		20
Zinc, Total	1.387	1.354	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1020954-4 QC Sample: L1722903-01 Client ID: DUP Sample						
Iron, Total	78.3	76.9	mg/l	2		20

INORGANICS
&
MISCELLANEOUS

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

SAMPLE RESULTS

Lab ID: L1722791-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 07/05/17 14:45
Date Received: 07/05/17
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	100		mg/l	5.0	NA	1	-	07/06/17 01:41	121,2540D	VB
Cyanide, Total	0.006		mg/l	0.005	--	1	07/06/17 09:45	07/10/17 15:12	121,4500CN-CE	LK
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	07/05/17 21:51	121,4500CL-D	AS
Nitrogen, Ammonia	0.401		mg/l	0.075	--	1	07/08/17 14:30	07/10/17 11:53	121,4500NH3-BH	JO
TPH, SGT-HEM	ND		mg/l	4.80	--	1.2	07/06/17 14:40	07/06/17 21:20	74,1664A	AW
Phenolics, Total	ND		mg/l	0.030	--	1	07/07/17 10:41	07/07/17 13:16	4,420.1	AW
Chromium, Hexavalent	ND		mg/l	0.010	--	1	07/06/17 00:15	07/06/17 00:24	1,7196A	VB
Anions by Ion Chromatography - Westborough Lab										
Chloride	225.		mg/l	50.0	--	100	-	07/08/17 23:45	44,300.0	JC

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1722791
Report Date: 07/18/17

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: WG1019893-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	07/05/17 21:51	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1019910-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	07/06/17 00:15	07/06/17 00:22	1,7196A	VB
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1019913-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	07/06/17 01:41	121,2540D	VB
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1020008-1										
Cyanide, Total	ND		mg/l	0.005	--	1	07/06/17 09:45	07/10/17 15:01	121,4500CN-CE	LK
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1020156-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	07/06/17 14:40	07/06/17 21:20	74,1664A	AW
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1020465-1										
Phenolics, Total	ND		mg/l	0.030	--	1	07/07/17 10:41	07/07/17 13:14	4,420.1	AW
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1020756-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	07/08/17 14:30	07/10/17 11:29	121,4500NH3-BH	JO
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1020880-1										
Chloride	ND		mg/l	0.500	--	1	-	07/08/17 17:27	44,300.0	JC

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1722791

Report Date: 07/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1019893-2								
Chlorine, Total Residual	109		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1019910-2								
Chromium, Hexavalent	98		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1020008-2								
Cyanide, Total	104		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1020156-2								
TPH	68		-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1020465-2								
Phenolics, Total	109		-		70-130	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1020756-2								
Nitrogen, Ammonia	95		-		80-120	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1020880-2								
Chloride	95		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

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 36(OW)_07032017	QC Batch ID: WG1019893-4		QC Sample: L1722791-01		Client ID: GP-SEC-							
Chlorine, Total Residual	ND	0.248	0.26	105		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 36(OW)_07032017	QC Batch ID: WG1019910-4		QC Sample: L1722791-01		Client ID: GP-SEC-							
Chromium, Hexavalent	ND	0.1	0.098	98		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01	QC Batch ID: WG1020008-4		QC Sample: L1722439-06		Client ID: MS Sample							
Cyanide, Total	ND	0.2	0.208	104		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01 36(OW)_07032017	QC Batch ID: WG1020156-4		QC Sample: L1722791-01		Client ID: GP-SEC-							
TPH	ND	21.1	14.1	67		-	-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 36(OW)_07032017	QC Batch ID: WG1020465-4		QC Sample: L1722791-01		Client ID: GP-SEC-							
Phenolics, Total	ND	0.4	0.44	109		-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01	QC Batch ID: WG1020756-4		QC Sample: L1722836-01		Client ID: MS Sample							
Nitrogen, Ammonia	ND	4	3.73	93		-	-		80-120	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01	QC Batch ID: WG1020880-3		QC Sample: L1722692-01		Client ID: MS Sample							
Chloride	10.6	4	14.0	**87**	Q	-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1019893-3 QC Sample: L1722791-01 Client ID: GP-SEC-36(OW)_07032017						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1019910-3 QC Sample: L1722791-01 Client ID: GP-SEC-36(OW)_07032017						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1019913-4 QC Sample: L1700007-26 Client ID: DUP Sample						
Solids, Total Suspended	ND	ND	mg/l	NC		29
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1020008-3 QC Sample: L1722439-05 Client ID: DUP Sample						
Cyanide, Total	ND	ND	mg/l	NC		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1020156-3 QC Sample: L1722680-01 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1020465-3 QC Sample: L1722791-01 Client ID: GP-SEC-36(OW)_07032017						
Phenolics, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1020756-3 QC Sample: L1722836-01 Client ID: DUP Sample						
Nitrogen, Ammonia	ND	ND	mg/l	NC		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1020880-4 QC Sample: L1722692-01 Client ID: DUP Sample						
Chloride	10.6	10.6	mg/l	0		18

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

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(*)
L1722791-01A	Plastic 250ml HNO3 preserved	A	<2	<2	2.5	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)
L1722791-01B	Plastic 250ml HNO3 preserved	A	<2	<2	2.5	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1722791-01C	Amber 1000ml Na2S2O3	A	7	7	2.5	Y	Absent		PCB-608(7)
L1722791-01D	Amber 1000ml Na2S2O3	A	7	7	2.5	Y	Absent		PCB-608(7)
L1722791-01E	Amber 1000ml unpreserved	A	7	7	2.5	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1722791-01F	Amber 1000ml unpreserved	A	7	7	2.5	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1722791-01G	Vial HCl preserved	A	N/A	N/A	2.5	Y	Absent		SUB-ETHANOL(14)
L1722791-01H	Vial HCl preserved	A	N/A	N/A	2.5	Y	Absent		SUB-ETHANOL(14)
L1722791-01I	Vial HCl preserved	A	N/A	N/A	2.5	Y	Absent		SUB-ETHANOL(14)
L1722791-01J	Vial Na2S2O3 preserved	A	NA		2.5	Y	Absent		504(14)
L1722791-01K	Vial Na2S2O3 preserved	A	NA		2.5	Y	Absent		504(14)
L1722791-01L	Vial HCl preserved	A	NA		2.5	Y	Absent		8260-SIM(14),8260(14)
L1722791-01M	Vial HCl preserved	A	NA		2.5	Y	Absent		8260-SIM(14),8260(14)
L1722791-01N	Vial HCl preserved	A	NA		2.5	Y	Absent		8260-SIM(14),8260(14)
L1722791-01O	Plastic 950ml unpreserved	A	7	7	2.5	Y	Absent		CL-300(28),HEXCR-7196(1),HOLD-WETCHEM(),TRC-4500(1)
L1722791-01P	Plastic 500ml H2SO4 preserved	A	<2	<2	2.5	Y	Absent		NH3-4500(28)
L1722791-01Q	Plastic 250ml NaOH preserved	A	>12	>12	2.5	Y	Absent		TCN-4500(14)
L1722791-01R	Plastic 250ml NaOH preserved	A	>12	>12	2.5	Y	Absent		TCN-4500(14)
L1722791-01S	Amber 1000ml HCl preserved	A	NA		2.5	Y	Absent		TPH-1664(28)
L1722791-01T	Amber 1000ml HCl preserved	A	NA		2.5	Y	Absent		TPH-1664(28)
L1722791-01U	Amber 1000ml H2SO4 preserved	A	<2	<2	2.5	Y	Absent		TPHENOL-420(28)

*Values in parentheses indicate holding time in days

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1722791
Report Date: 07/18/17

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1722791-01V	Plastic 950ml unpreserved	A	7	7	2.5	Y	Absent		TSS-2540(7)
L1722791-02A	Vial HCl preserved	A	NA		2.5	Y	Absent		HOLD-8260(14)
L1722791-02B	Vial HCl preserved	A	NA		2.5	Y	Absent		HOLD-8260(14)
L1722791-02C	Vial Na2S2O3 preserved	A	NA		2.5	Y	Absent		HOLD-504/8011(14)
L1722791-02D	Vial Na2S2O3 preserved	A	NA		2.5	Y	Absent		HOLD-504/8011(14)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD STADIUM ROAD	**Lab Number:**	L1722791
Project Number:	129379-004	**Report Date:**	07/18/17

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:	HARVARD STADIUM ROAD	**Lab Number:**	L1722791
Project Number:	129379-004	**Report Date:**	07/18/17

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:	HARVARD STADIUM ROAD	**Lab Number:**	L1722791
Project Number:	129379-004	**Report Date:**	07/18/17

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: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
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: 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, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **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.**

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1** Hg.

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 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: 7-5-17

ALPHA Job #: L1722791

Project Information
- Project Name: Harvard Stadium Road
- Project Location: Allston, MA
- Project #: 129379-004
- (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 #

H&A Information
- H&A Client: Harvard
- H&A Address: 465 Medford St, Boston, MA 0212-1400
- H&A Phone: 617-686-7400
- H&A Fax: bstraley@haleyaldrich.com
- H&A Email: cchristmas@haleyaldrich.com

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:

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	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	Total # of Bottles
22791-01	GP-SEC-36(OW)_07032017	7/5/17	1445	AQ	MJD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	22
-02	Trip Blanks	6/27	—	Aq	SM																	4

Sample Filtration: ☐ Done ☐ Lab to do
Preservation: ☐ Lab to do
(Please Specify below)

Sample Specific Comments: + dissolved metals (F.F.).

Tripblank HOLD

COC edits by Gina Hall AAL 7/6/17

26 TOTAL

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
	7/5/17		7/5/17 1630
	7/5/17 1632		7/5/17 1655
	7/5/17 1830		7/5/17 18:30

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)

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: 7-5-17

ALPHA Job #: L1722791

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: bstraley@haleyaldrich.com
H&A Email: cchristmas@haleyaldrich.com

Project Information
Project Name: Harvard Stadium Road
Project Location: Allston, MA
Project #: 129379-004
(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:

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.

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	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	Total # of Containers
22791-01	GP-SEC-36(OW)_07032017	7/5/17	1445	AQ	MJD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	22
-02	Trip Blanks	6/27	—	Aq	SM																	4

Sample Filtration
☐ Done ☐ Lab to do
Preservation ☐ Lab to do
(Please Specify below)

Sample Specific Comments
+ dissolved metals (FF).

26 TOTAL

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
	7/5/17		7/5/17 16:30
	7/5/17 1632		7/5/17 1655
	7/5/17 1830		7/5/17 18:30

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)

F-5
SUB UPS: Eurofins, PA

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL

Westborough, MA TEL 508-898-9220 FAX 508-898-9193
Mansfield, MA TEL 508-822-9300 FAX 508-822-3288

Date Rec'd in Lab:

ALPHA Job #: L1722791

Client Information

Client: Alpha Analytical Lab
Address: 8 Walkup Drive
Westborough, Ma 01581
Phone: 508-898-9220
Fax:
Email: subreports@alphalab.com

☐ These samples have been Previously analyzed by Alpha

Project Information

Project Name:
Project Location: MA
Project #:
Project Manager: Melissa Gulli
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

Report Information Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #

Regulatory Requirements/Report Limits

State/Fed Program | Criteria

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☐ No Are MCP Analytical Methods Required?
☐ Yes ☐ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:
Please reference Alpha Job # L1722791 on this report

ANALYSIS

SAMPLE HANDLING
Filtration
☐ Done
☐ Not Needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

Sample Specific Comments

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Ethanol	TOTAL # BOTTLES
	GP-SEC-36(OW)_07032017	7/5/17	14:45	AQ		X	1

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP *or* CT RCP?

Container Type	V												
Preservative	B												

Relinquished By:	Date/Time	Received By	Date/Time
AAL	7/10/17		

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

eurofins | Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Alpha Analytical, Inc.
145 Flanders Road
Westborough MA 01581

Report Date: July 18, 2017

Project: L1722791

Submittal Date: 07/11/2017
Group Number: 1823326
PO Number: L1722791
State of Sample Origin: MA

Client Sample Description	Lancaster Labs (LL) #
GP-SEC-36(OW)_07032017 Water Sample	9094776

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To	Alpha Analytical, Inc.	Attn: Melissa Gulli
Electronic Copy To	Alpha Analytical, Inc.	Attn: Sublab Contact

Respectfully Submitted,

Bonnie Stadelmann

Bonnie Stadelmann
Senior Project Manager

(312) 590-3133

eurofins | Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: GP-SEC-36(OW)_07032017 Water Sample
PMI Wastewaters

LL Sample # WW 9094776
LL Group # 1823326
Account # 09847

Project Name: L1722791

Collected: 07/05/2017 14:45

Submitted: 07/11/2017 08:25
Reported: 07/18/2017 11:18

Alpha Analytical, Inc.
145 Flanders Road
Westborough MA 01581

GPSEC

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
GC Miscellaneous	**EPA 1671 Rev A**		**ug/l**	**ug/l**	
02366	ethanol	64-17-5	N.D.	2,000	1

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02366	EPA 1671 VOCs	EPA 1671 Rev A	1	171930037A	07/12/2017 23:05	Tyler O Griffin	1

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Analysis Report

Quality Control Summary

Client Name: Alpha Analytical, Inc. Group Number: 1823326
Reported: 07/18/2017 11:18

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ
	ug/l	ug/l
Batch number: 171930037A	Sample number(s): 9094776	
ethanol	N.D.	2,000

LCS/LCSD

Analysis Name	LCS Spike Added	LCS Conc	LCSD Spike Added	LCSD Conc	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
	ug/l	ug/l	ug/l	ug/l					
Batch number: 171930037A	Sample number(s): 9094776								
ethanol	4010	3710.35	4010	3719.18	93	93	70-132	0	30

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc	MS Spike Added	MS Conc	MSD Spike Added	MSD Conc	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
	ug/l	ug/l	ug/l	ug/l	ug/l					
Batch number: 171930037A	Sample number(s): 9094776 UNSPK: P096158									
ethanol	1537.83	4010	5321.52	4010	5270.29	94	93	70-132	1	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EPA 1671 VOCs
Batch number: 171930037A

	Amyl Alcohol
9094776	94
Blank	93
LCS	103

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

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Analysis Report

Quality Control Summary

Client Name: Alpha Analytical, Inc. Group Number: 1823326
Reported: 07/18/2017 11:18

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EPA 1671 VOCs
Batch number: 171930037A

	Amyl Alcohol
LCSD	97
MS	98
MSD	100
Limits:	52-144

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

RS
SUB UPS: Eurofins, PA 9847 | 1823326 | 9094776

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL

Westborough, MA TEL 508-898-9220 FAX 508-898-9193
Mansfield, MA TEL 508-822-9300 FAX 508-822-3288

Date Rec'd in Lab:

ALPHA Job #: L1722791

Project Information

Project Name:

Project Location: MA

Project #:

Project Manager: Melissa Gulli

ALPHA Quote #:

Report Information Data Deliverables

☐ FAX ☐ EMAIL

☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client Info PO #:

Regulatory Requirements/Report Limits

State/Fed Program Criteria

Client Information

Client: Alpha Analytical Lab

Address: 8 Walkup Drive

Westborough, Ma 01581

Phone: 508-898-9220

Fax:

Email: subreports@alphalab.com

☐ These samples have been Previously analyzed by Alpha

Turn-Around Time

☒ Standard ☐ Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☐ No Are MCP Analytical Methods Required?

☐ Yes ☐ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:

Please reference Alpha Job # **L1722791** on this report.

ANALYSIS

SAMPLE HANDLING
Filtration
☐ Done
☐ Not Needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Ethanol	Sample Specific Comments	TOTAL # BOTTLES
	GP-SEC-36(OW)_07032017	7/5/17	14:45	AQ		X		1

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

Container Type	v														
Preservative	a														

Relinquished By:	Date/Time	Received By:	Date/Time
AAL	7/10/17		7-11-17 / 825

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

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Sample Administration Receipt Documentation Log

Doc Log ID: 188418

Group Number(s): 1823326

Client: Alpha Analytical

Delivery and Receipt Information

Delivery Method:	UPS	Arrival Timestamp:	07/11/2017 8:25
Number of Packages:	1	Number of Projects:	1

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	No	Sample Date/Times match COC:	Yes
Samples Chilled:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	0
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Timothy Cubberley (6520) at 08:42 on 07/11/2017

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT131	2.7	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mg**	milligram(s)
C	degrees Celsius	**mL**	milliliter(s)
cfu	colony forming units	**MPN**	Most Probable Number
CP Units	cobalt-chloroplatinate units	**N.D.**	none detected
F	degrees Fahrenheit	**ng**	nanogram(s)
g	gram(s)	**NTU**	nephelometric turbidity units
IU	International Units	**pg/L**	picogram/liter
kg	kilogram(s)	**RL**	Reporting Limit
L	liter(s)	**TNTC**	Too Numerous To Count
lb.	pound(s)	**µg**	microgram(s)
m3	cubic meter(s)	**µL**	microliter(s)
meq	milliequivalents	**umhos/cm**	micromhos/cm

< less than

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Laboratory Data Qualifiers:

C - Result confirmed by reanalysis
E - Concentration exceeds the calibration range
J (or G, I, X) - estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P - Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U - Analyte was not detected at the value indicated
V - Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference…
W - The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

ANALYTICAL REPORT

Lab Number:	L1724404
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Beck Straley
Phone:	(617) 886-7400
Project Name:	HARVARD STADIUM ROAD
Project Number:	129379-004
Report Date:	07/20/17

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).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1724404
Report Date: 07/20/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1724404-01	GP-SEC-36(OW)_07032017	WATER	ALLSTON, MA	07/05/17 14:45	07/05/17

Project Name: HARVARD STADIUM ROAD **Lab Number:** L1724404
Project Number: 129379-004 **Report Date:** 07/20/17

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.

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: Michelle M. Morris

Title: Technical Director/Representative Date: 07/20/17

METALS

Project Name: HARVARD STADIUM ROAD
Lab Number: L1724404
Project Number: 129379-004
Report Date: 07/20/17

SAMPLE RESULTS

Lab ID: L1724404-01
Client ID: GP-SEC-36(OW)_07032017
Sample Location: ALLSTON, MA
Matrix: Water
Date Collected: 07/05/17 14:45
Date Received: 07/05/17
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab											
Iron, Dissolved	0.375		mg/l	0.050	--	1	07/18/17 09:45	07/18/17 21:11	EPA 3005A	19,200.7	AB
Lead, Dissolved	0.0009		mg/l	0.0005	--	1	07/18/17 09:45	07/18/17 13:03	EPA 3005A	3,200.8	BV

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004
Lab Number: L1724404
Report Date: 07/20/17

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1023390-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	07/18/17 09:45	07/18/17 21:00	19,200.7	AB

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1023394-1										
Lead, Dissolved	ND		mg/l	0.0005	--	1	07/18/17 09:45	07/18/17 12:54	3,200.8	BV

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD STADIUM ROAD

Project Number: 129379-004

Lab Number: L1724404

Report Date: 07/20/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1023390-2								
Iron, Dissolved	106		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1023394-2								
Lead, Dissolved	107		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1724404
Report Date: 07/20/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 36(OW)_07032017 QC Batch ID: WG1023390-3 QC Sample: L1724404-01 Client ID: GP-SEC-												
Iron, Dissolved	0.375	1	1.42	104		-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 36(OW)_07032017 QC Batch ID: WG1023394-3 QC Sample: L1724404-01 Client ID: GP-SEC-												
Lead, Dissolved	0.0009	0.51	0.5434	106		-	-		70-130	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1724404
Report Date: 07/20/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1023390-4 QC Sample: L1724404-01 Client ID: GP-SEC-36(OW)_07032017						
Iron, Dissolved	0.375	0.370	mg/l	1		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1023394-4 QC Sample: L1724404-01 Client ID: GP-SEC-36(OW)_07032017						
Lead, Dissolved	0.0009	0.0009	mg/l	0		20

Project Name: HARVARD STADIUM ROAD
Project Number: 129379-004

Lab Number: L1724404
Report Date: 07/20/17

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(*)
L1724404-01A	Plastic 250ml HNO3 preserved	A	<2	<2	2.5	Y	Absent		FE-RI(180),PB-2008S(180)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD STADIUM ROAD	**Lab Number:**	L1724404
Project Number:	129379-004	**Report Date:**	07/20/17

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:	HARVARD STADIUM ROAD	**Lab Number:**	L1724404
Project Number:	129379-004	**Report Date:**	07/20/17

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

REFERENCES

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.

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: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
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: 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, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **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.**

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1** Hg.

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

Page 1 of 1

Date Rec'd in Lab: 7-5-17

ALPHA Job #: L1722791

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

H&A Information

H&A Client: Harvard

H&A Address: 465 Medford St, Boston, MA 0212-1400

H&A Phone: 617-686-7400

H&A Fax: [illegible]

H&A Email: [illegible]

Project Information

Project Name: Harvard Stadium Road

Project Location: Allston, MA

Project #: 129379-004

(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:

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	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 Specific Comments	Total # of Bottles
22791-01	GP-SEC-36(OW)_07032017	7/5/17	1445	AQ	MJR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	+ dissolved metals (F.F.).	22
-02	Trip Blanks	6/27	—	AQ	SM																		4

L1724404-01 only analyze for Dissolved Iron and Dissolved Lead (Field Filtered)

NPDES

Sample Filtration

☐ Done ☐ Lab to do

Preservation ☐ Lab to do

(Please Specify below)

26 TOTAL

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
[signature]	7/5/17	[signature]	7/5/17 1630
[signature]	7/5/17 1632	[signature]	7/5/17 1655
[signature]	7/5/17 1830	[signature]	7/5/17 18:30

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)