HALEY ALDRICH

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NPDES RGP APPLICATION FOR TEMPORARY CONSTRUCTION DEWATERING DISTRICT ENERGY FACILITY (DEF) HARVARD UNIVERSITY ALLSTON, MASSACHUSETTS

by Haley & Aldrich, Inc.
Boston, Massachusetts

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

File No. 129017-002
June 2017

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

29 June 2017
File No. 129017-002

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
District Energy Facility (DEF)
Harvard University
Allston, Massachusetts

Dear Ms. Puleo:

On behalf of our client, the President and Fellows of Harvard College acting by and through Harvard Engineering and Utilities (Harvard E&U), 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 Harvard District Energy Facility (DEF) site located off of Western Avenue in Allston, Massachusetts, herein referred to as the "Work Area".

A previous application was submitted for the DEF project on 6 February 2017 under the expired 2010 NPDES RGP; as such this discharge is considered an "existing discharge" under the 2017 NPDES RGP. Temporary construction dewatering began at the Work Area on 15 May 2017 under the administratively continued 2010 NPDES RGP. A copy of the 2017 Notice of Intent (NOI) is included in Appendix A. This application updates and supercedes information previously supplied for approval under the 2010 NPDES RGP.

A. GENERAL SITE DESCRIPTION

The location of the planned DEF is shown on Figure 1, Project Locus. The Work Area is a vacant portion of a larger property identified as 100 Western Avenue, and includes utility connections into Western Avenue to the north. The Work Area is bordered by Western Avenue and Harvard Business School to the north; by the Genzyme Facility at 500 Soldiers Field Road to the east; by the Interstate 90 on/off ramp to the southeast; by the former Sears property at 115 Cambridge Street to the southwest, and by the remainder of the 100 Western Avenue property to the west.

Dewatering is not anticipated to be required for construction of the main structure, but several project elements, including over-excavation of organic soils north of the building, a utility chase beneath the building slab, below ground fuel vaults located immediately west of the building, and certain utility connections will extend into groundwater. Excavation for the fuel vaults is anticipated to extend to approximately 14.5 feet below existing site grade, or approximately 10 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) to enable construction in-the-dry. Temporary construction dewatering began on 15 May 2017 and is estimated to occur intermittently over a period of approximately 11 months.

The planned DEF will be constructed within the limits of the Disposal Site associated with Release Tracking Number (RTN) 3-29441, currently in Phase V of the MCP. RTN 3-29441 is associated with chlorinated volatile organic compounds (CVOCs) in groundwater and CVOCs, petroleum hydrocarbons, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals in fill. Fill soils within the Work Area also contain asbestos-containing material (ACM) debris. A Release Abatement Measure (RAM) Plan was submitted to MassDEP on 17 February 2017. A Non-Traditional Asbestos Abatement Work Plan (NTWP) was submitted to MassDEP on 17 February 2017 and was approved on 14 April 2017.

Ongoing remediation in association with RTN 3-29441 has indicated decreasing levels of CVOCs in groundwater within the Work Area. Additionally, groundwater (source water) sampling conducted in association with the DEF project has indicated non-detect levels of CVOCs. Sampling for volatile organic compounds (VOCs) has been and will continue to be included in compliance sampling, and additional treatment (granular activated carbon) will be added to the treatment system if necessary for dewatering effluent to meet NPDES discharge limitations.

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 2,000 feet upstream of Outfall SDO 041 and approximately 4,000 feet upstream of the Charles River Chamber Outfall. 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 24 May 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. 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, groundwater samples were obtained from observation well DEF-A2-OW in October and December 2016 and April 2017. The groundwater samples were submitted to Alpha Analytical, Inc. of Westborough, Massachusetts (Alpha Analytical) for analysis of VOCs, SVOCs, total metals, ethanol, pH, PCBs, chloride, total residual chlorine, total, free, and physiologically available cyanide, ammonia nitrogen, total phenolics, total suspended solids (TSS) and total petroleum hydrocarbons (TPH). To evaluate possible interferences due to preservation, total cyanide was analyzed from an unpreserved and a sample preserved with sodium hydroxide.

As this discharge is considered an existing discharge, the influent compliance samples collected at the Work Area to date were also used to calculate the effluent limitations. Compliance sampling conducted at the Work Area to date has included VOCs, total metals (arsenic, total chromium, copper, iron, lead, nickel, and zinc), TSS, total and free cyanide, pH, ammonia nitrogen, TPH, chloride, and temperature. The highest detected concentrations of compounds analyzed were used to calculate effluent limitations. 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 near the Work Area that discharge into the Charles River. The proposed discharge routes are 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 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, as 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. A copy of the Contractor's proposed water treatment schematic for the proposed additional systems is included in Appendix C.

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

Approval for temporary construction dewatering and use of stormwater drain lines has also been obtained with the Department of Conservation and Recreation (DCR), the Boston Water and Sewer Commission, and Massachusetts Department of Transportation (MassDOT). Copies of the approvals are provided in Appendix F.

Owner and operation information are provided below for reference:

Owner:
President and Fellows of Harvard College
c/o Engineering and Utilities
46 Blackstone Street
Cambridge, MA
Attn: Matthew Ali

Operator:
Bond Brothers
145 Spring Street
Everett, MA 02149
Attn: Steve Liechti

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
Senior Scientist

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 Routes
- 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 Approved Access and Construction Dewatering Permits
- Appendix G – Laboratory Data Reports

c: Harvard Planning & Project Management; Matthew Ali
Harvard Environmental Health & Safety; Bree Carlson, Kelly McQueeney
Bond Brothers; Attn: Steven Liechti

TABLES

TABLE I
SUMMARY OF SOURCE WATER QUALITY DATA
DISTRICT ENERGY FACILITY
HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS
FILE NO. 129017-001

LOCATION	2017 NPDES RGP	DEF-A2-OW	DEF-A2-OW PRESERVED	DEF-A2-OW UNPRESERVED	DEF-A2-OW-20170420	HA17-DEF_INF	HA17-DEF_INF	2017-0519-DEF-INFLUENT
SAMPLING DATE	Freshwater Criteria for Activity Category III-G with Dilution	10/28/2016	12/7/2016	12/7/2016	4/20/2017	5/15/2017	5/17/2017	5/19/2017
LAB SAMPLE ID		L1635028-01 L1635035-01 L1637400-01	L1639588-01	L1639588-02	L1712551-01	L1715808-01	L1716160-02	L1716556-01
Volatile Organic Compounds (ug/L)								
1,2,4-Trimethylbenzene	NA	ND(2.5)	-	-	-	ND(2.5)	0.78 J	-
1,3,5-Trimethylbenzene	NA	ND(2.5)	-	-	-	ND(2.5)	0.17 J	-
Acetone	7970	ND(5)	-	-	-	1.9 J	2.9 J	-
Isopropylbenzene	NA	ND(0.5)	-	-	-	ND(0.5)	0.19 J	-
Naphthalene	NA	ND(2.5)	-	-	-	ND(2.5)	14	-
Total BTEX	100	ND	-	-	-	ND	ND	-
Total VOCs	NA	ND	-	-	-	1.9	18.04	-
Volatile Organic Compounds by SIM (ug/L)								
1,4-Dioxane	200	ND(3)	-	-	-	-	-	-
Semivolatile Organic Compounds (ug/L)								
Total Phthalates	190	ND	-	-	-	-	-	-
Total SVOCs	NA	ND	-	-	-	-	-	-
Semivolatile Organic Compounds by SIM (ug/L)								
Total Group I PAHs	1	ND	-	-	-	-	-	-
Total Group II PAHs	100	ND	-	-	-	-	-	-
Total SVOCs by SIM	NA	ND	-	-	-	-	-	-
Microextractables (ug/L)								
1,2-Dibromoethane	NA	ND(0.01)	-	-	-			
Total Metals (ug/L)								
Antimony	206	ND(4)	-	-	-	-	-	-
Arsenic	104	2.44	-	-	-	3.51	1.58	-
Cadmium	10.2	ND(1)	-	-	-	-	-	-
Total Chromium	323	1.76	-	-	-	3.26	2.43	-
Trivalent Chromium	323	ND(10)	-	-	-	-	-	-
Hexavalent Chromium	323	ND(10)	-	-	-	-	-	-
Copper	242	12.61	-	-	-	24.73	5.49	-
Iron	5000	266	-	-	-	**11500**	**7560**	**8090**
Lead	160	3.3	-	-	-	89.72	20.87	-
Mercury	0.739	ND(0.2)	-	-	-	-	-	-
Nickel	1450	2.31	-	-	-	4.31	2.33	-
Selenium	235.8	ND(5)	-	-	-	-	-	-
Silver	35.1	ND(1)	-	-	-	-	-	-
Zinc	420	61.04	-	-	-	73.24	21.9	-
Dissolved Metals (ug/L)								
Copper	NA	11.84	-	-	-	-	-	-
Lead	NA	0.86	-	-	-	-	-	-
Alcohols (ug/L)								
Ethyl Alcohol	Monitor Only	ND(2000)	-	-	-	-	-	-
Polychlorinated Biphenyls (ug/L)								
Total PCBs	0.000064	ND	-	-	-	-	-	-
Other								
Hardness (ug/L)	NA	80800	-	-	-	-	-	-
Chloride (ug/L)	Monitor Only	8550	-	-	-	35900	100000	-
Total Residual Chlorine (ug/L)	200	ND(20)	-	-	-	-	-	-
Total Cyanide (ug/L)	178	75	ND(5)	ND(5)	-	4 J	2 J	-
Free Cyanide (ug/L)	NA	-	ND(2)	-	-	1.32 J	ND(2)	-
Physiologically Available Cyanide (ug/L)	NA	-	ND(5)	-	-	-	-	-
Ammonia Nitrogen (ug/L)	Monitor Only	ND(75)	-	-	-	946	1590	-
pH (SU)	6.5 - 8.3	-	-	-	6.9	7.2	7	-
Total Phenolics (ug/L)	NA	ND(30)	-	-	-	-	-	-
Total Suspended Solids (ug/L)	30000	12000	-	-	-	**100000**	**130000**	**110000**
Total Petroleum Hydrocarbon (ug/L)	5000	ND(4000)	-	-	-	**ND(5200)**	ND(4000)	-

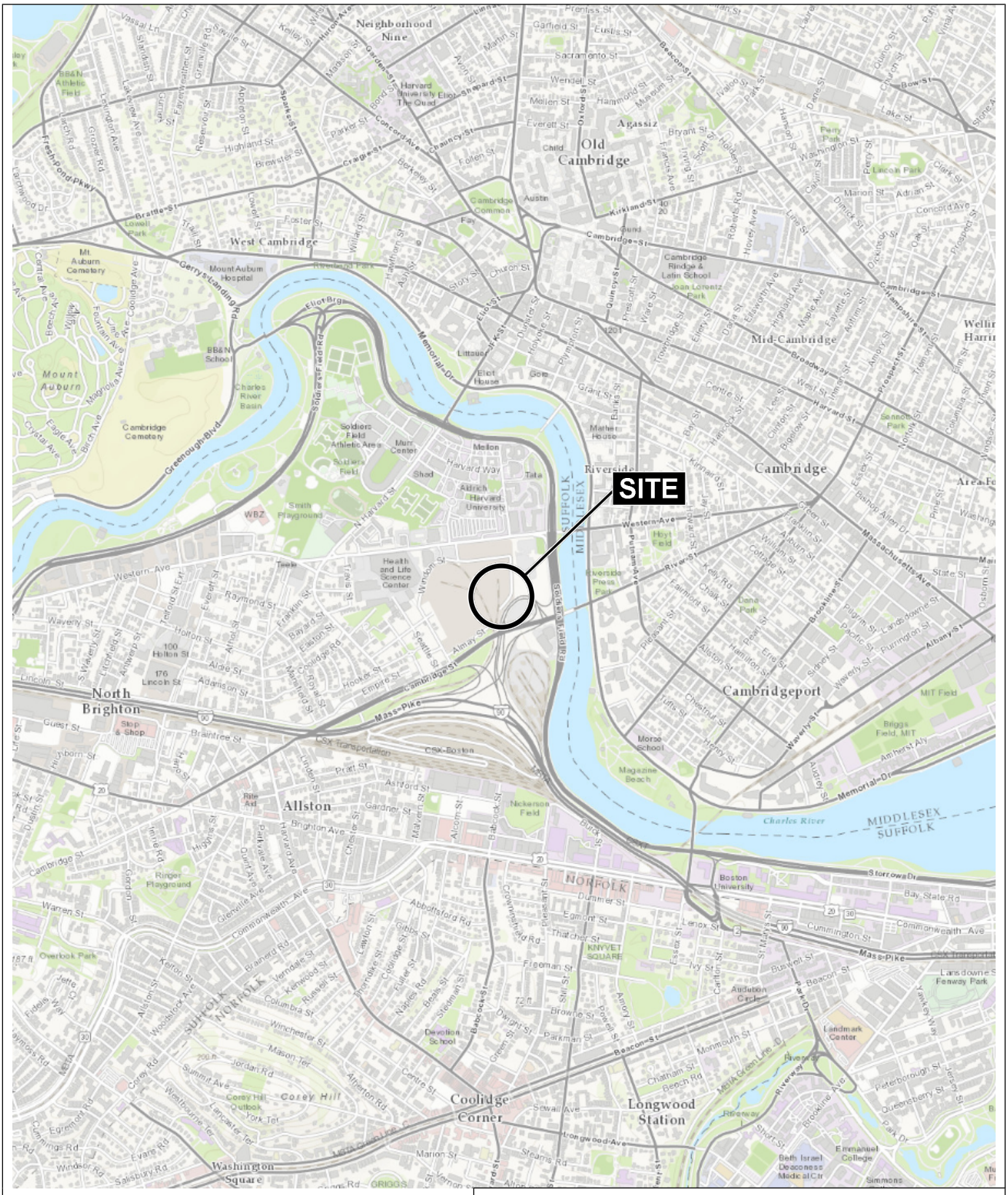
Notes & Abbreviations:
ug/L: micrograms per liter
ND (1.0): not detected, value is the reporting limit
NA: not available, no applicable standard
J: Estimated value; analyte reported below laboratory reporting limit but above method detection limit.
1. Only compounds detected at least once on the dates indicated for VOCs, SVOCs, and
2. Group I PAHs, Group II PAHs, total Phthlates, and BTEX compounds are limited by the total values.
3. Total BTEX defined as sum of Benzene, Toluene, Ethylbenzene, and total Xylenes.
4. Total phthalates defined as sum of individual phthalate compounds, with the exception of Bis(2-ethylhexyl)phthalate.
5. Dilution factor of 74.6 used to establish applicable criteria.
6. **Bold** values indicate an exceedance of applicable 2017 NPDES RGP Criteria.

TABLE II
SUMMARY OF RECEIVING WATER QUALITY DATA
DISTRICT ENERGY FACILITY
HARVARD UNIVERSITY
ALLSTON, MASSACHUSETTS
FILE NO. 129017-001

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°21'42"N, 71°7'14"W

N

HALEY ALDRICH

DISTICT ENERGY FACILITY
HARVARD UNIVERSITY
WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
JUNE 2017

FIGURE 1

129017-001 A004.PDF

PROPOSED DISCHARGE ROUTE 2

PROPOSED OUTFALL SDO 041

APPROXIMATE LOCATION OF CATCH BASINS PROPOSED FOR DEWATERING EFFLUENT DISCHARGE

APPROXIMATE LOCATION OF TREATMENT SYSTEM

PROPOSED DISCHARGE ROUTE 1

PROPOSED OUTFALL CHARLES RIVER CHAMBER OUTFALL

Proposed Discharge Route

Work Area

DISTRICT ENERGY FACILITY
HARVARD UNIVERSITY
WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROPOSED DISCHARGE ROUTES

SCALE: AS SHOWN
JUNE 2017

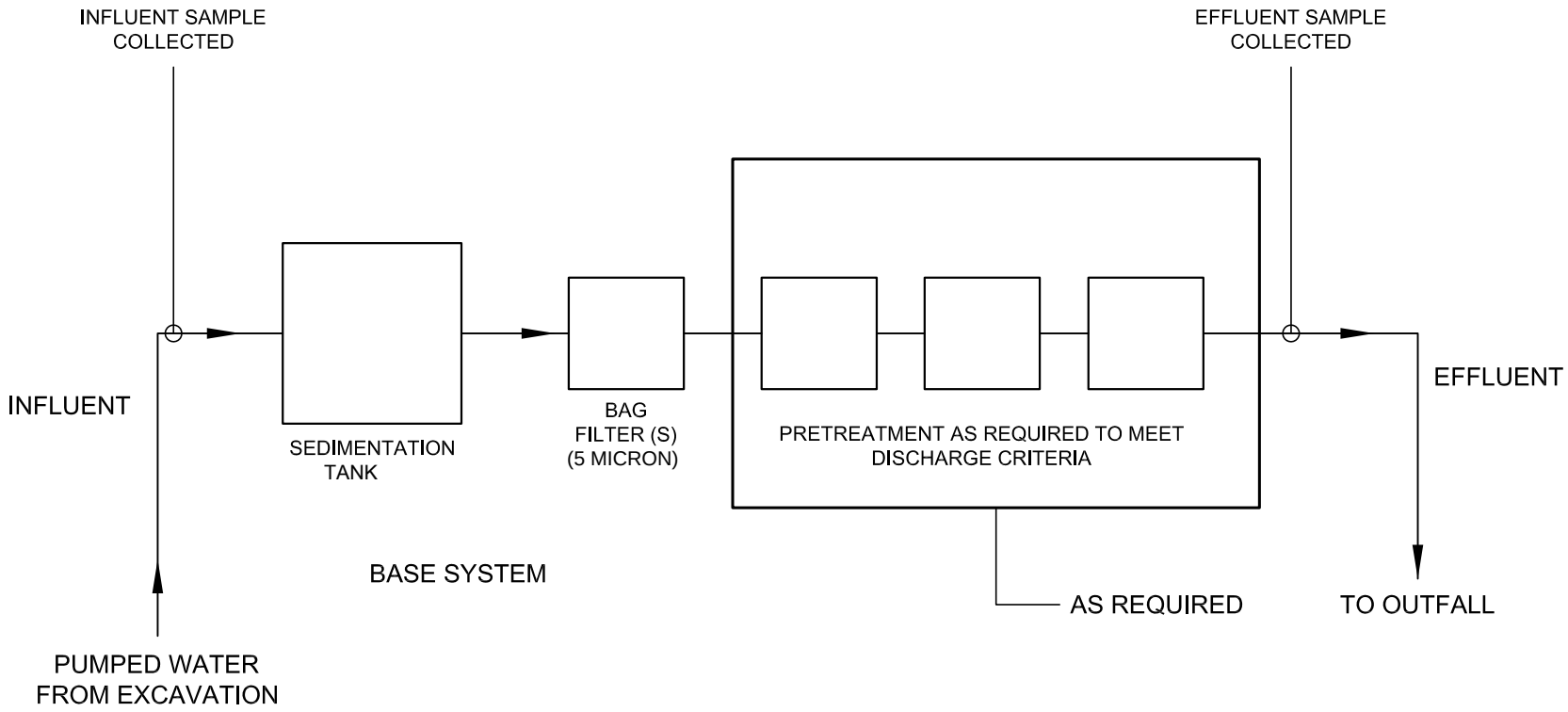
FIGURE 2

\\BOS\common\43074 DEF\129017-002 Dewatering\RGP\figures\Figure 2.pdf
bstraley

BOSTON WATER AND SEWER

N W E S

100 50 0 100 200 300 Feet
1 inch = 100 feet



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

DISTRICT ENERGY FACILITY
HARVARD UNIVERSITY
WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROPOSED TREATMENT SYSTEM SCHEMATIC

SCALE: NONE
JUNE 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:
District Energy Facility</td><td colspan="3">Site address: 100 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: Matthew Ali</td></tr>
<tr><td colspan="2">Telephone: 617-945-4928</td><td>Email: matthew_ali@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: 02163</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Bond Brothers</td><td colspan="3">Contact Person: Steven Liechti</td></tr>
<tr><td colspan="2">Telephone: 617-387-3400</td><td>Email: sliechti@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):
3-29441
☐ 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: 5/24/2017

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: VOCs, metals (As,Cd,Cr,Cu,Fe,Pb,Ni,Zn), 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 041 Charles River Chamber Outfall	Outfall location(s): (Latitude, Longitude) 42.364447, -71.117527 42.357434, -71.117928
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): 5/2017 through 3/2018 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="5">☐ I – Petroleum-Related Site Remediation
☐ II – Non-Petroleum-Related Site Remediation
■ III – Contaminated Site Dewatering
☐ IV – Dewatering of Pipelines and Tanks
☐ V – Aquifer Pump Testing
☐ VI – Well Development/Rehabilitation
☐ VII – Collection Structure Dewatering/Remediation
☐ VIII – Dredge-Related Dewatering</td><td colspan="2">a. If Activity Category I or II: (check all that apply)

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

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

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		✔	3	4500NH3	22	1,590	870.3	Report mg/L	---
Chloride		✔	3	300.0	839	100,000	48,150	Report µg/l	---
Total Residual Chlorine	✔		1	4500CL-D	20	0	0	0.2 mg/L	821 ug/L
Total Suspended Solids		✔	4	2540D	5000	130,000	88,000	30 mg/L	---
Antimony	✔		1	200.8	4	0	0	206 µg/L	47,751 ug/L
Arsenic		✔	3	200.8	0.16	3.51	2.51	104 µg/L	746 ug/L
Cadmium	✔		1	200.8	1	0	0	10.2 µg/L	13.3517 ug/L
Chromium III		✔	4	200.8	0.17	3.26	2.48	323 µg/L	4,070.4 ug/L
Chromium VI	✔		1	7196A	10	0	0	323 µg/L	852.9 ug/L
Copper		✔	3	200.8	0.38	24.73	14.28	242 µg/L	432.0 ug/L
Iron		✔	4	200.7	9	11,500	6,854	5,000 µg/L	74,571 ug/L
Lead		✔	3	200.8	0.34	89.72	37.96	160 µg/L	116.63 ug/L
Mercury	✔		1	245.1	0.2	0	0	0.739 µg/L	67.59 ug/L
Nickel		✔	3	200.8	0.55	4.31	2.98	1,450 µg/L	2,426.9 ug/L
Selenium	✔		1	200.8	5	0	0	235.8 µg/L	373.1 ug/L
Silver	✔		1	200.8	1	0	0	35.1 µg/L	108.1 ug/L
Zinc		✔	3	200.8	3.41	73.24	52.06	420 µg/L	5,570.5 ug/L
Cyanide		✔	5	4500CN	1	75	18.2	178 mg/L	388.0 ug/L
B. Non-Halogenated VOCs									
Total BTEX	✔		3	8260C	NA	0	0	100 µg/L	---
Benzene	✔		3	8260C	0.16	0	0	5.0 µg/L	---
1,4 Dioxane	✔		1	8260CSIM	3	0	0	200 µg/L	---
Acetone		✔	3	8260C	1.5	5	3.27	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	✔		3	8260C	0.13	0	0	4.4 µg/L	119.4 ug/L
1,2 Dichlorobenzene	✔		3	8260C	0.18	0	0	600 µg/L	---
1,3 Dichlorobenzene	✔		3	8260C	0.19	0	0	320 µg/L	---
1,4 Dichlorobenzene	✔		3	8260C	0.19	0	0	5.0 µg/L	---
Total dichlorobenzene	✔							763 µg/L in NH	---
1,1 Dichloroethane	✔		3	8260C	0.21	0	0	70 µg/L	---
1,2 Dichloroethane	✔		3	8260C	0.13	0	0	5.0 µg/L	---
1,1 Dichloroethylene	✔		3	8260C	0.17	0	0	3.2 µg/L	---
Ethylene Dibromide	✔		3	8260C	0.19	0	0	0.05 µg/L	---
Methylene Chloride	✔		3	8260C	0.68	0	0	4.6 µg/L	---
1,1,1 Trichloroethane	✔		3	8260C	0.16	0	0	200 µg/L	---
1,1,2 Trichloroethane	✔		3	8260C	0.14	0	0	5.0 µg/L	---
Trichloroethylene	✔		3	8260C	0.18	0	0	5.0 µg/L	---
Tetrachloroethylene	✔		3	8260C	0.18	0	0	5.0 µg/L	246.2 ug/L
cis-1,2 Dichloroethylene	✔		3	8260C	0.19	0	0	70 µg/L	---
Vinyl Chloride	✔		3	8260C	0.07	0	0	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✔							190 µg/L	
Diethylhexyl phthalate	✔		1	8270D	3	0	0	101 µg/L	164.1 ug/L
Total Group I PAHs	✔							1.0 µg/L	---
Benzo(a)anthracene	✔		1	8270DSIM	0.20	0	0	As Total PAHs	0.2835 ug/L
Benzo(a)pyrene	✔		1	8270DSIM	0.20	0	0		0.2835 ug/L
Benzo(b)fluoranthene	✔		1	8270DSIM	0.20	0	0		0.2835 ug/L
Benzo(k)fluoranthene	✔		1	8270DSIM	0.20	0	0		0.2835 ug/L
Chrysene	✔		1	8270DSIM	0.20	0	0		0.2835 ug/L
Dibenzo(a,h)anthracene	✔		1	8270DSIM	0.20	0	0		0.2835 ug/L
Indeno(1,2,3-cd)pyrene	✔		1	8270DSIM	0.20	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	✔							100 µg/L	---
Naphthalene		✔	3	8260C	0.22	14	4.8	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	✔		3	1664A	1,610	0	0	5.0 mg/L	---
Ethanol	✔		2	8260C	250/2000	0	0	Report mg/L	---
Methyl-tert-Butyl Ether	✔		3	8260C	0.17	0	0	70 µg/L	1,492 ug/L
tert-Butyl Alcohol	✔		3	8260C	1.4	0	0	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		3	8260C	0.28	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		✔	3	4500H+	NA	7.2	7.0		
Hardness		✔	1	200.7	660	80800	80800		
Free Cyanide		✔	3	9016	0.544	1.32	1.66		
Isopropylbenzene		✔	3	8260C	0.19	0.19	0.40		
1,3,5-Trimethylbenzene		✔	3	8260C	0.17	0.17	1.72		
1,2,4-Trimethylbenzene		✔	3	8260C	0.19	0.78	1.93		
Copper, dissolved		✔	1	6020A	1	11.84	11.84		
Lead, dissolved		✔	1	6020A	0.5	0.86	0.86		

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

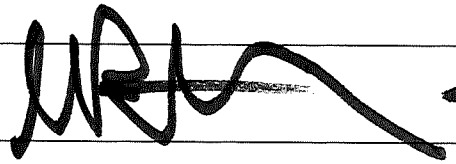
Has the operator attached the certification requirement for the Best Management Practices Plan (BMPP)? (check one): ■ Yes ☐ No

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: 

Date: 22 JAN '17

Print Name and Title: Matthew Ali

J. Certification requirement

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

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

BMPP certification statement:

Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ☐ No ■
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐ NA ☐
Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission.	Check one: Yes ■ No ☐ NA ☐
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	Check one: Yes ☐ No ☐ NA ■

Signature: Date: 6/26/17

Print Name and Title: Steven Liechti

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	13.3517	µg/L		
Chromium III	**323**	µg/L	4070.4	µg/L		
Chromium VI	**323**	µg/L	632.3	µg/L		
Copper	**242**	µg/L	432.0	µg/L		
Iron	**5000**	µg/L	34714	µg/L		
Lead	**160**	µg/L	116.63	µg/L		
Mercury	**0.739**	µg/L	67.59	µg/L		
Nickel	**1450**	µg/L	2426.9	µg/L		
Selenium	**235.8**	µg/L	373.1	µg/L		
Silver	**35.1**	µg/L	108.1	µg/L		
Zinc	**420**	µg/L	5570.5	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

↓

80.8	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**
1.59	Ammonia in **mg/L**
0	Antimony in **µg/L**
3.51	Arsenic in **µg/L**
0	Cadmium in **µg/L**
3.26	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
24.73	Copper in **µg/L**
11500	Iron in **µg/L**
89.72	Lead in **µg/L**
0	Mercury in **µg/L**
4.31	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
73.24	Zinc in **µg/L**
75	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

HALEY & ALDRICH, INC.		**CALCULATIONS**	FILE NO.	129017-002	
			SHEET	1 of 1	
CLIENT	HARVARD COLLEGE ACTING BY AND THROUGH E&U		DATE	23-May-17	
PROJECT	DISTRICT ENERGY FACILITY		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.

Christmas, Elizabeth

From: Vakalopoulos, Catherine (DEP) <Catherine.Vakalopoulos@MassMail.State.MA.US>
Sent: Wednesday, May 24, 2017 12:04 PM
To: Christmas, Elizabeth
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Thanks for explaining. No, you don't have to update your calculations. I have confirmed that the 7Q10 of 15.9 MGD and dilution factor of 74.6 are correct. You are all set.
Take care,
Cathy

From: Christmas, Elizabeth [mailto:EChristmas@haleyaldrich.com]
Sent: Wednesday, May 24, 2017 12:00 PM
To: Vakalopoulos, Catherine (DEP)
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

We are assuming 50 gpm with peak flows up to 150 gpm. I can update the calculations if you would prefer baseflow.

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

From: Vakalopoulos, Catherine (DEP) [mailto:Catherine.Vakalopoulos@MassMail.State.MA.US]
Sent: Wednesday, May 24, 2017 11:58 AM
To: Christmas, Elizabeth <EChristmas@haleyaldrich.com>
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Liz,
Yes, I see that the 7Q10 doesn't change between the two locations. Last question – is the assumed flow rate of 150 gpm the design flow?
Cathy

From: Christmas, Elizabeth [mailto:EChristmas@haleyaldrich.com]
Sent: Wednesday, May 24, 2017 11:39 AM
To: Vakalopoulos, Catherine (DEP)
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Cathy,
Yes, the lat/long is a little bit downstream of one of the two outfall locations we are proposing (this outfall is located downstream of the project site). I also ran the StreamStats program with a point just upstream of the second outfall location (upstream of the project site); it yielded the same 7Q10 value. Attached is the report for reference. If you would prefer, I can run the report again closer to the outfall location.

Thank you,
Liz

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

From: Vakalopoulos, Catherine (DEP) [mailto:Catherine.Vakalopoulos@MassMail.State.MA.US]
Sent: Wednesday, May 24, 2017 11:31 AM
To: Christmas, Elizabeth <EChristmas@haleyaldrich.com>
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Quick question. I noticed that the lat/long you used is for a location on the Charles is further downstream from Western Ave. Is this where the storm drain outfall is? Just checking because I've had instances where an incorrect lat/long was used.

From: Christmas, Elizabeth [mailto:EChristmas@haleyaldrich.com]
Sent: Tuesday, May 23, 2017 2:12 PM
To: Vakalopoulos, Catherine (DEP)
Cc: Straley, Beck
Subject: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation

Hi Cathy,

As required in Appendix V of the 2016 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:
District Energy Facility (DEF)
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

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

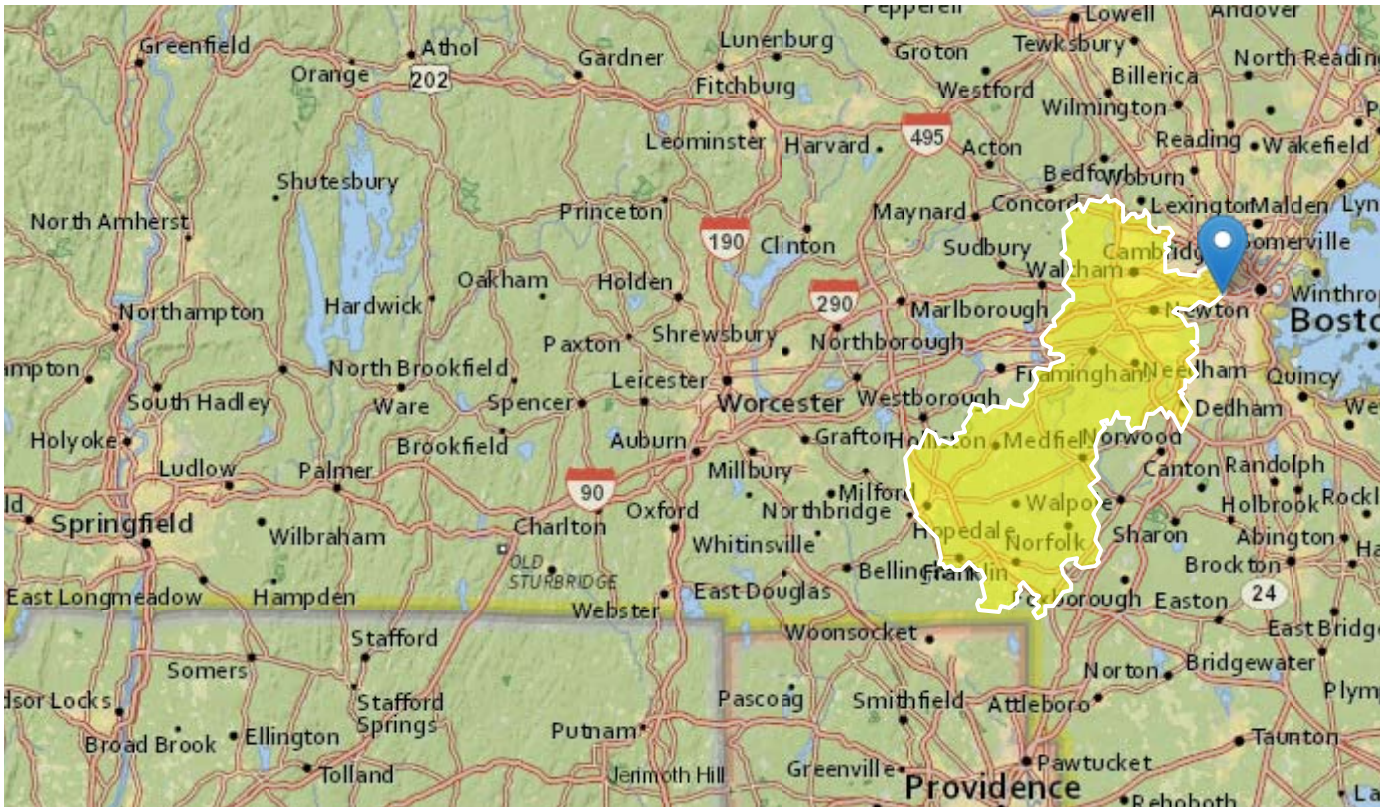
Haley & Aldrich, Inc.
465 Medford Street | Suite 2200
Boston, MA 02129-1400

T: (617) 886-7581
C: (978) 621-9611

www.haleyaldrich.com

StreamStats Report

Region ID:
MA
Workspace ID:
MA20170523090623780000
Clicked Point (Latitude, Longitude):
42.35328, -71.11349
Time:
2017-05-23 11:08:56 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	282	square miles
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
BSLDEM250	Mean basin slope computed from 1:250K DEM	2.33	percent

Low-Flow Statistics Parameters [100 Percent (282 square miles) Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	282	square miles	1.61	149
DRFTPERSTR	Stratified Drift per Stream Length	0.23	square mile per mile	0	1.29
BSLDEM250	Mean Basin Slope from 250K DEM	2.33	percent	0.32	24.6
MAREGION	Massachusetts Region	0	dimensionless	0	1

Low-Flow Statistics Disclaimers [100 Percent (282 square miles) 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 [100 Percent (282 square miles) 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

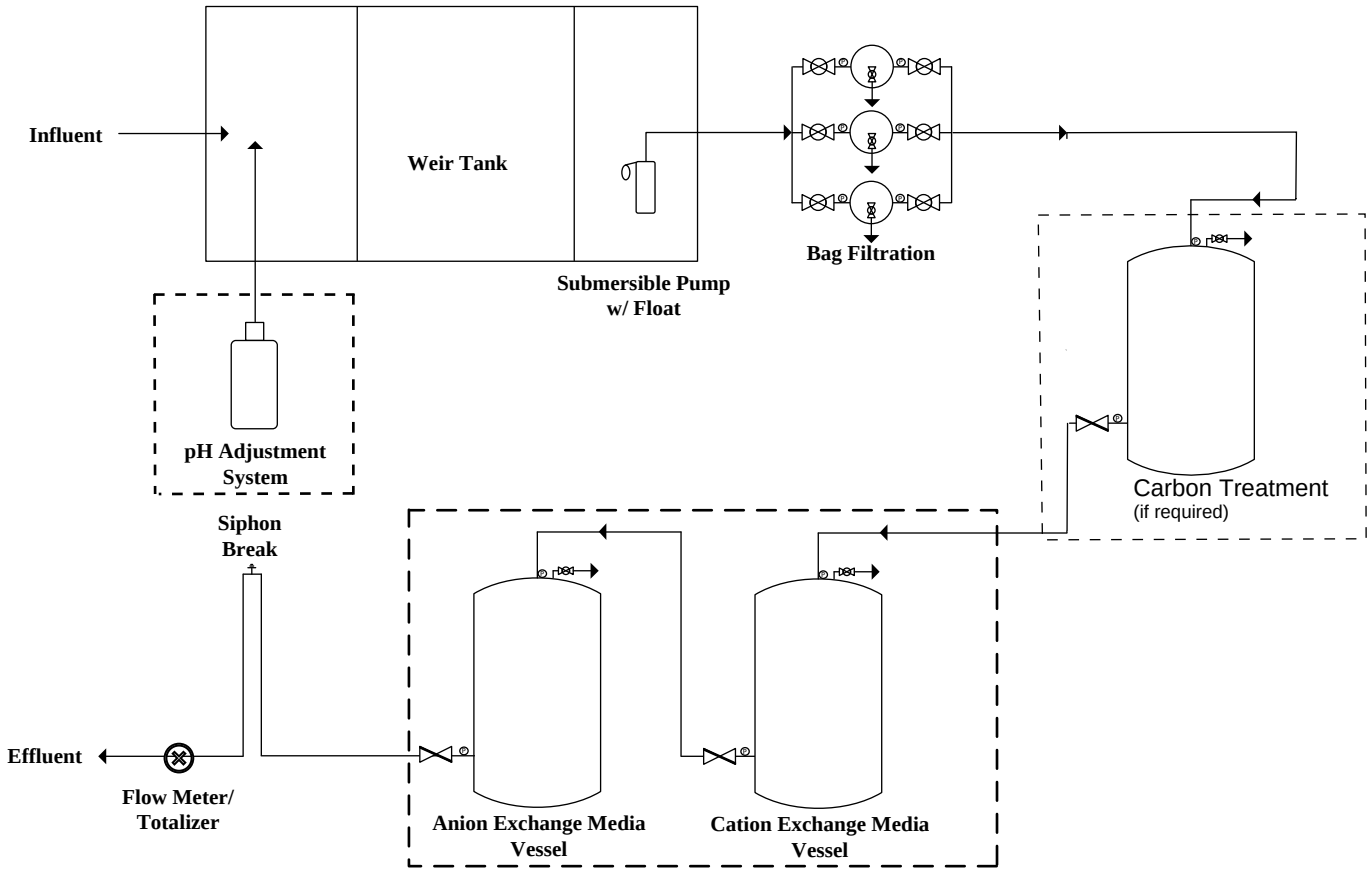
Low-Flow Statistics Citations

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

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

Harvard District Energy Facility Building
12 Western Avenue
Allston, Massachusetts

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.

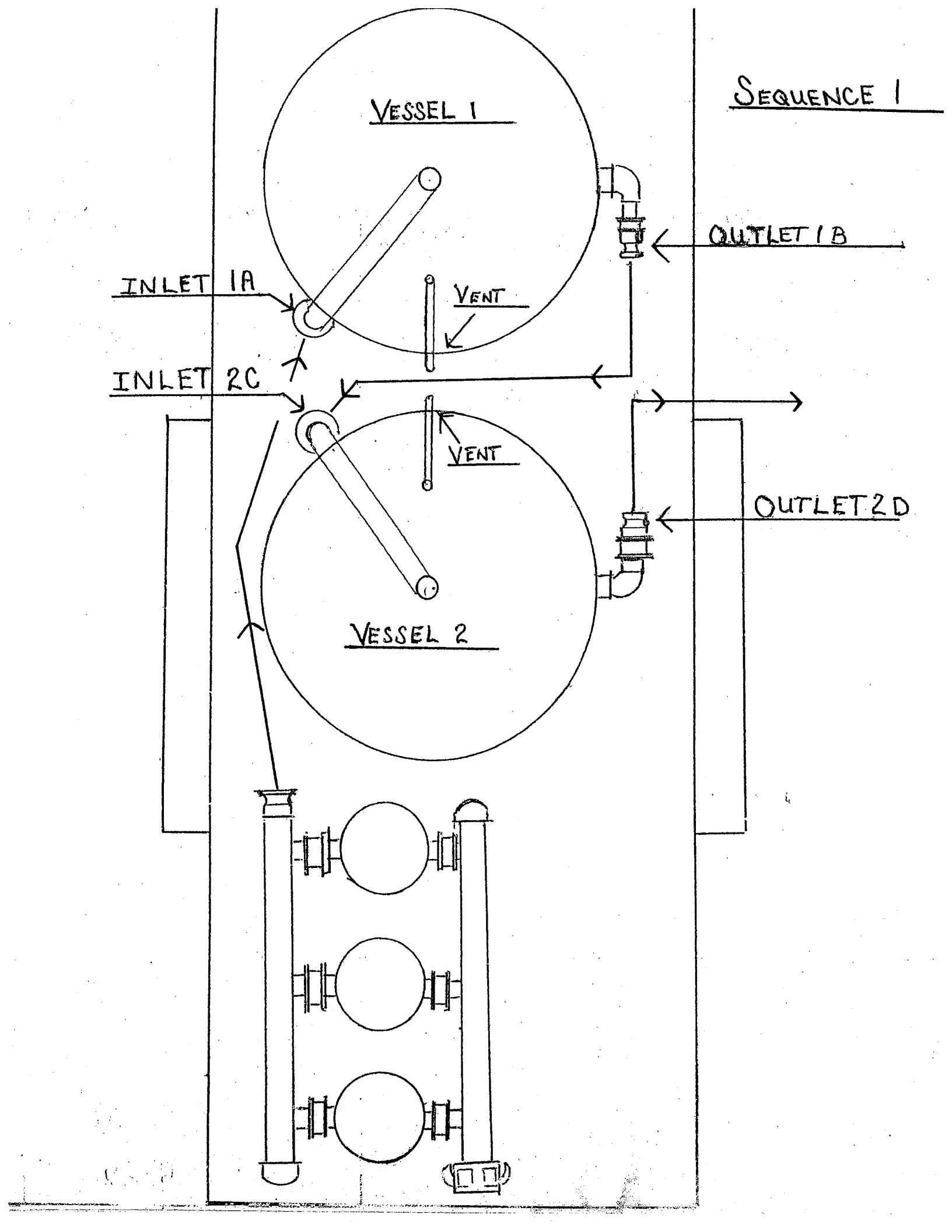
The system is mounted on a 12,230lb GVWR / 9600lb LC equipment hauler manufactured by Superior Trailers of Georgia. The main frame is 7" channel with two (2) 6000lb brake axles. There are four (4) 12000lb drop leg jackets with one mounted in each corner of the trailer. The combined dry weight of the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

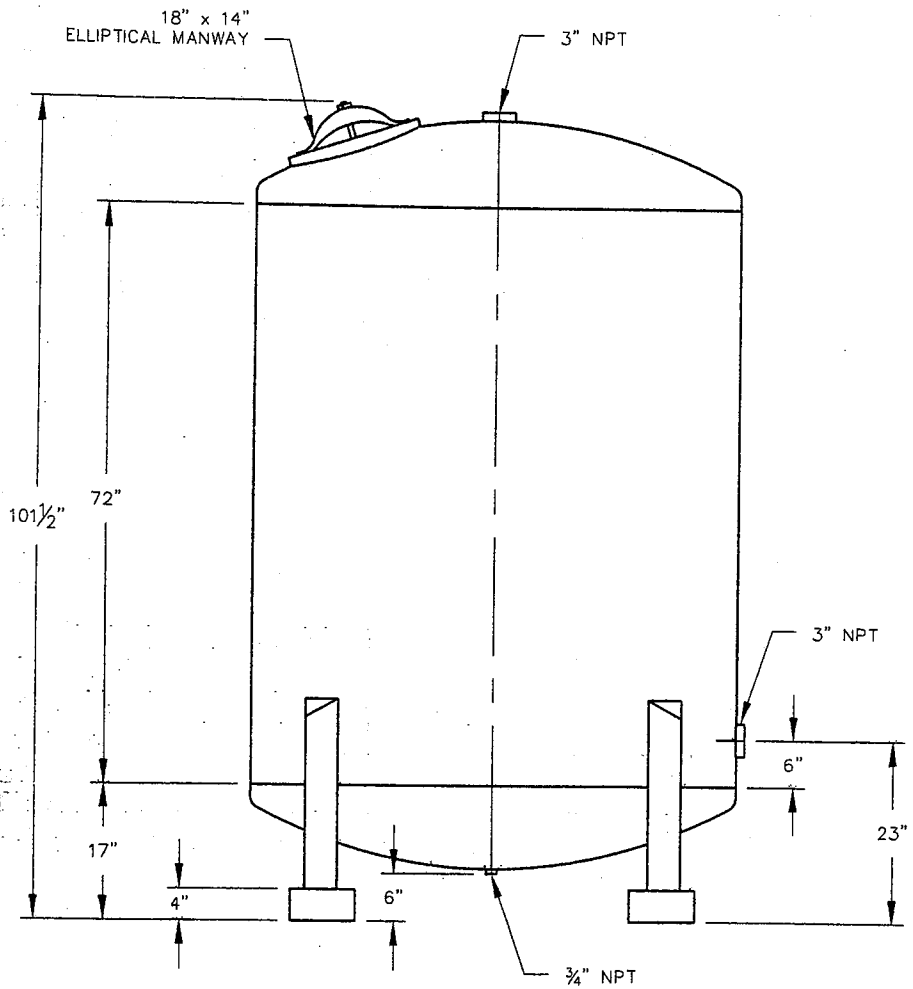
1) Superior Trailers 12,232lb GVWR trailer equipped with two (2) 6000lb AXIS Products brake axles.

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

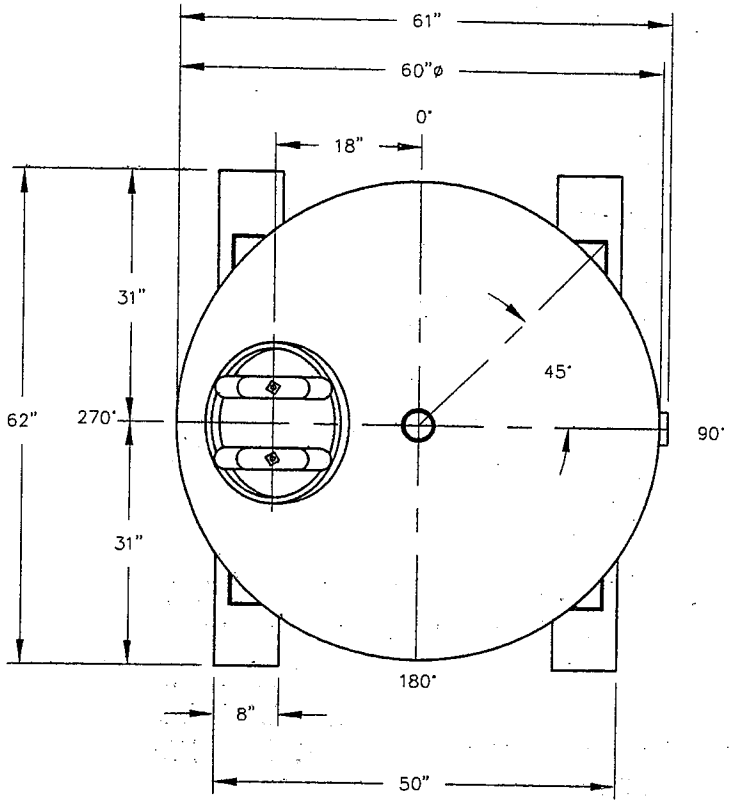
6) Legend Mfg. 2" Butterfly valves model T-335AB with EPDM seat, Aluminum/Bronze construction.

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.

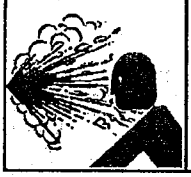
Once the desired service flow has been established, the filter will operate efficiently until dirty. However, under no circumstances should more than *15 PSI Differential Pressure* through the filter be obtained. Operating the filter unit with a high differential may cause filter bags to rupture and/or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

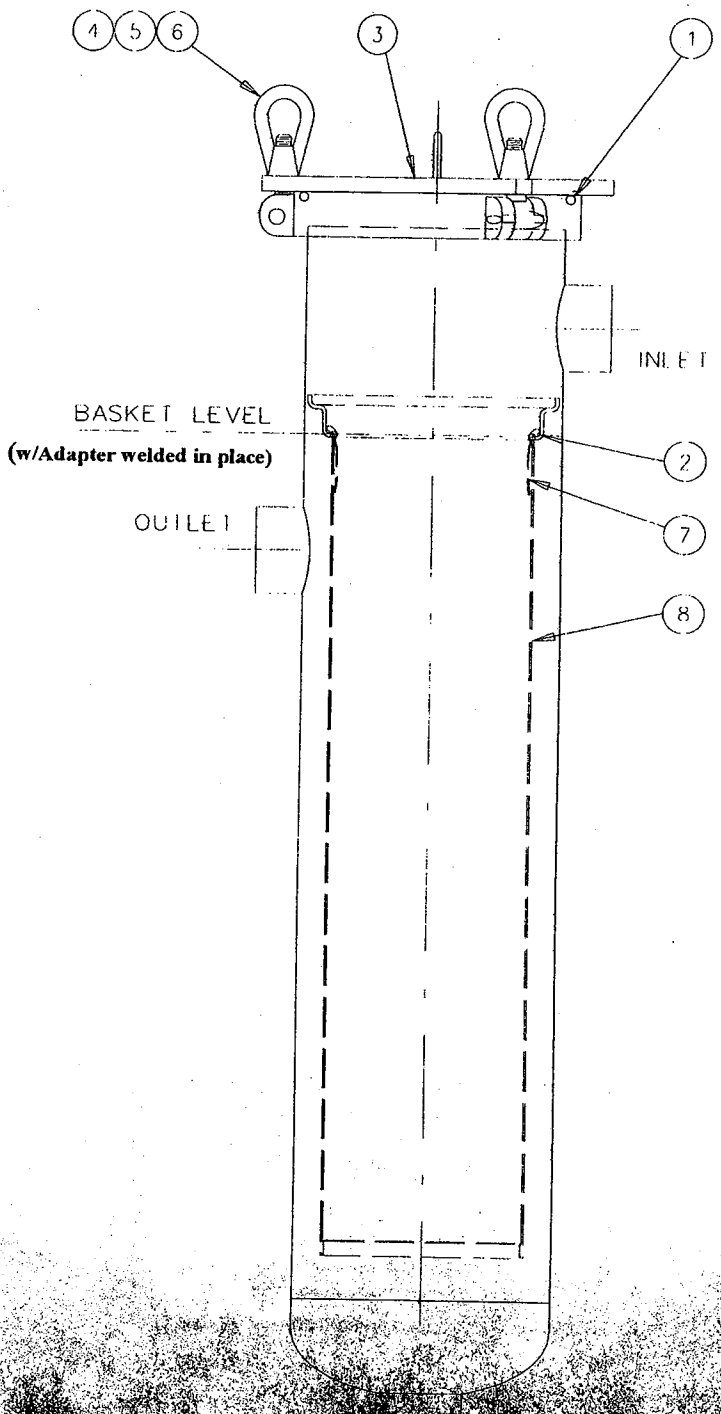
SPARE PARTS LIST			
Balloon	Description	Part Number	Time-Frame
1	Cover Seal	8150CG-*	as needed
2	Basket Seal	9BG-*	as needed
3	Cover	RCO8	as needed
4	Eye Nut	4ENNI	as needed
5	Rod End	4RENI	as needed
6	Clevis Pin Assembly	4CPNI	as needed
7	Filter Bag	(See Order)	as needed
8	Filter Basket	(See Order)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

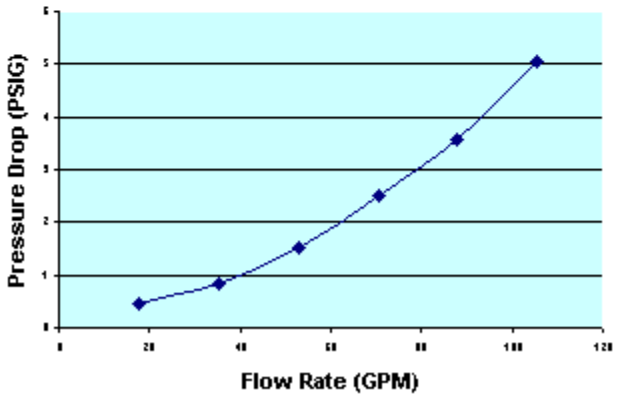
HPAF SERIES FILTERS
MODEL HPAF-2000

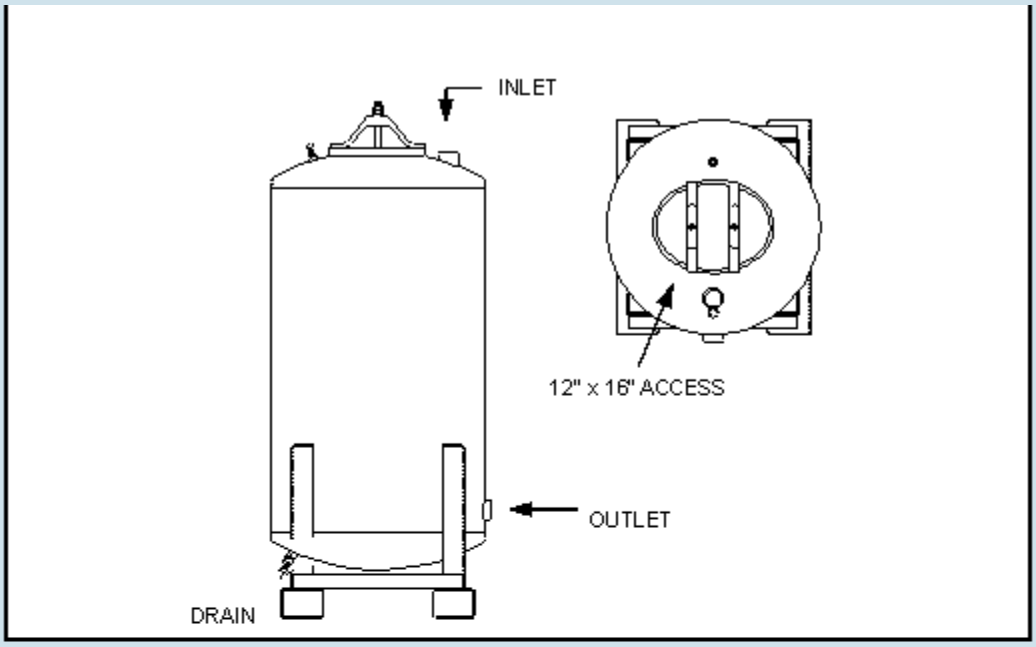
The HPAF-2000 filter is a media filter vessel designed to treat liquid streams. While the typical design application is a activated carbon adsorbtion unit, the filter can easily accommodate many medias. Some applications include:

- 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

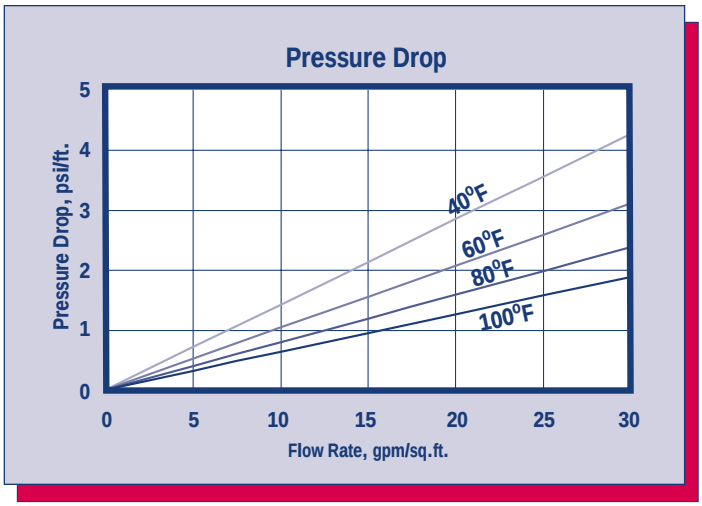
RESINTECH CGS is a high purity, light colored, high capacity, gel type sulfonated polystyrene cation resin supplied in the sodium form as moist, tough uniform spherical beads. *ResinTech CGS* specifically is intended for use in all water softening applications,including beverages, potable water and water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

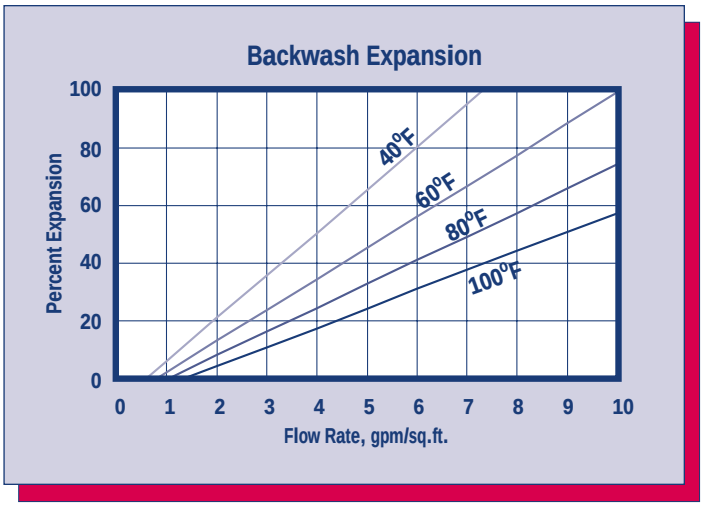
FEATURES & BENEFITS

- **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

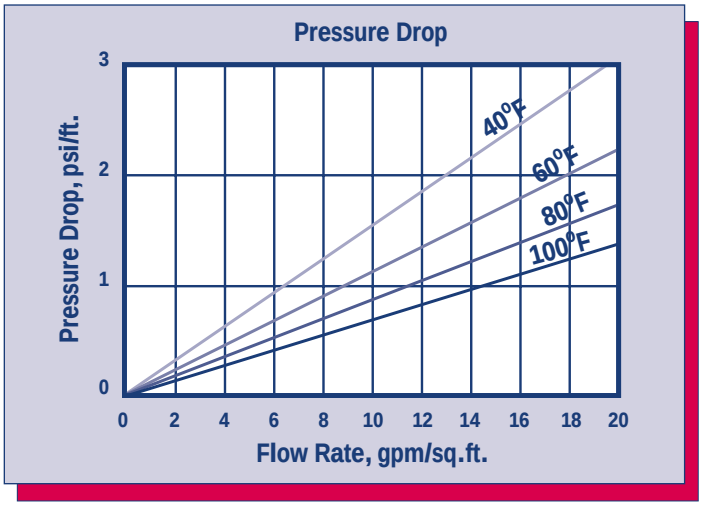
ResinTech SBG1 is a high capacity, shock resistant, gelular, Type 1, strongly basic anion exchange resin supplied in the chloride or hydroxide form as moist, tough, uniform, spherical beads. *ResinTech SBG1* is intended for use in all types of deionization systems and chemical processing applications.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

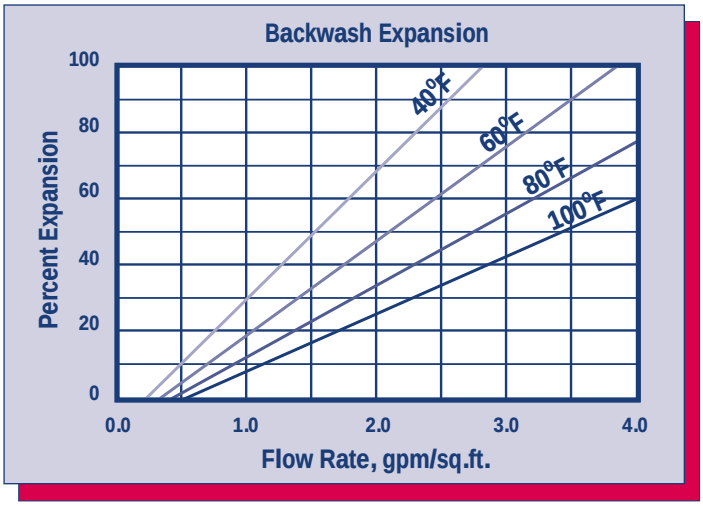
FEATURES & BENEFITS

- **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.

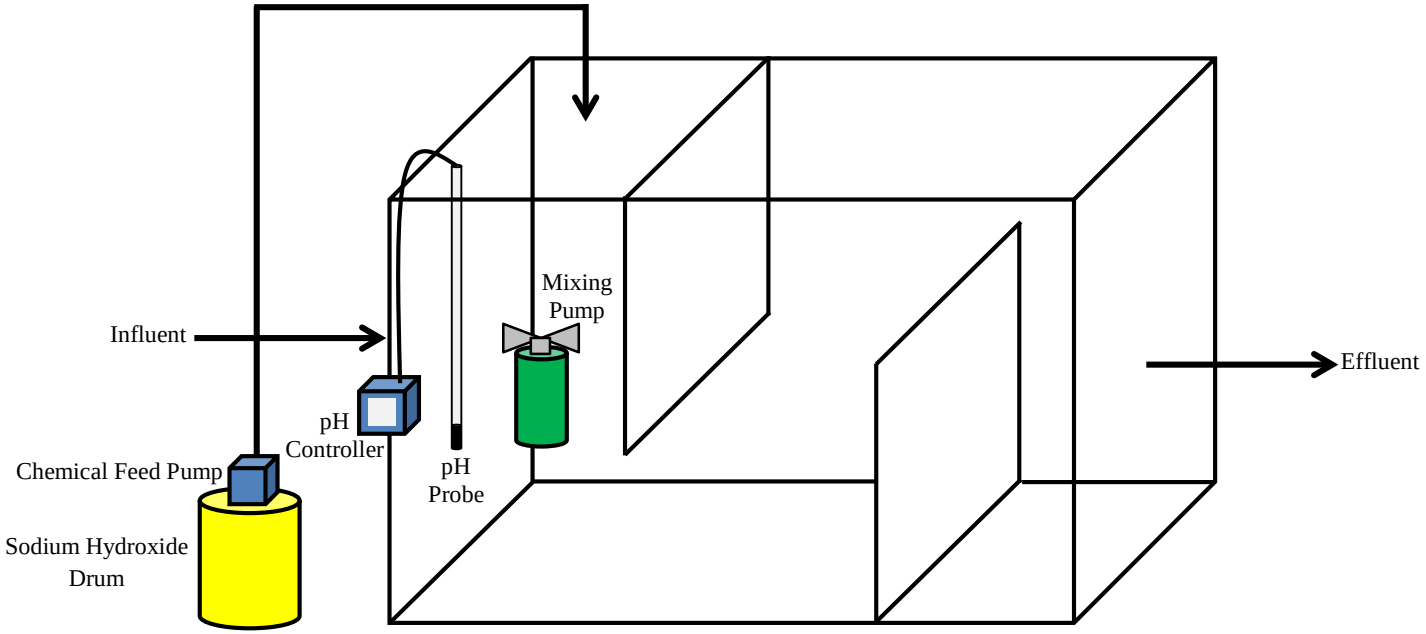
Section 15: Regulatory Information

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.

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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

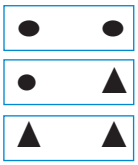
Choose from Hach's Broad Range of Digital and Analog Sensors

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	▲

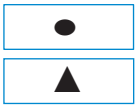
● = Digital ▲ = Analog

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



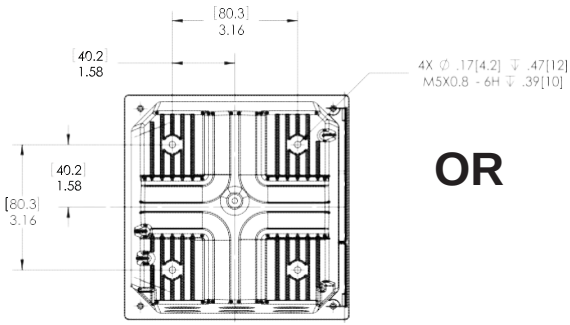
Specifications*

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.*

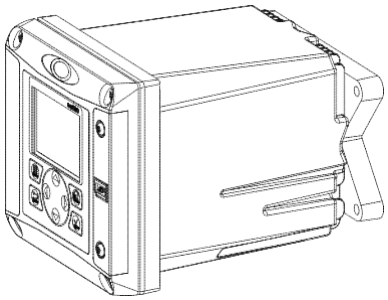
Dimensions

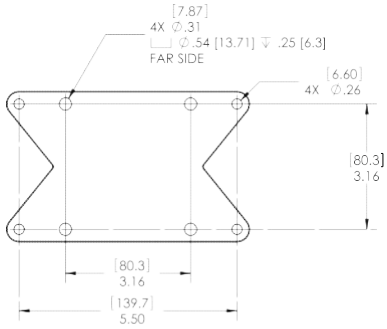
Surface Mounting Dimensions



Mounting Dimensions
(Rear View)

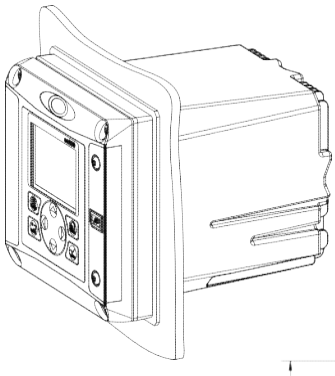
OR

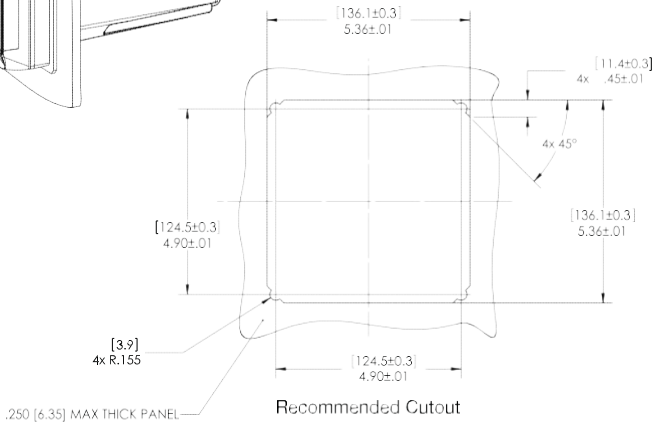




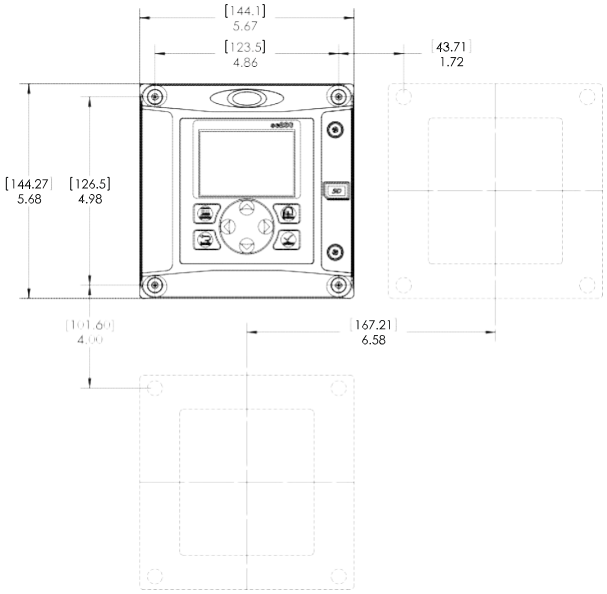
Bracket (supplied) for Surface Mounting
(Not compatible with Weather and Sun Shield
p/n 9220600 when surface mounting.)

Panel Mounting Dimensions



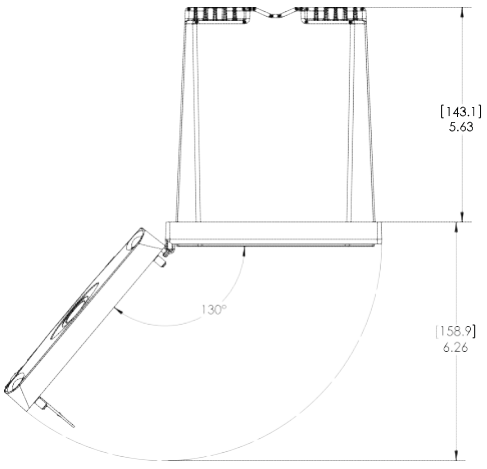


Recommended Cutout
for Panel Mounting

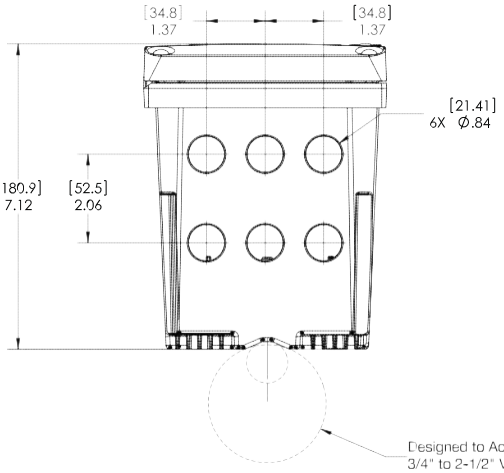


Minimum Spacing Dimensions
for Group Mounting

Top and Bottom Views



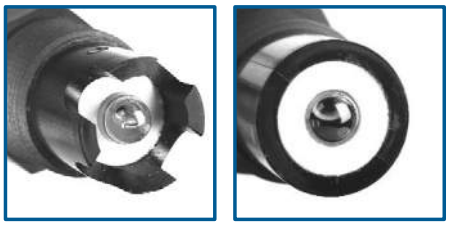
Door Opening Details



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.

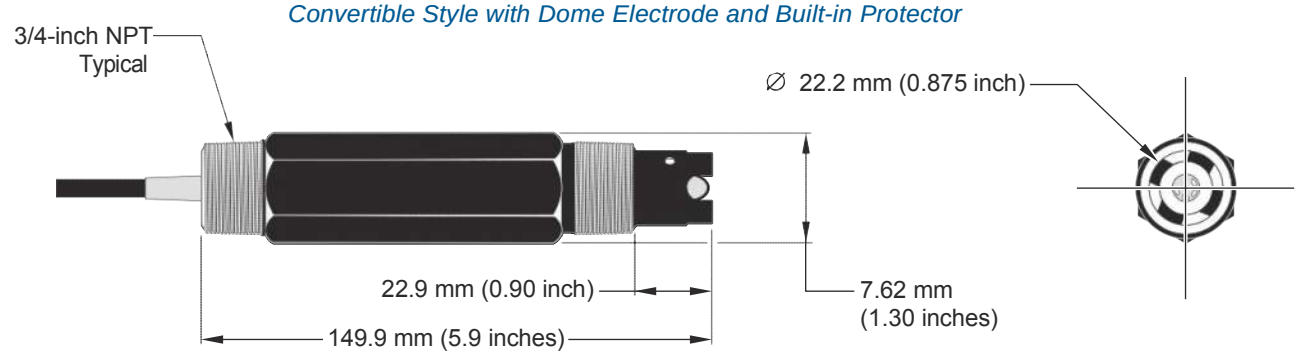
Insertion Style Sensor

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.

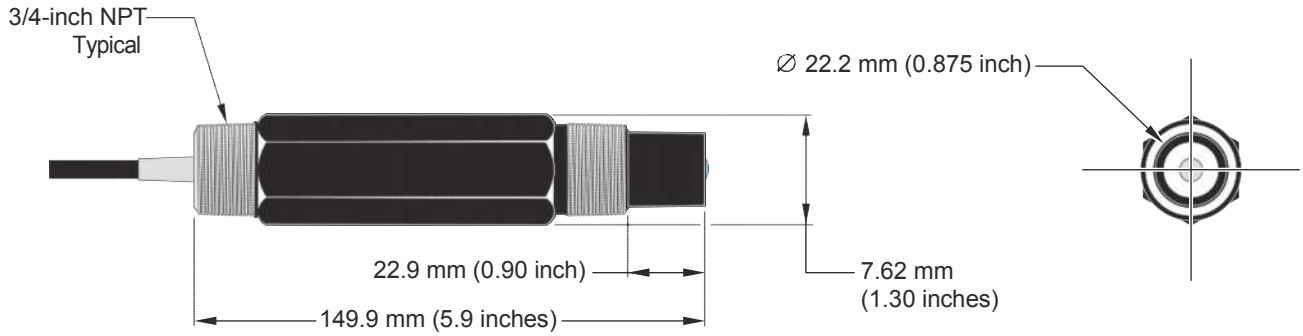
Sanitary Style Sensor

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

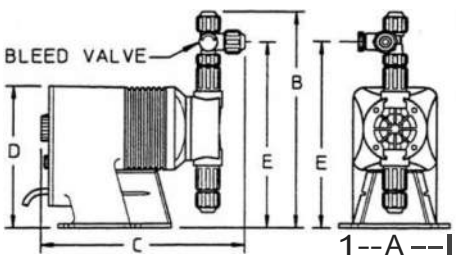
Pre-Engineered Systems

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

HALEY ALDRICH

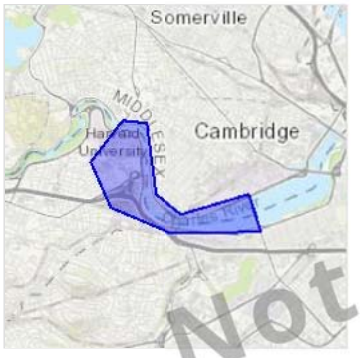
IPaC resource list

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

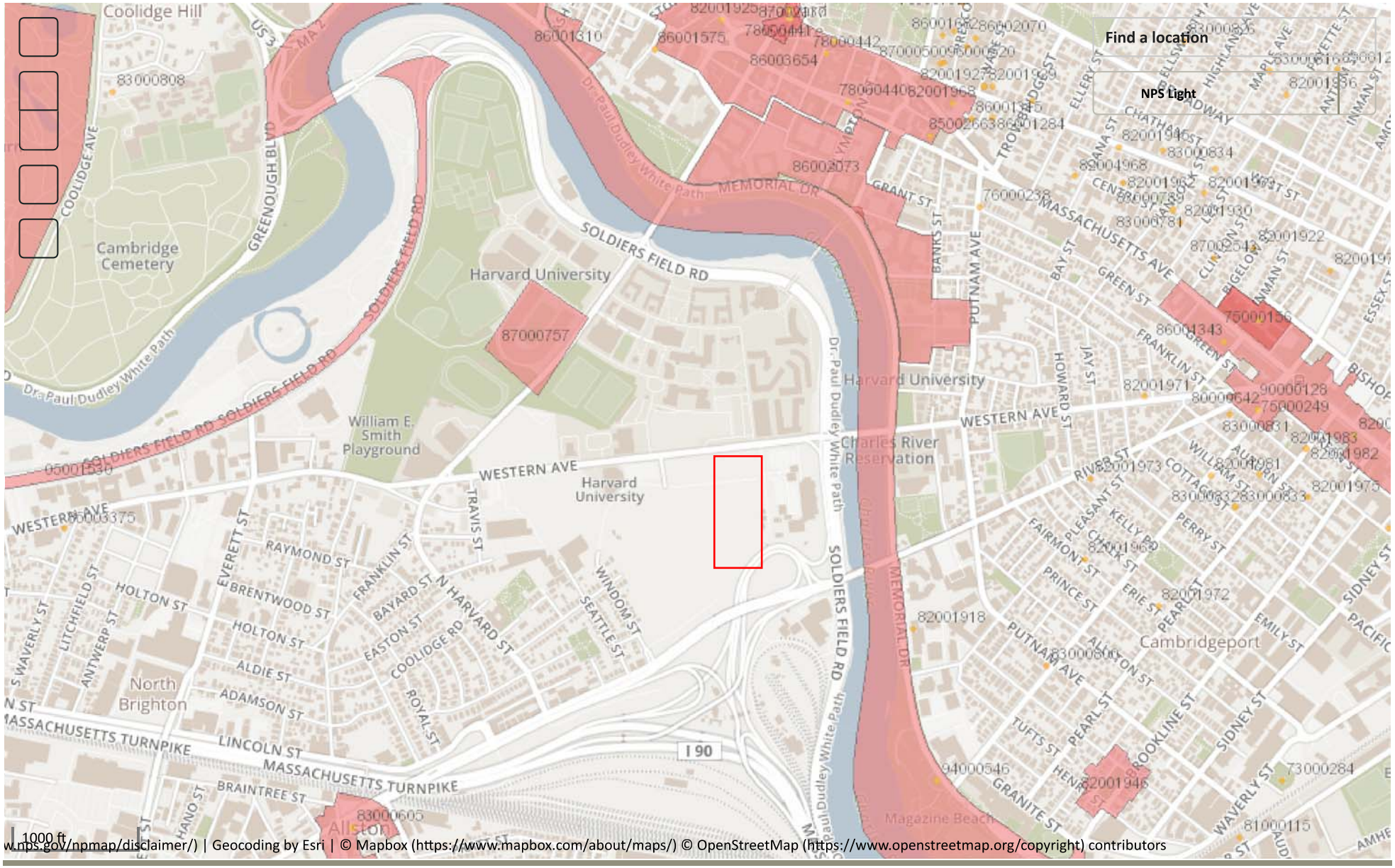
HALEY ALDRICH

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 Approved Access and Construction Dewatering Permits

Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119
617-989-7000
Fax: 617-989-7718

March 10, 2017

Mr. Matthew Ali
Harvard Engineering and Utilities
46 Blackstone Street
Cambridge MA 02139

RE: Temporary Construction Dewatering Permit
100 Western Avenue
District Energy Facility
Allston, MA

Dear Mr. Matthew Ali:

Based on the information provided in your application, the proposed discharge is acceptable to the Boston Water and Sewer Commission. You are granted, pursuant to Article V of the Regulations Governing the Use of Sanitary and Combined Sewers and Storm Drains, permission to discharge into the Boston Water and Sewer Commission storm drainage system.

The following conditions must be adhered to:

1. All water discharged must pass through a treatment system consisting of a sedimentation tank and bag filters prior to discharge to catch basins on Western Avenue, leading to the 24" storm drain and discharging to Commission Outfall SDO041.
2. If necessary, the use of granular activated carbon, or other pretreatment methods, may be required.
3. Any changes in the aforementioned plan must be approved by the BWSC prior to discharge.
4. Every precaution must be taken to avoid disruption of existing water and sewer connections.
5. All provisions outlined in EPA's Remediation General Permit MAG910000 must be strictly complied with.
6. You must acquire all appropriate permits from the other agencies that are relevant to the nature of this work.
7. This permit is valid from March 10, 2017 until March 10, 2018. Upon completion, the Boston Water and Sewer Commission must be notified in writing.

If you have any questions you can call me at (617) 989-7204.

Sincerely,

Matthew Tuttle
Construction Site Manager

Cc: Amy Schofield, BWSC
Stephen Perkins, EPA

COMMONWEALTH OF MASSACHUSETTS

Charles D. Baker, Governor
Karyn E. Polito, Lt. Governor
Matthew A. Beaton, Secretary
Executive Office of Energy
and Environmental Affairs

Department of Conservation
and Recreation
251 Causeway Street, Suite 600
Boston, MA 02114-2119
Leo Roy, Commissioner

DCR Construction / Access Permit

Boston **Date: March 23, 2017** **Permit #: 25772**

A Permit is hereby issued to:

ISSUED IN ACCORDANCE WITH M.G.L. C.132A§7 AND C.92§33 & ALL OTHER POWERS ENABLING

Harvard Engineering & Utilities
1350 Massachusetts Avenue
Cambridge, MA 02138
ATTN: Matthew Ali
C. (617) 945-4928
E. matthew_ali@harvard.edu

EMERGENCY CONTACT:
Steven Liechti
(617) 913-4160

DCR Contact:
Robert Lowell, Chief Engineer
251 Causeway St., Suite 700
Boston, MA 02114

Haley & Aldrich
465 Medford St.
Boston, MA 02129
(617) 886-7400

Bond Brothers
10 Cabot Rd.
Medford, MA 02155
(617) 387-3400

The following purpose: To enter upon DCR property in the Charles River Reservation adjacent to Soldiers Field Rd. in Allston for the purpose of dewatering in conjunction with the Harvard District Energy Facility Project located at 100 Western Avenue, as requested by Harvard Engineering & Utilities (as described in the Special Conditions).

WHEREAS: the Commonwealth of Massachusetts is the owner and/or has control of the premises subject to this permit as described in the Special Conditions (hereinafter collectively known as the Premises); in **Allston**, Massachusetts**;**

WHEREAS: the Permittee requests temporary access to the Premises in order to perform construction work as described in the Special Conditions (hereinafter the Project);

WHEREAS: the Permittee's activities will include approved activities, as described in the Special Conditions, that work will occur during approved hours only; and

WHEREAS: The granting of this Permit shall in no way interfere with the rights of the DCR to exercise its rights in or over the Premises.

NOW, THEREFORE, WITNESSETH, in accordance with Massachusetts General Laws chapter 92, §§33, 37, and chapter 132A §7; and rules and regulations promulgated there under (including Code of Massachusetts Regulations titles 304 and 350), DCR Standard Construction Specifications and Engineering Policy Memorandums and all other powers enabling, the DCR hereby grants to the Permittee and/or its contractors, agents, representatives, or employees the right to perform work on the Premises as described in the Special Conditions subject to the following terms and conditions.

IMPORTANT: SUBSEQUENT TO FULL EXECUTION OF THIS CONSTRUCTION / ACCESS PERMIT BY BOTH PARTIES, THE PERMITTEE MAY ONLY COMMENCE WORK WITH 72 HOURS VERBAL NOTICE TO DCR (617) 626-1444

This permit is issued and accepted upon by the Permittee subject to the terms and conditions herein and defined supra: conducting work under this permit shall constitute acceptance of all terms and conditions herein; shall conform to all provisions of law applicable to the exercise of the rights, the performance of work under the permit and the rules and regulations of the Department of Conservation and Recreation; shall do the work subject to the approval of the PERMIT SECTION of the Department of Conservation and Recreation as to the time, manner, location and all other conditions; that the permit may be revoked at any time by the said PERMIT SECTION; that the violation of any specification or requirement in this permit shall cause or constitute an immediate revocation thereof; shall protect and maintain all trees, drainage and other structures; shall restore the surface of the ground to a condition satisfactory to the PERMIT SECTION and maintain it in such condition against damage caused by the above-mentioned work. The Permittee and its successors and assigns, to the extent allowed by law, SHALL INDEMNIFY AND HOLD HARMLESS the DCR and its successors and assigns from all damages and/or claims arising from acts or omissions of the Permittee on the premises or of anyone acting by or through the Permittee. The Permittee's obligation under this paragraph shall include reimbursement for or restoration of all damages to the DCR's property. During the process of the work the Permittee shall place and maintain proper barriers at all times, and from the beginning of twilight through the whole of every night sufficient lights to protect the public from injury or damage.

Permit Information / Special Conditions

DCR CONSTRUCTION / ACCESS PERMIT
Issued to **Harvard Engineering & Utilities**
Charles River Reservation, Allston, MASSACHUSETTS
CONSTRUCTION PERMIT No: 25772

PERMIT DETAILS

LOCATION DETAILS:

Charles River Reservation adjacent to Soldiers Field Rd. in the vicinity of 100 Western Ave. (ref: attached locus map)

DESCRIPTION OF WORK:

Harvard District Energy Facility – Construction Site Dewatering

DCR PARKLAND AND/OR ROADWAY IMPACT SUMMARY

Construction Site Dewatering/Discharge to Storm Water Infrastructure and Charles River Outfalls (ref: attached discharge route plan)

SPECIAL CONDITIONS / REQUIREMENTS:

(Modifications to sections of the General Conditions are listed below)

B. PERMIT TERM

Effective Dates: Starts: **March 27, 2017** Expires: **March 30, 2018**

C. ADMINISTRATION FEE, RESTORATION, CONSIDERATION and MITIGATION

The **$50.00** administration fee has been paid. The permittee shall compensate DCR for the disruption of DCR Property by payment of a **Dewatering Fee** in the approximate amount of: **$6,500.00.**

[fee shall be paid quarterly to reflect actual applicable days of activity. Payment Schedule Closing Dates: June 30, 2017 /September 30, 2017/December 30, 2017/ March 30, 2018. Payment Schedule Due Dates: July 18, 2017/October 18, 2017 /January 18, 2018/April 18, 2018].

D. REQUIREMENTS

Permittee shall be responsible to provide the DCR Permits Sections with a construction schedule outlining the underground excavation activities.

Prior to the commencement of the project, the Field Operation Team Leader shall be contacted and informed of the project activities and schedule:

Steven Cyr
(617) 304-6164

I. ENVIRONMENTAL IMPACTS AND REPORTING

Permittee shall be responsible to submit any changes to the attached Dewatering Treatment System Plan, dated March 2017 for approval; notify DCR Environmental Section Head, Robert Lowell (617) 626-1340.

Permittee shall strictly adhere to Boston Water & Sewer Commission Drainage Permit.

M. INSURANCE

Permittee shall provide a copy of Liability Insurance Certification and shall name the Department of Conservation and Recreation as an additional insured.

Permittee shall be responsible to carry Environmental Impairment Liability Insurance

N. HAZARDS ~ PHYSICAL, ENVIRONMENTAL AND CHEMICAL

Permittee shall strictly adhere to the Remediation General Permit & RAM Plan associated with the site located at 100 Western Avenue in Allston. Copies of both documents shall be provided to the DCR Environmental Section.

SIGNATORIES

DEPARTMENT OF CONSERVATION AND RECREATION

Sean Casey, Construction Access Permits Director

For

Leo Roy, Commissioner
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

DATE: 3/31/17

The Parties herein have read the above terms and conditions and hereby agree and approve same. The individual(s) signing below warrant and represent that they are authorized to sign on behalf of and bind the Permittee.

Harvard Engineering & Utilities

Signature

MATTHEW ALI

Print Name

Sr. Project Manager

Title

DATE: 24 MARCH '17

DCR Construction / Access Permit

Issued to **Harvard Engineering & Utilities**
Charles River Reservation, Allston, MASSACHUSETTS
CONSTRUCTION PERMIT No: 25772

Notices and Contacts

DCR CONTACTS:

1.	DCR Construction Permits Director	Sean Casey	(617) 626-1444
2.	DCR Chief Engineer	Robert Lowell	(617) 626-1340
3.	DCR Boston Region Manager	Richard Woodward	(413) 441-5129
4.	DCR Environmental Section Head	Robert Lowell	(617) 626-1340
5.	Notifications to:		
	DCR Operations Control Center		(617) 946-3150

Exhibit 1

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF CONSERVATION AND RECREATION
PERMIT SECTION
PAYMENT TRANSMITTAL FORM

PERMIT NUMBER: **25772** DATE: **March 23, 2017**

SHORT DESCRIPTION: **Harvard Engineering & Utilities**
District Energy Facility - dewatering

Robert Lowell, Chief Engineer

ISSUED TO: **Harvard Engineering & Utilities**

ADDRESS: **1350 Mass Ave.**

CITY: **Cambridge** STATE: **MA** ZIP CODE: **02138**

CONTACT PERSON: **Matthew Ali** TEL: **(617) 945-4928**

PERMIT DATE	DESCRIPTION	UNIT	PRICE	AMOUNT DUE
March 23, 2017	**Administrative Fee – pd.**	**1**	**$50.00**	**$00.00**
Dewatering – one (1) year [fee shall be paid quarterly to reflect actual days] (ref: Special Condition C. Fee Consideration for Payment Schedule)		**260 days**	**$25.00 per day**	**$6,500.00**
		***TOTAL AMOUNT DUE:**		**$6,500.00**

FOR FINANCE USE ONLY	
RECEIVED BY	
CHECK NUMBER	
AMOUNT REC'D	

NOTICE TO PERMIT APPLICANT

PLEASE MAKE CHECK OR MONEY ORDER PAYABLE TO THE COMMONWEALTH OF MASSACHUSETTS and SUBMIT/BRING THIS FORM WITH YOUR PAYMENT TO: *The Department of Conservation and Recreation ('DCR')*
Construction Access Permits
251 Causeway Street, 7th FLOOR, BOSTON, MA 02114

PAYMENTS MUST BE RECEIVED WITHIN 30 DAYS. PERMITS WILL NOT BE ISSUED WITHOUT PROOF OF PAYMENT. IF PAYMENTS ARE NOT RECEIVED WITHIN 30 DAYS, THE DCR MAY RESCIND THE PERMIT. TO INSURE CREDIT, PLEASE WRITE PERMIT NUMBER ON YOUR CHECK OR MONEY ORDER.

Permit #: **25772**

FOR QUESTIONS ON PAYMENTS, PLEASE CALL (617) 626-1444. THANK YOU.

** PER CODE OF MASSACHUSETTS REGULATIONS TITLE 350: CHAPTER 14.08.*

GENERAL CONDITIONS

A. CONDITION OF PREMISES

1. The Permittee acknowledges that it has made an inspection of the Premises and that the Premises are in a satisfactory condition, suitable for the purposes of this Permit in the Premises' existing condition and that it has not relied upon representations or statements of the DCR, its officers, employees or agents with respect to these conditions. The Permittee expressly agrees that the DCR has no obligation to make any alterations, repairs, additions, or improvements to the Premises. The Permittee acknowledges and agrees for itself and its contractors, subcontractors, officers, servants, agents, employees, representatives and invitees that it accepts the Permitted Area in 'as is', 'where is' and 'with all defects' condition; that DCR is under no obligation to make any repairs, renovations or alterations to the Permitted Area; that DCR has made no representations or warranties regarding the adequacy, operability, safety or fitness of the Permitted Area for any particular purpose or use; and that DCR has made no representations that the Permitted Area complies with applicable laws, ordinances, rules and regulations of government authorities. The Permittee further acknowledges and agrees that entry and activities upon the Permitted Area by the Permittee and its contractors, subcontractors, officers, servants, agents, employees, representatives and invitees shall be at the sole risk and sole expense of the Permittee.
2. At the Permittee's expense DCR property shall be restored/ returned to its original or better condition, in accordance with standards and specifications of the DCR and this permit.
3. Upon the expiration, termination, or revocation of this Permit, the Permittee shall promptly vacate and surrender the Permitted Area and remove all of its personal property from the Permitted Area. Any property not so removed shall, at the option of DCR and at the sole expense of the Permittee, either become the property of DCR or be removed by DCR and disposed of without any liability in DCR for such removal and disposition.

B. PERMIT TERM

1. The term for the use authorized herein is specified in the Special Conditions, subject to review of the Permittee's performance and compliance with all terms and conditions of this Permit.
2. All obligations required of the Permittee under the terms of this Permit shall expressly survive the given termination/ expiration date until such obligations are completed to the satisfaction of the DCR, unless the DCR has exercised its option to terminate the agreement.
3. If the Permittee is found to be noncompliant with any term and or requirement of this Permit, and does not remedy or cure the noncompliance matter promptly or within a time frame set by DCR, the DCR may immediately revoke this Permit.

C. ADMINISTRATION FEE, RESTORATION, CONSIDERATION & MITIGATION **[in accordance with 801 CMR 4.02]**

1. The Permittee shall pay the Commonwealth a fifty dollar administration/application fee.
2. In addition to the administration fee (C.1. above), and required work. The permittee will compensate DCR for the disruption to the DCR properties including parkway, boulevard, road and/or recreational facilities by doing mitigation and or the payment of Parkway/Roadway Excavation Fee, Sidewalk and Parkland modification fees.
3. See the Special Conditions of this permit for the details of the compensation to DCR for the disruption to the DCR parkway and/or recreational facilities which may include fees or mitigation or a combination of both.
4. If mitigation is allowed as an alternate for the fees, the cost of the mitigation must equal or exceed the Parkway Excavation Fee, Sidewalk and Parkland modification fees: should the mitigation work not exceed the fee amount the difference shall be paid to DCR.

SEE THE SPECIAL CONDITIONS AND THE PAYMENT TRANSMITTAL INVOICE FOR DETAILS ON FEES,

PAYMENT SCHEDULE AND MITIGATION APPROVED FOR THIS PERMIT.

5. Payments, shall be in the form of a money order, cashier's check or certified bank check payable to the Commonwealth of Massachusetts (exclusively), accompanied by a DCR "Payment Transmittal Form," Exhibit 1 attached to this permit. Indicate your Permit Number on your check, all correspondence and on the mailing envelope; mail to the following address:

Department of Conservation and Recreation
Construction Access Permits
Permit No: _____
251 Causeway Street, Suite 700
Boston, Massachusetts 02114

D. REQUIREMENTS

1. The Permittee shall keep a copy of this Permit at the Premises (on site and visible) and shall be solely responsible for maintenance, care, repair or replacement of all work, improvements or installations related to the permitted work placed or situated on the Premises at all times.
2. The Permittee shall be solely responsible for all expenses arising under this Permit.
3. The Permittee will not use any DCR utilities or resources without express permission from DCR. If the Permittee and or its representative or contractor uses any DCR utilities any expenses associated with that use is the responsibility of the Permittee.
4. The Permittee shall conform to all provisions of state, federal and local laws, rules and regulations applicable to the exercise of the rights and the performance of work under the Permit. Such provisions include, but are not limited to, all health, environmental, noise and sanitary standards and conditions required by Commonwealth of Massachusetts statutes; rules and regulations, including DCR regulations, local bylaws, engineering standards and administrative and executive orders.
   a. Prior to the commencement of any work involving excavation or disturbance of any soils and or vegetation under this Construction / Access Permit:
      i. Dig Safe must be notified for field mark-out of utilities (1-888-DIG-SAFE).
      ii. The Permittee will comply with M.G.L. Chapter 254 requiring approval by the Massachusetts Historical Commission
   b. The Permittee shall adhere to all OSHA Standards for Safety during the construction period.
   c. The Permittee will comply with local noise regulations, exercising care to subject neighborhood abutters to the least amount of noise and vibration pollution during working and non-work hours.
5. All correspondence with the DCR regarding permitted activities should indicate the DCR Construction Permit Number associated with this permit.
6. If the work herein authorized is for a driveway entrance, this Permit is granted and accepted on the condition that if the ownership of the land to which the driveway is appurtenant shall at any time become united with that of any adjoining lot fronting on the roadway and also having an entrance on said roadway, then the DCR may revoke the right to maintain any or all of such entrances and grant a single entrance in place thereof. The entrance hereby granted shall be used only for the Premises shown on the Plan.
7. Within thirty (30) days, after completion of the project or a date specified herein, by the DCR in the Special Conditions, the Permittee shall submit a paper copy and an electronic copy of as-built plan(s) for the Project as it relates to DCR property. Each sheet shall be stamped, signed and dated. This information shall be sent to Construction Access Permits, Department of Conservation & Recreation, 251 Causeway Street, Suite 700, Boston, Massachusetts 02114. In addition to the standard title box the permittee will list/add the DCR Construction Permit Number associated with this permit.
8. Within thirty (30) days, after completion of the project or a date specified by DCR in the Special Conditions, the Permittee shall submit two (2) copies of all final environmental reports generated for the Permittee's Project related to DCR property if applicable. One (1) copy each of the information will be sent (see Notices and Contacts) to the attention of the Environmental Section Head and the Regional Director.
9. The Permittee shall keep the Premises in a clean and orderly manner at all times.
10. The Permittee shall be solely responsible for ice and snow removal during the winter months and street sweepings during the spring, summer and fall on all DCR property associated with this permit and/or impacted by the permit, per DCR protocol (inclusive of all area where public access is possible, as well as but not limited to all roadways, sidewalks and walking paths), inclusive of any and all associated costs and labor. This responsibility shall remain in place until the work area(s) are closed and all obstacles that would interfere with DCR's regular maintenance are removed, leaving the area unencumbered.

E. INSPECTIONS, ACCESS AND PERMITS

1. The Permittee shall arrange for inspections by local health officials, utilities engineers, building inspectors and others as may be required.
2. The Permittee shall take prompt action to correct any condition that is found not compliant with any federal, state, or local regulation, code or statute.

3. The Permittee agrees at its own expense, to file for; obtain and comply with all applicable federal, state and local permits, licenses and approvals necessary for the work to be performed which is the subject of this Permit. Failure to obtain any required permits, licenses and or approvals, prior to the commencement of work, or failure to maintain such legal obligations in full effect throughout the term of this Permit shall be cause for revocation of this Permit by the DCR.
4. The DCR shall be provided full and unrestricted access to and upon the Premises at all times during the Term of this Permit to inspect the Premises and to review the operations and inspect the Permittee's equipment.
5. The permittee shall maintain adequate abutter access at all times.

F. PUBLIC SAFETY

1. The Permittee will hire as many safety and/or law enforcement details, as needed to ensure the general public (including but not exclusive of pedestrian, cyclists, and vehicular traffic) safety at all times during all permitted activities on and near the Premises. Advanced notice of starting work shall be provided to the appropriate authority.
    a. For vehicle traffic management and public safety, in and/or on DCR property **excluding** parkways, boulevards, skating rinks, and or water sheds, the Permittee shall contact and hire as many Environmental Police Officers, as needed to ensure the safety of park users at all times.
    b. For vehicle traffic management and public safety, in and/or on DCR Parkways, Boulevards, skating rinks, and or state water sheds the Permittee shall hire as many Massachusetts State Trooper details as necessary to ensure the public safety at all times during all activities on and/or near the Premises.
    c. For work inside DCR Parks **excluding** motor vehicle traffic management on Chapter 90 Roadways (parkways and public ways), the Permittee may hire Park Rangers, to ensure the wellbeing of the public in low use situations, within the confines of the park (i.e. playing fields, bike-paths, parking lots, gardens etc.~~...~~).
    d. For projects impacting both DCR property and municipal roadways, for safety and/or traffic management on the municipal roadways the Permittee may hire as many local safety and/or law enforcement details, or certified flagmen as needed to ensure public safety.
2. The Permittee shall barricade excavations with safety fencing and reflectorized drums with "Type A" flashers to guide personnel and eliminate free access to the work area on, in, or near the Premises. All flashers and "steady-burn" lights on drums must be in good working order. From dusk through dawn, the Permittee shall place sufficient working lights to protect the public from injury or damage.
3. Signage indicating the name of the Permittee, and including contact names and telephone numbers shall be on the premises (permitted work site) in plain view or erected during the duration of the Project.
    a. Additional signage may be required by DCR; See Notice paragraph 2 and the Special Conditions.

G. RESTORATION OF PREMISES

1. See SPECIAL CONDITIONS for additional information specific to this permit.
2. At the Permittee's sole expense, DCR property shall be restored/returned to its original or better condition, or otherwise improved in accordance with this permit, and in accordance with standards and specifications of the DCR. The Permittee is responsible for repairing, replacing and restoring any and all damage to the DCR real or personal property, its infrastructure improvements and appurtenances, or any other property of third-parties, caused or necessitated by the Permittee by operation of this Permit, regardless of whether such damage occurs within or without the layout of the Premises itself.
    a. Any/all DCR utilities (storm drainage, electrical services, plumbing, sprinklers, sanitary services, dam and flood control structures, traffic signals and/or street lighting) worked on, damaged or altered (installation, change, relocation, modification, or adjustment) shall be replaced by the Permittee at their expense, unless specifically addressed in this permit.
    b. Temporary service for the impacted utility shall be provided by the Permittee. The Permittee must provide adequate and safe services.
    c. Temporary operating expenses for the impacted utility starting at the time of the disruption and/or installation, through DCR acceptance shall be the responsibility of the Permittee.
    d. All utilities/equipment shall be replaced or reinstalled to working order by the Permittee at their expense unless specifically addressed in this permit or its attachments.

e. The appropriate DCR section chief, engineer and/or designee shall with assessment review and consultation, determine if the part(s)/fixture(s) may be reused and/or replaced. If the part(s)/fixture(s) need to be replaced, DCR shall supply the specifications.

f. All DCR utilities worked on by the Permittee shall be reviewed and/or inspected by DCR prior to acceptance.

3. Abandonment of existing underground utilities, pipes, chambers, etc.; The Permittee, its agents, contractor or representative shall take all appropriate measures to properly close, fill and cap all underground structure(s) to guard against future sinkholes and eliminate the possibility of future collapse of these abandoned structures. Pipe abandonment under DCR owned or controlled property shall be managed as follows:

   a. Located under DCR roadways: All pipes, underground utilities, chambers etc. that are under the roadway must be completely filled with grout or high slump 500 psi concrete and abandoned in place.

   b. Not located under DCR roadways: All pipes, underground utilities, chambers etc. that are 18-in. in diameter or greater must be completely filled with grout or high slump 500 psi concrete and abandoned in place. (Specification §.02650, ¶ 3.01 D.3).

   c. All pipes that are less than 18-in. in diameter shall be securely plugged with brick, mortar, concrete and/or masonry plugs in both ends at least 12-in. thick and abandoned in place.

4. Any and all parkways, boulevards, roadways, parking areas and/or driveways repairs including trench patches that remain in place for one year or longer will be reviewed by the Permittee and the DCR annually, until such time as the road is permanently repaved from curb to curb. Should the patch fail or prove to be inadequate, the Permittee will be responsible for removal and restoration of the failing area.

5. All opening(s) shall be covered by steel plates when not in use. The Permittee shall not use steel plates that are vulnerable to flexing, or lateral movement due to vehicular traffic. Where any gaps exist between the plate and the roadway surface, "cold-patch" asphalt mix shall be used to fill those voids.

6. In non-trench areas of roadways or sidewalks requiring repairs, the subgrade material shall be Massachusetts Department of Transportation – Highway Division (hereinafter MassDOT -HD) "Type C" Gravel (2" maximum aggregate size) and it shall be mechanically compacted in six-inch (6") lifts.

7. Pavement trimming: Only saw cutting (without overcuts) shall be allowed as a means of creating the final, permanent edge between existing and new hot-mix asphalt or cement concrete on any roadway or sidewalk. All accidental overcuts shall be filled with bituminous joint sealer. The standard "cutback" for all permanent pavement patches shall be twenty-four inches (24") beyond the original pavement cuts made to perform the work allowed by this permit. If curbing does not allow for twenty-four inches (24"), then the face of the curbing will serve as the edge of the permanent pavement patch.

8. Controlled-density fill (hereinafter the CDF) shall be used for backfilling trenches made in roadway or sidewalk pavement. The CDF shall conform to MASSDOT -"Type 2E," "Flowable and Excavatable." (If the Permittee needs to use backfill materials with higher strength characteristics than MassDOT -"Type 2E" CDF, then the Permittee can request a waiver from the DCR to substitute that higher strength backfill.)

   a. The Permittee shall place the CDF so as to allow enough room for a depth of pavement replacement that matches existing pavement thickness
   b. The Permittee is responsible for allowing sufficient curing time for the CDF prior to installing pavement material. The Permittee shall exercise extra caution in areas of high water table.

9. If the Permittee cannot use MassDOT -"Type 2E" CDF, trenches and other excavations shall be back-filled with DCR-approved gravel. The use of previously excavated material as backfill is acceptable, providing that the previously excavated material is suitable for sub-base with no stones larger than 3" in diameter, and is free of all clays and organic matter. However, immediately below any sidewalk or roadway surface, there must be a minimum of twelve inches (12") of clean gravel borrow (MassDOT #M1.03.0 – Type "C" two-inch [2"] maximum stone size) for the sub-base.

10. All sub-base shall be mechanically compacted in six-inch (6") lifts to ninety-five percent (95%) compaction, as tested by nuclear compaction equipment, and verified by the DCR on site.

11. The permanent pavement patch of hot-mix asphalt for roadway sections shall consist of the following minimum measurements: four inch (4") base, two inch (2") binder, one and one-half inch (1-1/2") of "State Top" (one-half-inch (1/2") stone size) top course. Pavement replacement thickness must match the existing pavement thickness, or conform to Figure # 1 "TYPICAL ROADWAY TRENCH REPAIR" whichever pavement depth is deeper.

12. All mixes shall conform to MassDOT "Type I" mixes: Base, Binder, "State Top" [with one-half inch (1/2") stone size] for roadway use & "Dense Top" [with three-eighths inch (3/8") stone size] for sidewalk use. The permanent hot-mix asphalt patch shall extend over the original trench cut, and act as a "bridge" twenty-four inches (24"). All hot-mix asphalt surfaces (vertical and horizontal) shall be coated with emulsion tack coat immediately prior to placing any new hot-mix asphalt layer.

13. The Permittee shall be responsible for the adequacy and performance of the trench pavement patch (roadway and/or sidewalk) and restoration of all affected curbing in the work zone. DCR reserves the right to have the trench patches repaired or replaced completely and curbing reset at the expense of the applicant as a result of incomplete or inadequate work by the Permittee.

14. All pavement markings removed and/or damaged during the course of construction must be replaced with markings matching the configuration, color, width and type (thermoplastic, paint, etc.) of the markings removed.

15. Any sidewalk replacement shall conform to the most recent Americans with Disabilities Act (hereinafter the ADA) or Architectural Access Board (hereinafter the AAB) handicapped accessibility standards, whichever is more stringent.

16. Any fine-grading of subgrade soils required before sidewalk installation shall be accomplished with MassDOT - M1.03.0 "Type C" Gravel Borrow (two-inch (2") maximum stone size).

17. Any sidewalk damaged must be replaced with a material matching the existing sidewalk surface (hot-mix asphalt or cement concrete), and the replacement shall conform with the following;
    a. The limits of the sidewalk repair shall include the entire work area and extend to the nearest sidewalk control joint. Sawcuts shall be made along those joints and only full, complete concrete sidewalk panels shall be removed. All demolished concrete walkways shall be removed from the DCR property and legally disposed of off-site.
    b. All cement concrete sidewalk shall contain welded wire mesh. Welded wire mesh for cement concrete walks must meet ASTM Specification A185 and be 6 gauge wire with six-inch by six-inch (6" x 6") squares. Only sheet mesh shall be permitted (no rolls). The mesh must be installed at mid-depth in the slab and rest on reinforcement "chairs" or cement concrete bricks spaced at 36" maximum in every direction to keep the mesh from deforming during cement concrete placement.

18. For all edgestone/curbing being reset or replaced, on both the front and back of the curbing/edgestone, 2,000 p.s.i. cement concrete (with a six-inch by six-inch (6" x 6") profile) shall be installed for the entire length of the curbing/edgestone being reset or replaced, and the top surface of both the front and back sections of this cement concrete shall be one and three-quarter inches (1 ¾") lower than the finished roadway elevation.

19. Detectable warning panels are required for any pedestrian ramp. The detectable warning panels for cement concrete pedestrian ramps shall be "brick-colored" and "safety yellow" for hot-mix asphalt pedestrian ramps. Exceptions to this are possible with the prior approval of DCR's Chief Engineer, if, for example, the Permittee is trying to match the color of existing nearby pedestrian ramp warning panels. This work must be MUTCD, ADA and AAB compliant.
    a. Detectable warning panels can be precast concrete, cast-in-place concrete or other suitable material permanently applied to the ramp.

H. TRAFFIC MANAGEMENT

1. Traffic Management, including both Vehicle and Pedestrian management; the Permittee must provide safe passage to the public including but not limited to motorists, cyclists, pedestrians, workers, and others affected by the Permittee activities and are the sole responsibility of the Permittee.

2. The Permittee assumes full liability and responsibility for Traffic Management, and shall plan for traffic control on a case by case basis to adjust for the varying conditions among work locations in cooperation with the detail officer..

3. All work done on DCR roadways must conform to the **2009** U.S. Department of Transportation, Federal Highway Administration's Manual on Uniform Travel Control Devices Guidelines ('MUTCD') and the **April 28th 2009 Governors Executive Order 511**. Including recently updated Federal Regulations (the FHWA's **Rule on Work Zone Safety and Mobility**) emphasize the importance of providing safe work areas for motorists, workers, and others affected by the maintenance/ utility/ construction activities; whenever the need is indicated the permittee should expand or improve traffic controls.

4. **For additional and permit specific Traffic Management requirements see the Special Conditions.**

5. Without limiting any of Permittee's obligations under this or any other Section of this Permit, the Permittee is responsible for proper Traffic Management, including the planning and installation of temporary traffic controls in maintenance, utility, or construction work areas, including, but not limited to, responsibility for ensuring that the pedestrian and vehicular safety is properly and safely performed according to all applicable federal, state, and local laws, regulations and governmental requirements.

6. The Permittee shall submit a site specific Traffic and Pedestrian Management Plan (hereinafter the TMP) for DCR's review, comment, and subsequent approval.

7. The site specific **TRAFFIC MANAGEMENT PLANS** DCR approved will be strictly adhered to during field operations.

   (see the Special Conditions, Item H for Approved Plan)

   a. At the discretion of the DCR Chief Engineer or his designee, all TMPs must be prepared and stamped by a Massachusetts Licensed Engineer, specializing in traffic management.

   b. The Permittee will notify and coordinate with the District Manager, the facility supervisor and / or the Regional Engineer regarding the TMP, as listed in the Special Conditions and/or Notices and Contacts Section of this Permit.

   c. Any subsequent changes to the approved plan **(See the Special Conditions, item H)** by any party other than DCR must be resubmitted to DCR and are subject to DCR's review and subsequent approval before any construction activities may commence.

   d. The TMP will be followed and precautions will be taken to protect the public, the environment and any cultural resource in the area.

8. If the work associated with this Permit potentially impacts other parties, the contractor/ permittee is responsible for notification, and cooperative coordination with all parties, (including but not exclusive of DCR, contractors and representatives, Federal, State and local entities; police fire and ambulance, public transportation and utilities) working in the permitted locations. The coordination is to assure such that all disruptions of vehicular and/or pedestrian traffic is minimized.

   a. If this is not done to the satisfaction of DCR this permit will be revoked by a DCR representative during field operations and all associated work will stop until the deficiencies are resolved to the satisfaction of DCR traffic and or permit engineers.

9. In order to reduce the effects on the public who use the DCR's recreational areas, parks, campgrounds, parkways, boulevards and/or roadways, the Permittee will minimize construction work during peak use periods.

10. Pedestrian and vehicular traffic flow and safety shall be maintained at all times. Detours shall conform to the 2009 U.S. Department of Transportation, Federal Highway Administration's Manual on Uniform Travel Control Devices Guidelines ('MUTCD').

11. The Permittee will leave sidewalk areas clear and open to permit unimpeded pedestrian traffic passage at all times during construction. A minimum of three feet (3') clearance will be maintained to permit public access to alternate passage by the affected portion of the Premises.

12. All deliveries shall be made in such a manner as to have the least negative impact on the visiting public, the Premises and the environment.

I. ENVIRONMENTAL IMPACTS AND REPORTING

1. Prior to any construction work for a project in or adjacent to an environmentally sensitive resource area(s), the Permittee will contact appropriate Federal, State, and local agencies and or authorities, obtain any licenses, permits and or Certificates necessary and will comply with all applicable laws, rules and regulations. The Permittee will supply copies of all applicable documentation to DCR when applying for this permit, and or as they are granted, including but not limited to:
   a. Executive Office of Energy and Environmental Affairs, Offices of Massachusetts Environmental Policy Act and Coastal Zone Management
   b. The Massachusetts Department of Fish and Game regarding wildlife and/or plant impacts.
   c. MassGIS data on any Priority Habitat of Rare Species.
   d. The Massachusetts Department of Environmental Protection's Wetland, Waterways, and Water Management Sections
      i. During all construction phases the Permittee will minimize any potential impacts to flora, fauna and natural resources and habitats on, in, or near the Premises; including the preparation and execution

of a management plan for resource protection, erosion and sedimentation control, to minimize the potential impacts to environmentally sensitive resources.

ii. Special care will be used when permitted work area borders wetlands or waterways resource area(s), including but not limited to installation and maintenance of staked "salt hay" straw bales and silt fences to prevent sediment erosion and siltation from entering resource areas, and protect adjacent resources in accordance with the management plan. Erosion control measures will be in place prior to the start of any earthwork. The Permittee is responsible for inspecting all control measures twice weekly and after every rainfall event, and will maintain the erosion controls such that they operate properly. All erosion control measures will be maintained throughout the construction season until slopes have been stabilized and will be removed upon completion of the project, or stabilization of the area, whichever is last. All silt collected shall be removed and properly managed before the fences and straw bales are removed.

2. This permit in **NO** way should be construed as approval of any other applicable permits, notices or findings issued by Federal, State, and local agencies and/or authorities including but not limited to the Massachusetts Department of Fish and Game, and the Department of Environmental Protection.

3. The Permittee shall protect and maintain drainage and other structures against damage.
   a. Any drainage structures damaged or altered will be replaced by the Permittee at their expense. All catch basins should be deep-sump unless utilities or site conditions interfere with the installation, as determined by DCR storm water engineer(s).
   b. Absolutely no bitumen, asphalt, concrete or brick debris shall be dumped into drainage structures during the construction period. All storm water structures within the limits of work shall be cleaned prior to the conclusion of the project. This work shall include removing any accumulated dirt, refuse and other debris from each structure, including the gutter mouth of curb inlets. All removed materials shall be properly handled and transported to an approved disposal facility. The Permittee shall incur all cleanup costs.
   c. For NPDES MS4 requirements, the following activities shall continue throughout the construction period:
      i. Street Sweeping
      ii. Catch Basin Cleaning
   d. If applicable, construction projects shall provide the DCR Storm Water Manager, Robert Lowell with a copy of the Storm Water Pollution Prevention Plan for the site.
   e. If applicable, construction projects shall provide the DCR Storm Water Manager, Robert Lowell with a copy of site dewatering permits.

4. The Permittee shall protect and maintain all existing trees against damage.
   a. If applicable, air excavation tools shall be used on DCR property to ensure tree root protection within the drip line. (ref: Special Conditions)
   b. If applicable, a Certified Arborist shall be required on-site during excavations that are located within the drip line. (ref: Special Conditions)

5. Should the permitted work area be located adjacent to an environmentally sensitive area (i.e. wetlands, protected habitat, waterway, and/or coastal shoreline), the Permittee shall notify the DCR Arborist, Jeff Enochs at (508) 942-3872 and/or DCR Ecologist, Nancy Putnam at (617) 626-1394 (see Notices and Contacts) a minimum of seventy-two (72) hours prior to any tree or shrub removal.
   a. Should the Permittee disturb any vegetation, the disturbed areas will, upon DCR's approval, be filled, groomed, and planted with native vegetation to blend in with the natural landscape at or before 95% project completion.
   b. The Permittee will monitor the areas of replaced vegetation to make sure that they are established. If the vegetation dies, the Permittee will consult with DCR Arborist (see Notices and Contacts) to work out replacement details.

6. The Permittee will minimize the impact on trees and shrubs on, in and near the Premises.
   a. The Permittee will remove and replace trees and shrubs only if absolutely necessary to the integrity of the construction and only if such removal is approved by DCR Arborist prior to start of construction.
   b. Any tree removed, damaged and or distressed by the proximity of the construction allowed by this permit will be replaced and warranted for two (2) years at the permittee's cost.

c. A second notice will be made to the DCR Arborist (see Notices and Contacts) a minimum of 72 hours before any tree is removed.
    i. If the removal of a tree is approved, the Permittee is responsible for disposal/elimination of all associated vegetation materials, above and below ground including but not exclusive of leaves, branches, trunk, and the stump, and restoration of the area.

d. In locations where tree removal/loss are unavoidable, the specific field placement of replacement vegetation will be at a location(s) as directed by DCR; planting locations may include areas outside the permit premises.

e. The Permittee will replace all trees removed for construction, the replacement will be based on caliper inch removed and/or cash equivalent. DCR Arborist and/or designee will have the choice of species, size and location;
    i. One caliper inch (1") for every caliper inch of lost/removed trees in **suburban areas,** as deemed practical by DCR.
    ii. Two caliper inches (2") for every caliper inch of lost/removed trees in **urban areas,** as deemed practical by DCR.
    iii. Any deficiency to the total required replacement caliper inch(es) shall be paid as restitiution to the Conservation Trust and Urban Parks Trust Fund. (See the Special Conditions for details).

f. All replacement trees shall be tagged at the approved nursery by the DCR Arborist, before being shipped to the work site.

g. All replacement trees shall be planted by an approved Landscape Contractor, supervised by a Certified Arborist and by standard arboricultural practices. They will be planted within the planting season during which the work is completed. If this cannot be done, planting shall be done in the next planting season. Planting seasons are April 1 through June 15 and September 15 through October 31.

J. OPERATING SCHEDULE

1. DCR roadways shall not be occupied between the hours of 6:30 a.m. and 9:30 a.m. and the hours of 3:30 p.m. and 6:30 p.m. Monday through Friday, or as otherwise described **in the Special Conditions**. This provision includes time for the placements of traffic equipment to set up the Traffic Management Plan.

2. The Permittee shall shut down all work at 12:00 p.m. (noon) on the eve of major holidays, which include Memorial Day, Independence Day, Labor Day, Thanksgiving, Christmas and New Year's Day or as otherwise described in the Special Conditions.

3. During periods of closing due to inclement weather or any other cause not within the control of the DCR, all other obligations of the Permittee shall not be waived. The DCR shall not be responsible for any costs incurred or revenue lost due to closing or re-opening of facilities or roadways under the provisions of this section.

4. Should a Special Event occur on the premises during the active duration of this permit, the Permittee will minimize any impacts on the park patrons. Any permitted work on DCR properties associated with the special event location, will cease and or shutdown at 10:00 p.m. prior to the start of the special event permit, and shall only resume after the area impacted by the special event has been cleared, cleaned and maintained.

K. TAXPAYER IDENTIFICATION NUMBER

1. Upon request by DCR, the Permittee shall remit to the DCR a Department of Revenue Certification of Good Standing; complete and remit a Taxpayer Identification Number and/or a Certification (Massachusetts Substitute W-9 Form) prior to the execution of this Permit. (as noted in the Special Conditions)

L. RISK OF OPERATION AND INDEMNIFICATION

1. The Permittee shall assume all risk in connection with any and all activities engaged in on the Premises, and shall be solely responsible and answerable in damages and any other remedies for all accidents or injuries to all persons or property caused by the Permittee and/or its contractors, agents, representatives, employees, licensees, guests and invitees.

2. The Permittee shall be responsible for the security of the Premises and the protection of the assets and property of the DCR. The Commonwealth shall not be responsible for property of the Permittee, its contractors, agents, representatives, employees, licensees, guests and invitees.

3. The Permittee shall agree to defend, hold harmless, and indemnify the Commonwealth of Massachusetts, the DCR, and its agents, officers and employees from any claims regardless of fault, arising out of any violation of any law, ordinance or regulation affecting the activities authorized herein by this Permit, from any claims for personal injury or death or damage to personal property, of whatever kind or nature, arising from the Permittee's activities on the Premises, including claims arising from the intentional, reckless or negligent acts or omissions of the Permittee, its contractors, agents, representatives, employees, Permittee's, licensees, guests and invitees, as authorized under this Permit and claims arising from the Permittee's failure to provide adequate security on the Premises.
4. The Permittee shall not make any claims against the Commonwealth or the DCR for any injury, loss, or damage to persons, including bodily injury or death, or damage to property or costs or liabilities arising out of or in connection with this Permit, the obligations thereunder and the Permitted Uses, such as without limitation response actions engaged in or required under law or this Permit, including any acts or omissions of the Permittee, its contractors, agents, representatives, employees, licensees, guests and invitees, except for claims arising solely from the reckless conduct of the DCR.
5. The Permittee shall waive any and all claims for compensation for any and all loss or damage sustained by reason of any interference by any public agency or official in the operation of this Permit.
6. The risk of loss resulting from any natural weather phenomena or occurrences remains with the Permittee.
    a. Compensation due to the DCR shall not be reduced or abated in any manner due to natural weather phenomena or other occurrences.

M. INSURANCE

1. The Permittee, its employees, contractors or agents shall hold the appropriate valid license(s) as required by law to perform the construction work associated with this Permit for the duration of the Permit.
2. The Permittee and or their contractor shall carry insurance in the types and amounts as described in this section of the Permit at its own expense.
3. The Permittee shall maintain said policies for the full Term of this Construction permit. Failure to maintain insurance coverage shall be deemed a material breach of the Permittee's duties under this Construction permit.
4. If the Permittee's insurance provisions, terms, and coverage, are amended, changed, suspended, expired or cancelled in any fashion, the Permittee shall, to the extent practicable, provide DCR with at least 30 days advance notice thereof.
5. The Permittee shall furnish Certificates of Insurance issued by an insurer or insurers qualified to do business in the Commonwealth. Said Certificates of Insurance must be provided for review and approval to the address listed below prior to execution of the Permit.

Department of Conservation and Recreation
Construction Access Permits
Permit No: _____
251 Causeway Street, Suite 700
Boston, Massachusetts 02114

6. Failure to furnish said Certificates of Insurance and/or policies shall be deemed a material breach of the Permittee's duties under this Permit but in no way shall release Permittee of its obligations herein.
7. The Commonwealth of Massachusetts, including its DCR, shall be named as an additional insured on all policies specified herein, except that in regard to section M.12 the Commonwealth shall be named as an additional insured only on the contractors pollution liability portion of the professional/contractors pollution liability policies per policy endorsements.
8. **General Liability:** The Permittee shall carry General Liability Insurance in the minimum amount of $1,000,000 per occurrence, $2,000,000 in the aggregate.
9. **Public/Products Liability Insurance**. The Permittee shall carry public liability insurance as to third persons, and products liability insurance against claims based upon the services provided, in the minimum amount of One Million Dollars ($1,000,000) in the event of death or injury to one individual, and a minimum of Two Million Dollars ($2,000,000) in the event of death or injury to more than one individual, or such other amounts of liability insurance coverage the DCR shall reasonably require from time to time.

10. **Fire and Casualty Insurance**. The Permittee and or their contractor shall carry fire and casualty liability insurance in a minimum amount equal to the fair market value of the structure(s) located upon the Premises, if required by DCR.

11. **Professional/Environmental Impairment Liability Insurance**: Unless specifically excluded in writing in the Special Conditions of this Permit, the Permittee shall carry, or shall cause its contractor to carry, Environmental Impairment Liability Insurance, and shall cause its consultants to carry Professional Liability Insurance, that includes coverage for environmental contamination, bodily injury and/or property damage arising out of acts, errors and omissions of Permittee or its contractors, employees or agents in the performance of the Permitted Uses or any other activities or failures to act at or with respect to the Premises in the amount of one million dollars ($1,000,000) for each claim and three million dollars ($3,000,000) in the aggregate. Coverage includes claims based upon or arising out of underground storage tanks. Notwithstanding any contrary provisions section, said Professional Liability and Environmental Impairment Liability Insurance may be written on a "claims made" basis provided that the insurance coverage is maintained during the full term of this Permit and for at least three (3) years after the expiration of the Term.

12. **Automobile Bodily Injury and Property Damage Liability Insurance** in an amount not less than the compulsory coverage required in Massachusetts. Such insurance shall extend to owned, non-owned and hired automobiles used in the performance of the activities under this License. The limits of liability of such insurance shall be not less than one million dollars ($1,000,000) combined single limit.

13. If the Permittee's and/or their contractor's insurance provisions, terms, coverage, etc. are amended, changed, suspended, expired or cancelled in any fashion, the Permittee must notify the DCR verbally immediately and shall notify the DCR in writing within five (5) business days.

N. HAZARDS ~ PHYSICAL, ENVIRONMENTAL AND CHEMICAL

1. The Permittee shall periodically inspect all areas used by the public in and around the Premises for the presence of unsafe or hazardous conditions and shall promptly remedy such conditions when found and shall promptly report the conditions to the DCR. The Permittee shall develop an accident reporting system and shall ensure that all employees understand and comply with said system. The Permittee shall make and preserve records of all accidents, emergencies and administration of medical aid on the Premises.

2. The Permittee shall immediately verbally notify DCR of any injuries, property damage or related incidents that occur on the Premises and shall provide written notice to the DCR Regional Engineer within five (5) calendar days of said incident. The written notice shall provide a detailed account of the incident, including, but not limited to, the nature of the incident, the names of any individuals involved and the names of any and all witnesses, all phone numbers, addresses, and contact information of affected individuals and witnesses, and the names of any agencies (federal, state, and/or local) that responded to the incident.

3. If the Permittee is notified by any regulatory agency having authority over the Premises that the Premises operations are in violation of an applicable rule, regulation or statute, the Permittee shall take immediate action to cure said violation. If the Permittee fails to take prompt remedial measures, the DCR may suspend the operations on any part or all of the Premises.

4. The Permittee shall not release, discharge or similarly dispose of hazardous substances, chemicals or materials.

5. Without limiting any of Permittee's obligations under this or any other Section of this Permit, Permittee agrees that it shall not cause any hazardous materials to be used, (with the exception of oil and other petroleum products contained within and necessary for the equipment utilized during the Permitted Uses), generated, stored or disposed of on, under or about, or transported to, from or through the Premises, except for soil, groundwater or any other material originating on the Premises and removed from the Premises by Permittee as required for the Permitted Uses (e.g., drill cuttings and soil samples, and excavated soil). Permittee assumes full liability and responsibility for such soil, groundwater or other material removed from and not replaced on the Premises including, but not limited to, responsibility for ensuring that the handling, treatment, transport, storage and/or disposal of these materials is properly and safely performed according to all applicable federal, state, and local laws, regulations and governmental requirements.

6. If Permittee's use of the Premises results in the need for a further response action under applicable environmental laws (other than the ch. 21E response actions being undertaken as described in the Scope of Work), the Permittee shall give immediate telephone notice to DCR by calling the Environmental Section Head, Robert Lowell at (617) 626-1340. Without limiting any other provision of this Permit, completion of any such response action shall be the sole responsibility of the Permittee, shall be performed in accordance with

applicable environmental laws at Permittee's sole expense, and shall not be performed without the prior approval of DCR unless an emergency situation exists and approval cannot be obtained. DCR reserves the right to supervise Permittee's contractor(s) implementing any such response action, and all submittals required to be made to any regulatory agency must be reviewed and approved by DCR.

7. For the purposes of this Permit, "hazardous materials" shall include, but not be limited to, substances defined as "hazardous substances", "toxic substances", "hazardous wastes", "hazardous materials", "oil" or "asbestos" in any federal or state statute concerning hazardous substances, wastes or materials now or hereafter enacted, including all regulations adopted or publications promulgated hereunder.

8. Pesticide applications may be allowed with written permission by DCR. If allowed, only those materials approved and registered by the U.S. Environmental Protection Agency for the specific purpose planned shall be considered for use on the Premises. Label instructions shall be strictly followed in the preparation and application of pesticides and other hazardous substances and disposal of excess materials and containers. Any and all applicators shall be duly licensed by the Commonwealth and the U.S. Environmental Protection Agency. Use of said materials must have prior authorization from DCR.

9. The Permittee assumes all risk associated with any environmental condition within the subject property and shall be solely responsible for all costs associated with evaluating, assessing and remediating, in accordance with all applicable laws, any environmental contamination (1) discovered during the Permittee's work or activities under this permit to the extent such evaluation, assessment or remediation is required for Permittee's work, or (2) resulting from Permittee's work or activities under this permit. Permittee shall notify DCR of any such assessment and remediation activities for review and approval of proposed activities; except for emergency containment. The Permittee is hereby held solely responsible for obtaining and maintaining any and all environmental compliance permits required by local, state and federal laws and regulations when regular or emergency work is proposed within, or in close proximity to, any wetland area.

10. In the event the Permittee learns of any release of oil or hazardous material or any other emergency within or from the Permitted Area, in addition to providing any regulatory notice required by any local, state or federal law or regulation, the Permittee shall provide notice of any such release or other emergency to DCR as soon as practicable thereafter, but not more than three (3) hours following any such release or emergency. Notice shall be given orally by telephone to the DCR Operations Control Center at (617) 946-3150. In the case of a release or other environmental emergency, notice must also be given in writing within twelve (12) hours, deposited in the United States mail, certified, return receipt requested, postage prepaid to:

    Department of Conservation and Recreation
    21 Causeway St., Suite 700
    Boston, MA 02114
    ATTN: Robert Lowell

11. In the event that the Permittee may impact contaminated soil and/or groundwater through permitted activities, the result may require site characterization under the supervision of a Licensed Site Professional (LSP). In this instance, the Permittee shall cease work and obtain from the Massachusetts Department of Environmental Protection (MassDEP) a written approval of a Response Abatement Measure (RAM) Plan (per 310 CMR 40) for the Permitted Uses to continue. The Permittee and its LSP shall oversee work in the Permitted Area to ensure that:

    a. Worker health and safety is protected.

    b. Soil generated and to be removed, if any, is properly disposed of in accordance with M.G.L. c. 21E / Massachusetts Contingency Plan and other applicable state and federal law

    c. The RAM is properly implemented and completed. Disposal, if any, of such soil shall be done under the supervision of an LSP and certified by the LSP to MassDEP.

O. LAND MARKERS AND MONUMENTS

1. The Permittee shall take reasonable precautions to protect all public land survey monuments, public land boundary markers and private property corners.

2. In the event that any such markers or monuments are disturbed or destroyed, the Permittee shall take appropriate action to reestablish them in accordance with specifications of the town or county surveyor, or the DCR.

P. TERMINATION

1. The nature of this Permit is a revocable license. As such, the DCR may terminate, with or without cause, upon written or oral notice to the Permittee, at which time all work associated with the permit will immediately end. If applicable, thereafter, the Permittee may cure or remedy such matter within no more than twenty four (24) hours. If the Permittee does not satisfactorily remedy or cure said matter, this Permit will be deemed terminated. If this Permit is revoked or terminated, Permittee shall not be relieved of liability to DCR or the Commonwealth for arrears in any fees or for any other injury, cost, liability or damage sustained or for any response action required or identified as needed as result of a Permittee's entry and/or use of the Premises, whether occurring before or after such termination.
2. All obligations required of the Permittee under the terms of this Permit shall expressively survive the given termination/expiration date until such obligations are completed to the satisfaction of the DCR.

Q. NON-DISCRIMINATION

1. The Permittee acknowledges that there shall be no discrimination against any employee who is employed in the work covered by this Permit, or against any applicant for such employment, based on race, color, religion, sex, sexual orientation, age, national origin, veterans' status, or physical or mental handicap.
2. The Permittee shall comply with all applicable federal and state statutes, and rules and regulations promulgated there-under prohibiting discrimination in employment.

R. STATUS OF PERMITTEE

1. The relationship of the Permittee to the Commonwealth of Massachusetts and the DCR is that of a Licensee. The Permittee covenants and agrees that it will conduct itself consistent with such status, that it will neither hold itself out as, nor claim to be, an officer or employee of the Commonwealth by reason hereof, and that it will not, by reason hereof, make any claim, demand or application to, or for any right or privilege applicable to an officer or employee of the Commonwealth of Massachusetts, including, but not limited to, Worker's Compensation Coverage, unemployment insurance benefits, Social Security coverage or retirement membership or credit.
2. Nothing herein contained shall create or be construed as creating a co-partnership between the DCR and the Permittee or to constitute the Permittee as an agent of the DCR.
3. The Permittee acknowledges that this Permit does not confer any rights in real property to the Permittee. As a licensee, the Permittee may enter and use the Premises solely for those purposes contained in this Permit. Any use of the Premises by the Permittee that is inconsistent with the terms of this Permit shall be deemed a material breach of the Permittee's rights and obligations under this Permit.

S. MERGER

1. All Attachments or Exhibits to this Permit are hereby incorporated by reference and become part of this Permit. Any failure to comply with the terms and conditions contained in any Attachment or Exhibit by either party constitutes a breach of this Permit. The Attachments and Exhibits are intended to be used to clarify the terms of this Permit. In the event there is an irreconcilable conflict between the terms of this Permit and those contained in an Attachment or Exhibit, the term contained in this Permit shall supersede.
2. Plans and documents, including, but not limited to, TMP, pedestrian and vehicle plans, and MUTCD specifications, which are submitted to and approved by the DCR, are hereby incorporated by reference and become part of this Permit.

T. WAIVER

1. No waiver during the term of this Permit, by either party, of any term, condition or covenant of this Permit shall be deemed a waiver at any time thereafter of the same provision or of any other provision contained herein, or of the strict and prompt performance thereof.

U. FORCE MAJEURE

1. Neither party shall be liable to perform its part of this Permit when such failure is due to fire, flood, war, riot, insurrection and/or other catastrophe beyond the control of the parties.

V. SEVERABILITY

1. If any provision of this Permit, or portion of such provision, is held invalid, the remainder of this Permit shall continue in full effect.

W. MODIFICATIONS OR AMENDMENTS

1. Modifications or amendments to this Permit shall be in writing and duly executed by both parties hereto to be effective.

X. ASSIGNMENT AND SUBLETTING

1. Except with the consent of the DCR, this Permit is not transferable.
2. The Permittee shall not assign, sublease, transfer or otherwise dispose of its management responsibilities or of any right, interest or use of the Premises covered by this Permit to anyone other than its contractor or parties specifically named in this permit, without the prior written consent of the DCR.
3. Any such disposition without the written consent of the DCR shall constitute a material breach of this Permit, which shall be cause for immediate termination of the Permit by the DCR.
4. The DCR shall not be obligated to recognize any right of any person or entity to any interest in this Permit or to any rights, equipment, structures, or property of the Permittee at the Premises. Any assignments of rights under this Permit are void.
5. The Permittee may not enter into any agreement with any entity or person, except employees of the Permittee, and/or its contractor or parties specifically named in this permit and/or their contractors, to exercise substantial management responsibilities for operation of the Premises without the prior non-electronic written consent of the DCR Commissioner or designee.
6. In the event of any unapproved or prohibited transfer or encumbrance by the Permittee, or in the event of any default of its obligations to persons or entities which are not a Party to the Permit, such person or entity shall not be deemed to have acquired operating rights, privileges, or title to the Premises or real or personal property of the DCR.
7. Any third-party beneficiaries have no enforceable rights under this Permit.

Y. ATTACHMENT

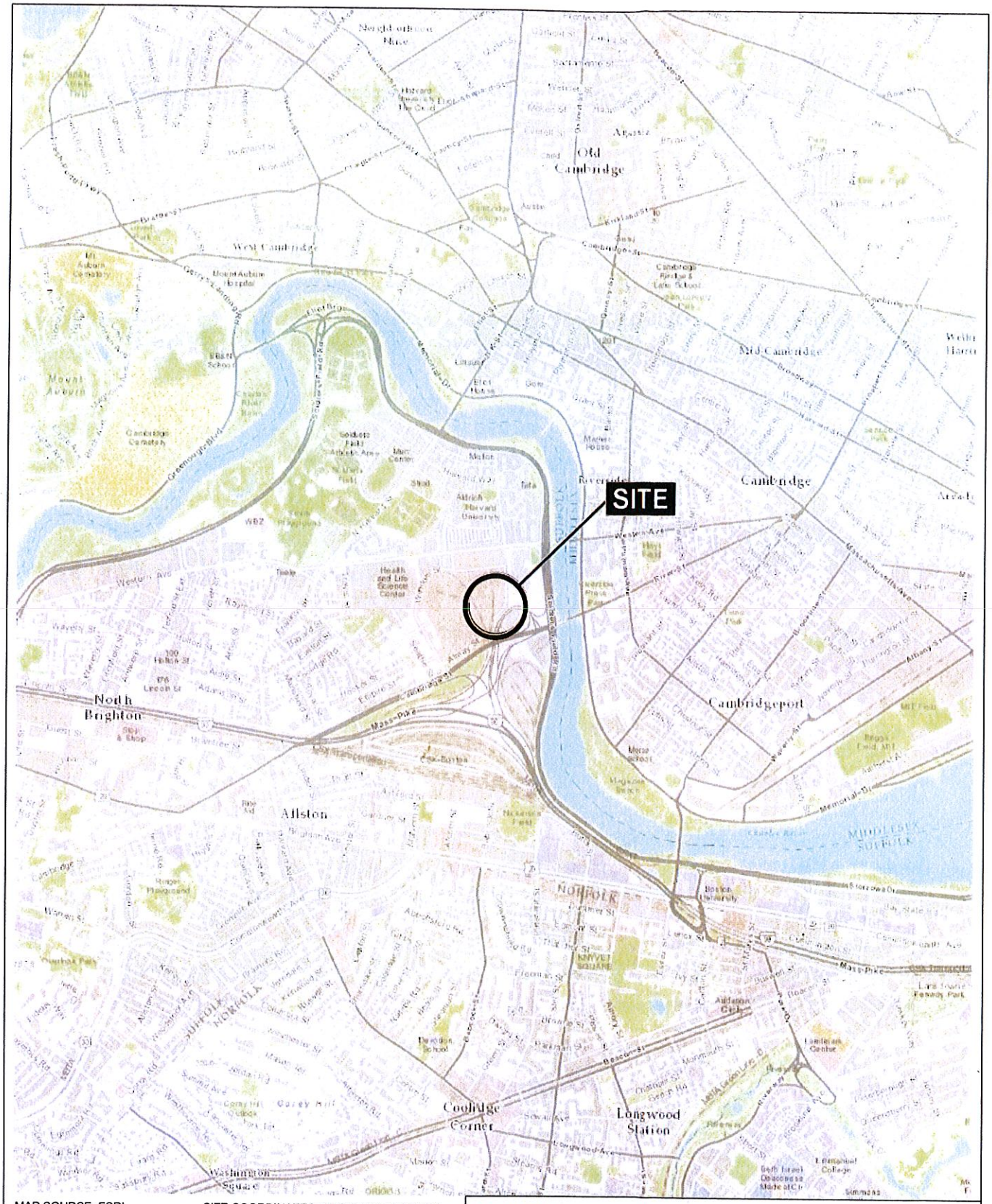
1. The Permittee is not authorized to permit and shall not permit any liens, mortgages or other security interests for any purpose to be attached to the Permitted Area in connection with the Permittee's use of, occupancy of, and/or activities in, around or near the Permitted Area under this Permit, including without limitation any repairs, renovations, alterations, additions, betterments, fixtures and/or improvements to the Permitted Area. The Permitee shall, upon request of DCR, furnish such waivers of any liens, mortgages, and/or any other security interests, as DCR may require and in a form that is satisfactory to DCR. The Permitee shall, upon the request of DCR, furnish such surety bonds as DCR may request and require, as it relates to said waivers. In the event that any liens, mortgages, or other security interests are attached to the Permitted Area or any part thereof or improvement thereto, the Permitee shall forthwith cause such liens, mortgages, and/or security interests to be released of record without cost to DCR.

Z. NOTICE

1. For purposes of this Permit, the parties hereto shall, unless otherwise indicated below, be deemed duly notified of any information or issues arising from the operation of this Permit in accordance with the terms and provisions hereof only if written notices are provided by first class mail, overnight mail or hand delivered or fax delivery with confirmation to the parties noted in the Notices and Contacts section, (DCR Construction Permits Director; DCR Region Manager, and (DCR Chief Engineer) subject to change upon notice in writing to that effect;
2. If the permitted work site encompasses and or encroaches upon designated parking spaces and or parking areas, the permittee will install additional **signage** indicating the parking restriction.
    a. The "TEMPORARY PARKING RESTRICTIONS" signage must be installed at least 48 hours prior to the start of each portion of the permitted work. A copy of the parking restriction along with the date and time it was posted must be emailed to kathy.delucca@state.ma.us [617-626-1418] or Faxed to 1-617-626-1472. Should the permittee not post within the specified time, they will be responsible for any towing reimbursement that may occur.
    b. Should the parking spaces and/or parking areas be located in a residential neighborhood the permittee will provide written notice (mailed or posted) to area residents who may be impacted, at least 72 hours prior to use of the parking space. This notice may include leafleting all cars and mailboxes within 150 feet of the restricted parking area. A description of how you notified the neighbors plus a copy of the

parking restriction including the date and time it was posted must be emailed to kathy.delucca@state.ma.us or Faxed to 1-617-626-1472.

3. Before any work is started, the Permittee will provide notice to parties indicated in the Special Conditions and the Notices and Contacts section.
4. The Permittee will supply a written work schedule prior to the commencement of work, and will update the schedule at the time of 50% and 80% completion to parties indicated in the Special Conditions and Notices and Contact section.
5. At least seventy-two (72) hours prior to removing any vegetation from the Premises, notice shall be provided to the DCR Landscape Architect (as specified in the Notices and Contacts section).



MAP SOURCE: ESRI

SITE COORDINATES: 42°21'42"N, 71°7'14"W

HALEY ALDRICH

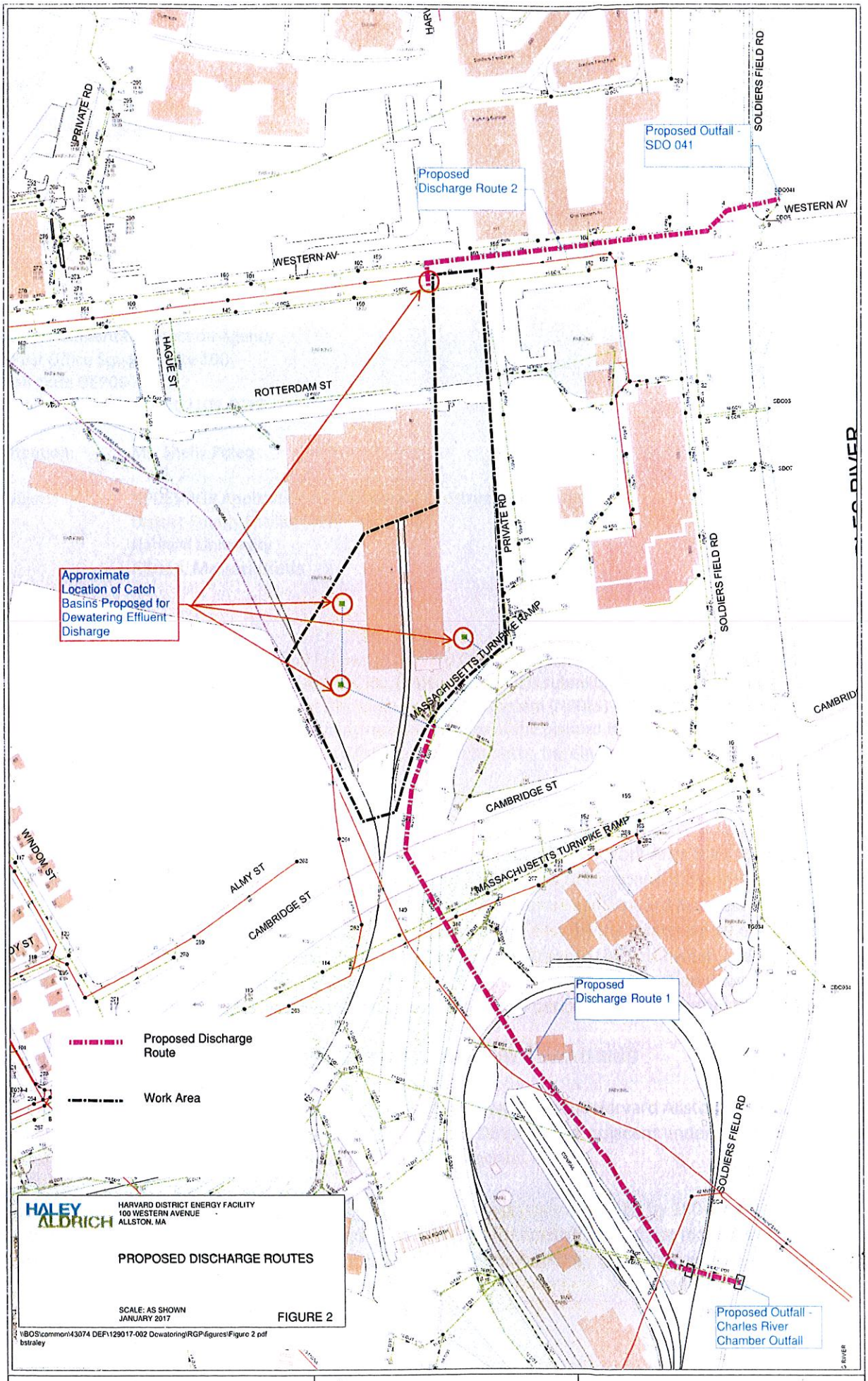
DISTICT ENERGY FACILITY
HARVARD UNIVERSITY
WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
NOVEMBER 2016

FIGURE 1

129017-001 A004.PDF



HALEY ALDRICH

HARVARD DISTRICT ENERGY FACILITY
100 WESTERN AVENUE
ALLSTON, MA

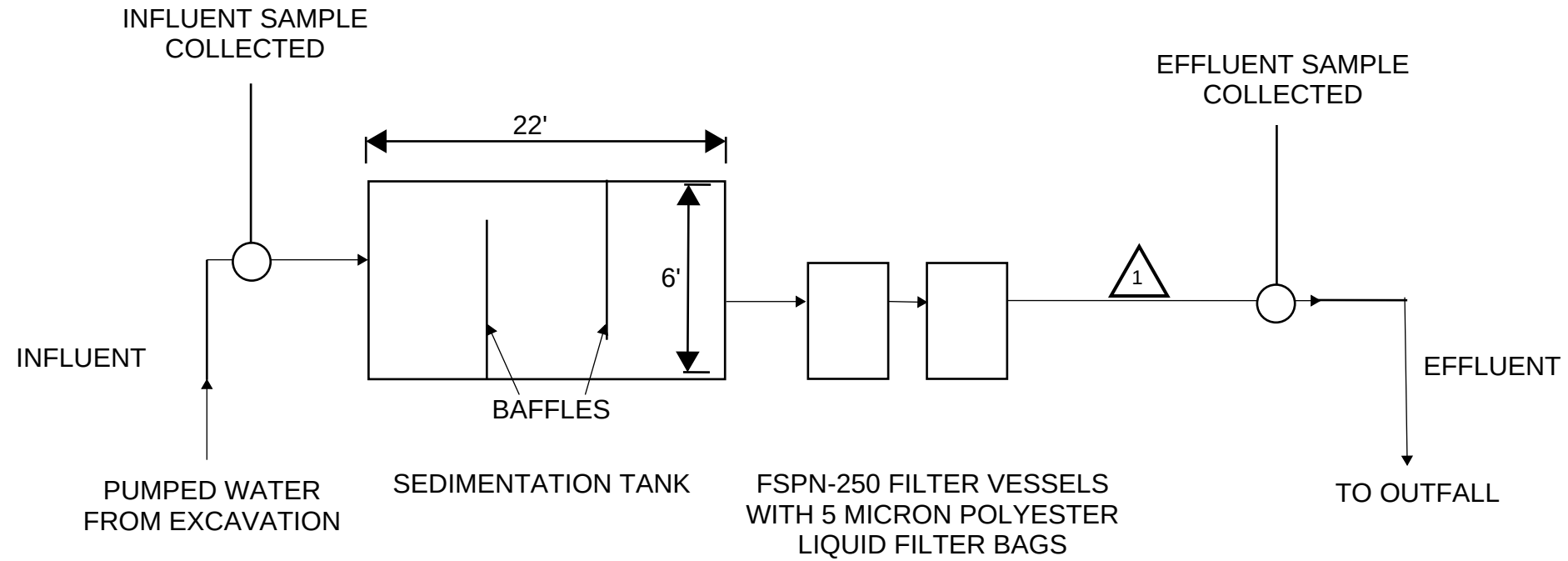
PROPOSED DISCHARGE ROUTES

SCALE: AS SHOWN
JANUARY 2017

FIGURE 2

\\BOS\common\43074 DEF\129017-002 Dewatering\RGP\figures\Figure 2.pdf
bstraley

BOSTON WATER AND SEWER



LEGEND:

DIRECTION OF FLOW

1 IF MONITORING RESULTS INDICATE THE NEED FOR ADDITIONAL PRETREATMENT, ADDITIONAL COMPONENTS WILL BE ADDED HERE AS REQUIRED. NO ADDITIONAL COMPONENTS ARE PLANNED AT THIS TIME.

HALEY ALDRICH

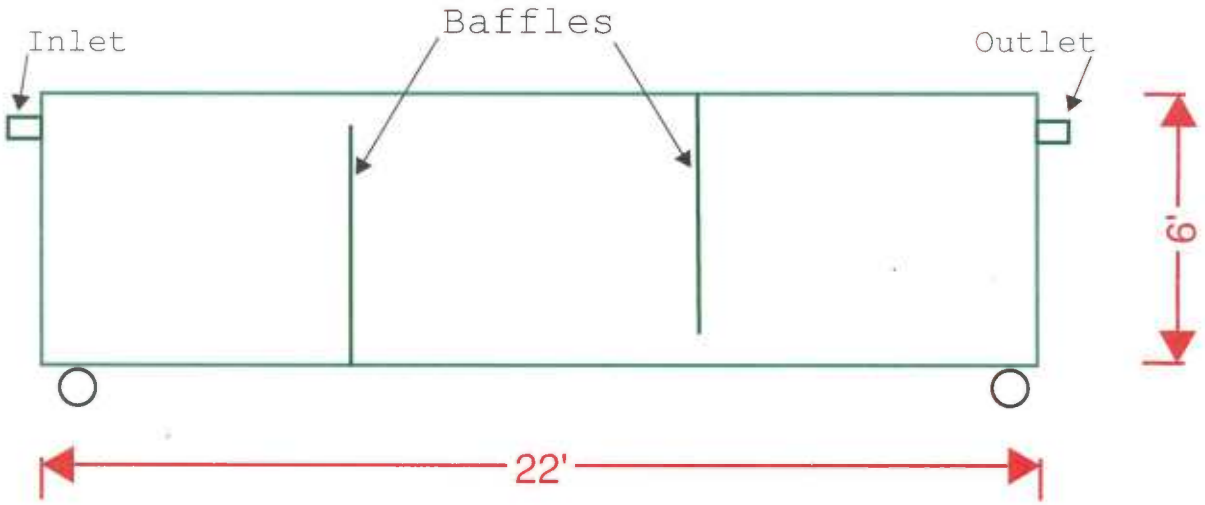
HARVARD DISTRICT ENERGY FACILITY
ALLSTON MASSACHUSETTS

DEWATERING TREATMENT SYSTEM PLAN

SCALE: NTS
MARCH 2017

FIGURE 1

\\BOS\common\43074 DEF\129017-002 Dewatering\RGP\Appendix B- DCR Permit\Figure 3 - Trea
bstraley

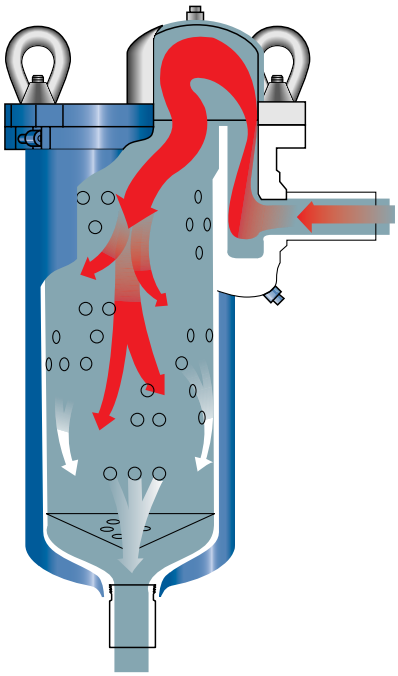


DEWATERING SEDIMENTATION TANK

N.T.S.

THE WELCH CORP. Contractors

FSPN Vessels



Introduction

When it comes to a line of filters that cover nearly every fluid application need, it has to be the FSI line of FSPN vessels. From the compact FSPN-35 miniature single bag filter vessel to the workhorse FSPN-40 and FSPN-85 vessels, or to the FSPN-250 dual filter vessel, we have exactly what your flow demands require. The FSPN vessels can also be equipped with a hydraulic lid lift.

All FSI filter vessels are designed, built and stamped to meet code requirements in our own ASME Code manufacturing facilities. Standard equipment features like the single-gasket seal and permanent piping, with sturdy perforated metal baskets provide durable and consistent performance. Order Information sheets are available.

Features:

- Completely cleanable with easy access to all cleanable parts.
- Full ports for unrestricted flow.
- Single gasket lid seal.
- Positive seating bag.
- Optional hydraulic lid lifts.
- NPT or flange connections.
- Standard materials for the FSPN vessel include Carbon Steel and 316 Stainless Steel.
- Optional materials include Hastelloy C, 304 Stainless Steel, 304L, 316L, Titanium, and Alloy 20.
- Vessels are designed and built to ASME code, where applicable. CRN & CE also available.
- All vessels conform to OSHA standards.
- Multiple bag vessels are available with in-line or offset connections. Flanged fittings are standard.
- On single bag units, side-in, bottom out designs are standard; other outlet configurations are available as options.
- On single bag units for sanitary or coated interior applications see our FSPN - 21,31,42 or 82 models.

Pressure Ratings

100, 150 or 300 PSI. Other ratings available as specified by customer.

Options

- Corrosion allowance, Partial Jacket or Full Jacket. Fully adjustable legs available on FSPN250 and smaller only.
- Different coatings are available.
- Mesh lined and heavy duty baskets are also available.
- Sanitary fittings

FSPN Vessels

Hinged cover and swing-out bolts with eyenuts

Single gasket seal

Polyloc snap-tight bag seal

Permanent piping (in-line models available)

Seam welded basket

***FSI Bag Filter Vessels** are designed, built and stamped to meet code requirements in our own ASME code manufacturing facilities.*

STANDARD FSPN VESSEL MODELS

Model Number	FSPN-20	FSPN-35	FSPN-40	FSPN-85	FSPN-250	FSPN-355	FSPN-800	FSPN-1100	FSPN-2000	FSPN-2500	FSPN-3000	FSPN-3500	FSPN-4000	FSPN-4200	FSPN-4500	FSPN-4800	FSPN-5000
No. of Bags	1	1	1	1	2	3	4	6	8	10	12	14	16	18	20	22	24
Bag Size No.	3	4	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Surface Area per Bag, Ft	0.5	1.0	2.0	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Surface Area per Vessel, Ft^2	0.5	1.0	2.0	4.4	8.8	13.2	17.6	26.4	35.2	44.0	52.8	61.6	70.4	79.2	88.0	96.8	105.6
Inlet and Outlet Siz	1”	1”	2”	2”	3-4”	3-4”	4-6”	4-6”	6-8”	8-10”	8-10”	10-12”	10-12”	10-14”	10-14”	10-14”	10-14”
Max Flow Rate, GPM	25	45	90	200	400	600	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800

* ***NOTE:** The maximum flow rate GPM is the MAXIMUM FLOW RATE recommended through the vessel WITHOUT filter bags installed using water as a base. Any increase in fluid viscosity, or the installation of filter bags, will reduce the maximum GPM figures significantly. Please consult your FSI representative when sizing these vessels.*

FSPN Vessels

HOW TO ORDER FOR FSPN VESSEL MODELS

Outlet Type:
See Inlet Type (below) for code letter

Inlet Type:
C = Sanitary fitting
D = Flange, din
F = Flange, slip-on, raised face, std.
H = Flange, weld neck, raised face
I = Flange, weld neck, flat face
K = Flange, lap joint
N = Female NPT
M = Male NPT
P = Plain pipe
S = Special
T = Plain OD tube
W = Socket weld

Inlet Size:
Use basic pipe size with the following exceptions:
0D = 0.5
0E = 0.75
1B = 1.25
1D = 1.5
2D = 2.5

Vessel Pressure Rating (PSI):
0100, 0150, 0300
Per customer specification

Model Number:

Example: FSPN0800 A 0150 N 04 F 04 F 01 B 2P 065 A

Vessel Material:
A = Carbon steel
B = 304 stainless steel
C = 316 stainless steel
D = 304L stainless steel
E = 316L stainless steel
F = Alloy 20
G = Hastelloy C-276
T = Titanium
S = Special

Coating/Lining Material

	THICKNESS
A = Electropolish	
B = Buna-N	1/8" or 3/16"
E = EPR	1/8" or 3/16"
F = Paint finish/prep	
H = Hypalon	1/8" or 3/16"
J = Kynar or Halar	20 mil
L = Electroless nickel	
M = Prime electropolish	
N = None	
P = Plastic (epoxy)	10 mil
R = Natural rubber	1/8" or 3/16"
S = Special	
T = Teflon	5 mil
X = Passivation	
Y = Butyl	1/8" or 3/16""

Outlet Size:
Use basic pipe size with the following exceptions:
0D = 0.5
0E = 0.75
1B = 1.25
1D = 1.5
2D = 2.5

Lid Opening Type:
1 = Hinge
2 = Manual davit
3 = Hydraulic davit
4 = Clamshell
5 = Other

Jacket Pressure Rating:
065 (standard), 100, 150
Per customer specifications

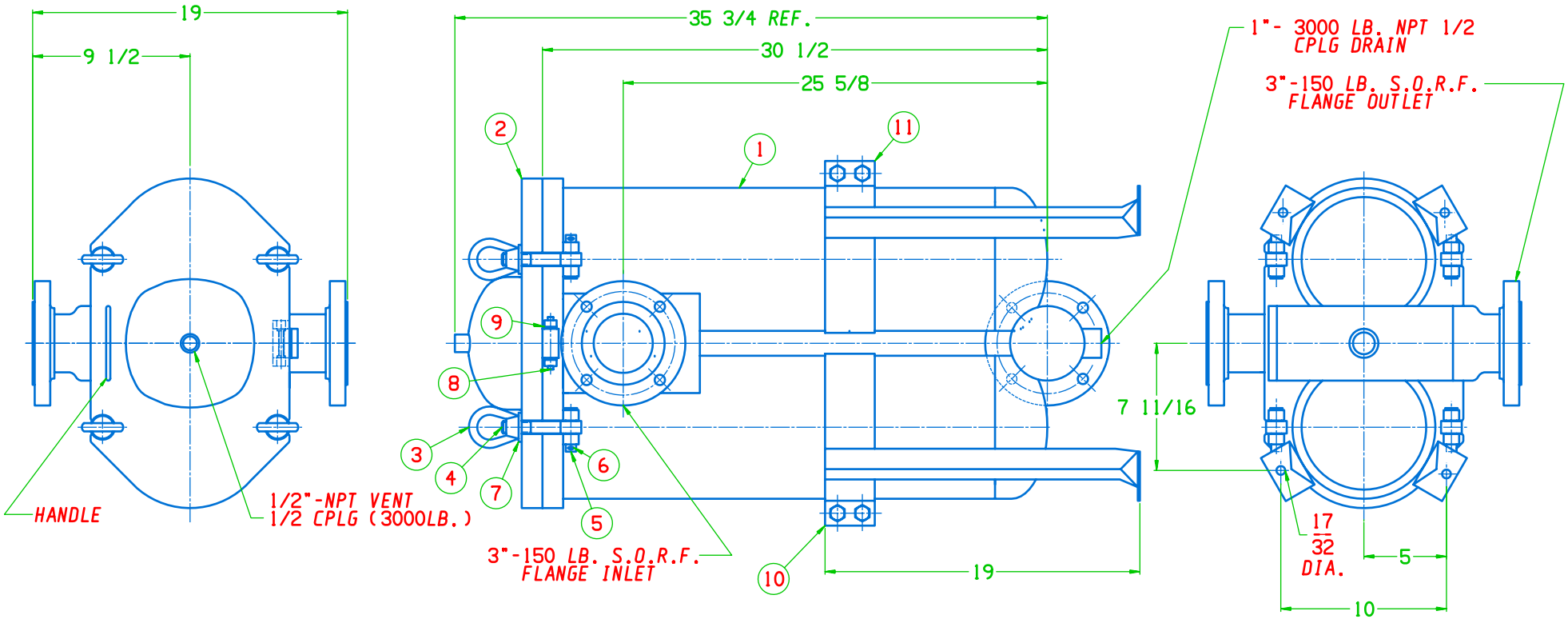
Jacket Material:
See Vessel Material group (left) for code letter

Nozzle Configuration:
See chart on page 59
(2 digits needed)

Internal Usage:
A = Removable grate
B = Modified basket seat
F = Fixed grate
R = Snap fit rings
S = Special
(Single Basket Housing)

Jacket Type:
N = None
P = Partial
F = Full

ITEM	QTY	DESCRIPTION	MATERIAL	PART NO.	ITEM	QTY	DESCRIPTION	MATERIAL	PART NO.
1	1	HOUSING WELD ASSY	C.S.	429026	8	2	1/2"X 3/4" SOCKET HEAD SHOULDER SCREW	C.S.	EHSB8C120A
2	1	LID ASS'Y (1 1/4" TK)	C.S.	PCA408971A	9	4	WASHER (1/2 USS)	C.S.	EHWS08S0A
3	4	EYE NUT (3/4-10 UNC)	SA-194-1	PHE25007A10	10	1	LEG ASSY (L.H.)	C.S.	LLA28180A
4	4	EYE BOLT (3/4-10 UNC 4 3/16"L)	SA-193-B7	PHB25009A09	11	1	LEG ASSY (R.H.)	C.S.	LLA28181A
5	4	CLEVIS PIN (5/8 DIA. 2 1/2"L)	SA-193-B7	PHP25152A09	12	2	BASKET (NOT SHOWN)	304 S.S.	EBA27025B
6	4	COTTER PIN (1/8 DIA.)	S.S.	EHCP03X160B	13	1	GASKET (NOT SHOWN)	BUNA-N (STD.)	EGL30010B
7	4	WASHER (HARDENED) 3/4 USS	C.S. ZN PLT.	EHWU12H0AZ					



CONSTRUCTION IN ACCORDANCE WITH A.S.M.E. CODE
SECTION VIII, DIV. 1.
FOR UNFIRED PRESSURE VESSELS
MAX. ALLOWABLE WORKING PRESSURE 150 PSI
HYDROSTATIC TEST PRESSURE 195 PSI
MAX. DESIGN TEMP. 500° F
MIN. DESIGN METAL TEMP. 20° F

STOCK VESSEL

CHG	REVISION	BY	DATE
C	REMOVED IT● 14 POLY-LOC INSERT RING	RS	10/25/12
B	REVISED BOM	JSM	2/23/05
A	UPDATED BOM	JSM	1/24/05

FSI FILTER SPECIALISTS INC.
MICHIGAN CITY, IND. 46360

FILTER ASSY
FSPN-250 #6- 3"FLG
PART NO. 429027

DATE 11-17-03 DWN BY RLH
APP'D RLH SCALE 1-5
MATERIAL C.S.
DRAWING NO. 1901749

Polyester Liquid Filter Bag

Features

* Polyester liquid bag filter are available with a carbon steel ring, stainless steel ring or plastic flanges.
* Heavy-duty handle eases installation and removal
* Metal ring sewn into bag top for increased durability and positive sealing
* Wide array of media fibers to meet needed temperature and micron specifications

Applications

Polyester liquid filter bags can be used in the filtering of a wide array of industrial and commercial process fluids

Sizes

Our liquid filter bags are available for all common liquid bag housings. Dimensions range from 4.12" diameter X 8" length thru 9" diameter X 32" length.

Micron Ratings

Available fibers range from 1 to 1500 microns

Options

* Bag finish or covers for strict migration requirements.
* Plastic top O.E.M. replacements
* Multi-layered filtering capabilities for higher dirt holding capacities

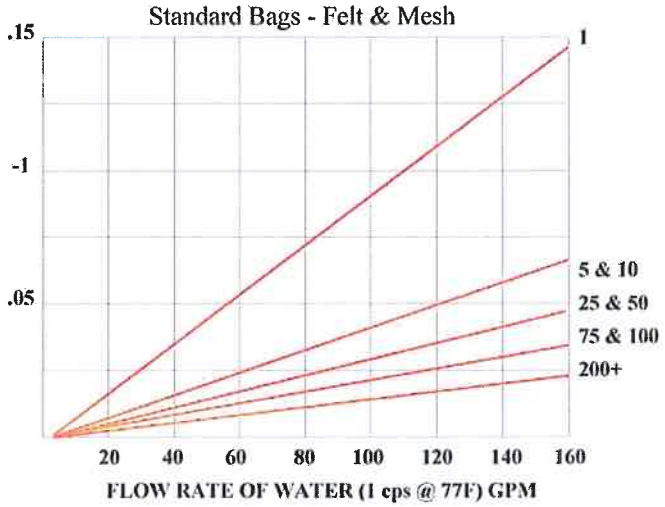
Optional Filter Media

Felt: Nomex, Polyester, Polypropylene

Monofilament: Nylon, Polyester, Polypropylene

Multifilament: Nylon, Polyester

Polypropylene: Oil Removal



Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Thomas J. Tinlin, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

May 10, 2017

Mr. Matthew Ali
The President and Fellows of Harvard University
thru Harvard Engineering and Utilities (E&U)
46 Blackstone Street
Cambridge, MA 02139

SUBJECT: **PERMIT # 6-2017-0013**
TEMPORARY CONSTRUCTION DEWATERING AT
I-90 INTERCHANGE NO. 18 RAMP D (100 WESTERN AVE) IN
ALLSTON, MA

Dear Mr. Ali:

Enclosed is the original, fully executed permit for your records. As stated in the Terms and Conditions, you must contact Mr. Robert Hutcheon to coordinate your access to the state highway. He may be reached at telephone number (857) 368-6308 or via email at **robert.hutcheon@state.ma.us**.

Once access has been granted, please contact the Highway Operations Center at telephone number (617) 946-3150 prior to and after roadway access.

Should you have additional questions/concerns please feel free to contact me at telephone number (857) 368-6319.

Thank you for your cooperation.

Sincerely,

Vivek Trivedi, PE
Permits Engineer

cc: D. Belanger, MassDOT

District 6 – OPERATIONS & MAINTENANCE
185 Kneeland Street, Boston, MA 02111
Tel: 857-368-6300, FAX: 857-368-0106/0105
www.mass.gov/massdot

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Thomas J. Tinlin, Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

PERMIT – ALLSTON

Temporary Construction Dewatering

Permit # 6-2017-0013

This Permit is issued as of the **10th** day of **May, 2017** by the Massachusetts Department of Transportation (MassDOT), a body politic and corporate duly established and existing pursuant to G. L. Chapter 6C, having an address of 10 Park Plaza, Suite 4160, Boston, Massachusetts 02116, to **Harvard Engineering and Utilities (E&U)** (the "Grantee"), having a usual place of business at **46 Blackstone Street, Cambridge, MA 02139** subject to the terms and conditions set forth in this Permit and any attachments to this Permit, to allow the Grantee to enter upon the Property (as that term is defined in Section 1 – "Scope of Work" of this Permit) for the sole purpose of performing the Work as that term is defined in Section 1 – "Scope of Work" of this Permit.

TERMS AND CONDITIONS

1. Scope of Work. The MassDOT hereby permits the Grantee, its agents and contractors, to enter upon the properties owned by or under the control of MassDOT located **within the State Highway Layout of I-90 interchange no. 18 Ramp D in Allston** (the "Property") as described in the **Application for Permit to Access State Highway** prepared by **Mr. Matthew Ali of Harvard Engineering and Utilities** and as shown on the plans titled **" Figure 1 Project Location; Dated: November 2016"** and **"Figure 2 Proposed Drainage Routes; Dated: January 2017"** prepared by **Haley & Aldrich, Inc.** for the limited purpose of permitting the Grantee access to **discharge temporary construction dewatering effluent to an existing on-site catch basins which connects to the MassDOT drainage system's drain manhole within Ramp D of I-90 interchange in conjunction with the Harvard District Energy Facility Project located at 100 Western Avenue in accordance with the aforementioned application and supporting documents, if applicable** (the "Work"), and in strict accordance with the terms and conditions of this Permit.

1.1. The Grantee is required to complete and submit the Access Work Request Form (attached) to Mr. Robert Hutcheon (857-368-6308) via email at Robert.hutcheon@state.ma.us no later than 12:00 PM on the Wednesday of the week preceding the work. MassDOT notifications (approvals and denials) will be delivered via email by 12:00 PM on Friday. The duration of work approvals shall be limited to one week at a time. If the work exceeds one week then a new Access Work Request Form is required to be submitted for each additional week.

1.2. The District will assign an inspector for the project whose primary responsibility shall be quality assurance inspections for work on MassDOT infrastructure. At least 48 hours in advance of work to be performed the Grantee must notify District 6 Permits Office from 7:30 AM to 3:00 PM Monday through Friday at (857) 368-6319. No work shall be authorized without said notification. Rework required for work performed without an inspector present shall be at no expense to MassDOT.

1.3. The proposed dewatering activity may be within the active construction work area for MassDOT Project for Improvements at Cambridge Street & River Street and I-90 Toll Demo project in Allston. Grantee will be required to coordinate scheduling of this work with Mr. Robert Hutcheon (857-968-6308) through MassDOT Access Work Program and Project Engineer Kathy Barr at 857-368-6211 prior to beginning of the work under this permit.

1.4. All MassDOT effected drainage structures including up to the pump station in the parking area now owned by Harvard University and pump station no. 1 located in the parking area on the inside of the ramp shall be cleaned before and after discharging the construction dewatering effluent and maintained during the dewatering period.

District 6 – OPERATIONS & MAINTENANCE
185 Kneeland Street, Boston, MA 02111
Tel: 857-368-6300, FAX: 857-368-0106/0105
www.mass.gov/massdot

1.5. At least 48 hours in advance of cleaning of drainage structures to be performed the Grantee must notify District 6 Director of Environmental Engineering, Mr. Rick McCullough, at (857) 368-6171. Work shall not proceed until the Director of Environmental Engineering approves a start date.

1.6. Prior to discharging the effluent into catch basins leading to MassDOT drain system, collected water must be routed through a treatment system consisting of a sedimentation tank and bag filters and/or other pre-treatment as necessary to comply with NPDES discharge criteria to remove suspended solids and un-dissolved chemical constituents.

1.7. All waste removal (liquid and solid) and disposal shall conform to the federal, state, and local regulations. Documentation of waste removal shall be sent MassDOT, Attn: Mr. Rick McCullough, Director of Environmental Engineering, D6, 185 Kneeland Street, Boston, MA 02111 within five days of submittal to the agency(s).

1.8. The Grantee shall be responsible to provide all EPA RGP testing results and any other communications with EPA, DCR, MWRA/BWSC, or any other environmental regulatory agency to MassDOT, Attn: Mr. Rick McCullough, Director of Environmental Engineering, D6, 185 Kneeland Street, Boston, MA 02111 within five days of submittal to the agency(s).

1.9. No roadway lane/shoulder closures shall be permitted to complete this work.

1.10. The Grantee shall comply with local noise regulations, exercising care to subject neighborhood abutters to the least amount of noise and vibration pollution during working and non-work hours.

1.11. No work will be performed on the day prior to or the day after a holiday or a long weekend which involves a holiday on any highway, roadway or property under the control of the MassDOT or in areas where the work would adversely impact the normal flow of traffic on the State Highway System without permission of the DHD or an authorized representative.

1.12. MassDOT will not be held liable for any damages to local roads caused by the increase in traffic generated because of the work under this permit.

1.13. ADA Compliant pedestrian access shall be maintained at all times during this permit.

1.14. It shall be the responsibility of the Grantee to provide access to the property of residents and business owners in the vicinity of the work during progress of the proposed work.

1.15. Provisions shall be made for the safety and protection of Pedestrian and Vehicular Traffic during the work. Sufficient uniformed police necessary to control motor vehicle and pedestrian traffic and to man the detour shall be present. The Grantee shall minimize delays to motorists and ensure the safety of pedestrians at no expense to MassDOT.

1.16. All work shall be in compliance with the LATEST Edition of the "Massachusetts Highway Department Standard Specifications for Highways and Bridges", and LATEST Supplemental Specifications at the time of construction of work approved under this permit and/or as directed in this Permit.

1.17. The furnishing and erecting of all required signs and traffic safety devices shall be the responsibility of the Grantee. All signs and devices shall conform to the LATEST edition of the Manual on Uniform Traffic Control Devices (MUTCD) with the Commonwealth of Massachusetts Amendments.

1.18. The Grantee shall take care during his operations not to damage existing signs. The Grantee is responsible to replace damaged signs at his/her expense in accordance with MassDOT sign installation protocols.

1.19. Care shall be exercised so as not to disturb any existing State Highway Traffic Duct Systems or any underground structures that exist. Any disturbance shall be restored immediately to its original condition. All expenses for restoring conditions shall be borne by the Grantee.

1.20. It shall be the responsibility of the Grantee to install or replace all pavement markings which have been disturbed by Work performed under this Permit as directed by MassDOT. The

pavement markings shall be restored within ten (10) Days after this work is performed or as deemed necessary by the District Highway Director or an authorized Representative.

1.21. The Grantee shall be responsible for and shall repair any damage caused by his operation to fence, guard rails, curbing, retaining wall, structures, roadways, traffic signal conduits, infrastructure, etc. Damage to guard rails, signal conduits or loop detectors shall be repaired by the end of the work day.

1.22. Care shall be used so as not to disturb any highway markers or property bounds. If it becomes necessary to remove and reset any bounds then the Grantee shall hire a Registered Professional Land Surveyor to perform this work. It shall be the responsibility of the land surveyor to submit to this office a statement in writing and a plan containing his stamp and signature showing that said work has been performed.

1.23. No trees shall be cut and/or removed under this permit.

1.24. No excavation of the sidewalks, roadways or driveways shall be permitted under this permit.

1.25. No construction vehicle shall be parked or construction equipment to remain within the state highway layout during non-work hours. In addition, on-site parking by construction personnel is not permitted. No personal vehicles will be allowed to be parked at or around the construction site.

1.26. Concrete sidewalk patches shall include full width and depth construction of the entire panel and shall extend to the nearest control or expansion joint covering full length of the trench construction as required. The sidewalk reconstruction shall be ADA compliant and in accordance with the MassDOT Standard Sidewalk Detail.

1.27. All disturbed unpaved areas must be regarded, loomed and seeded as per MassDOT standards and specifications upon completion of the work under this permit.

1.28. The highway surface shall be kept clean of debris at all times and shall be thoroughly cleaned at the completion of the scope of work under this permit.

1.29. All utility companies whose services are located within or adjacent to the proposed installation areas shall be notified in writing of the proposed installation at least 48 hours prior to the start of any excavation in said areas. Note: This is independent of the required Dig-safe notification.

1.30. Under no circumstances shall the operations create a hazardous environment for the general public.

1.31. The Grantee's contractor is responsible to ensure that all contractor personnel, including all subcontractors, working on the project are issued and are wearing all necessary personal protective safety equipment while working within the project limits. This equipment shall include, as a minimum, a hardhat, safety vest and glasses, regardless of the type of work being performed. Other safety equipment shall be added as required to perform the work in which they are engaged and in accordance with all local, state and federal requirements in effect.

1.32. Cones and non-reflecting warning devices shall not be left in the operating position on the highway when the daytime operations have ceased. All costs to remove any construction warning devices or their appurtenances from the project if it becomes necessary for the Department will be charged to the Grantee.

1.33. At the completion of this permit, all disturbed areas shall be a) restored to a condition equal to that which existed prior to the work or b) restored as agreed upon by the MassDOT as required at the Grantee's expense.

1.34. The Grantee shall complete and return the "Notice of Completion of Work" form (attached). The Grantee's liability for the site shall continue until the form is received and the completed work has been inspected.

1.35. The work shall be performed as per the aforementioned plans and documents on file at the MassDOT District 6 Permit Office.

1.36. This permit is issued with the stipulation that it may be modified or revoked at any time at the discretion of the District 6 Highway Director or an authorized representative without rendering said Department or the Commonwealth of Massachusetts liable in any way.

1.37. A copy of this permit must be on the job site at all times for inspection. Failure to have this permit available will result in suspension of the rights granted by this permit until such permit is made available.

1.38. This permit does not relieve the Grantee of their obligation to procure all necessary local, State or federal permits or licenses or public outreach/notifications as required completing the scope of work as depicted in the drawings. No work shall be permitted by the Department unless all permits necessary to complete the scope of work are secured by the Grantee. Copies of all other permits and/or approvals shall be forwarded to the MassDOT District 6 Permit office five (5) business days prior to commencing any field work. Said permits must be current and in full effect at the time of construction.

1.39. Failure to meet the terms and conditions provided at set forth by the Department shall result in the denial of future Permit requests.

2. Term of Permit. The term of this Permit shall commence on the date first above written and shall end on **May 9, 2018** (the "Expiration Date"), unless otherwise revoked or extended by the MassDOT in accordance with this Permit. The MassDOT reserves the right to revoke this Permit at any time prior to the Expiration Date for any reason or for no reason by written notice to the Grantee in accordance with the provisions of Section 6 below or, in the event of an emergency, as provided in Subsection 3(f) below, by verbal notice to the Grantee by the District Highway Director or his designee.

3. Conditions to Entry. The Grantee shall provide MassDOT representative(s) specified in Subsection 3(a) below with reasonable prior notice before the Grantee, its agents or contractors, enters onto the Property to perform the Work, and such entry shall be subject to reasonable conditions imposed by MassDOT representatives. The following shall apply to entry on the Property by the Grantee, its agents or contractors:

(a) the Grantee shall notify the following MassDOT representatives (where doubled checked) of the name of each agent or contractor that will be entering onto the Property, the proposed date and time of such entry and the nature of the Work:

Check off as appropriate (MassDOT use only)	*Name of MassDOT Representative*	*Title of MassDOT Representative*	*Telephone # of MassDOT Representative*
XX	Dave Belanger or designee	District 6 Highway Operations Engineer	(857) 368-6301
XX	Rick McCullough or designee	District 6 Director of Environmental Engineering	(857) 368-6171

The Grantee is prohibited from performing any work under this Permit until the Grantee (i) has received permission from the appropriate MassDOT representative(s), specified above, to commence the Work and (ii) has followed any further instructions of MassDOT;

(b) the Grantee or its principal shall comply with all provisions of the Permit which are prerequisites for commencing the Work including, but not limited to, the furnishing of payment and performance bonds to MassDOT and the securing of all requisite environmental permits from each municipality in which the Grantee will be conducting the Work under this Permit;

(c) all of the activities performed on the Property by the Grantee, its agents and contractors, shall be undertaken in a good, workmanlike and safe manner in compliance with all Applicable Laws. The term "Applicable Laws" shall mean all applicable local, state and federal laws, regulations, rules, orders, decrees, codes or ordinances.

(d) the Grantee shall notify the appropriate public service corporations and/or municipal departments prior to performing any work in the vicinity of their installations in accordance with the provisions of M.G.L. Chapter 82, Section 40. In particular, the Grantee shall notify the public service corporations and/or municipal departments 72 hours prior to performing any excavation on the Property in the vicinity of these installations, except as otherwise provided by the statute or this Permit. The telephone number for the Dig Safe Center is 1-888-DIG-SAFE;

(e) the Grantee, its agents and contractors, shall not unreasonably interfere with MassDOT or any tenants of the Property or their respective business operations or use and enjoyment of the Property. The Grantee shall not cause or permit any unlawful conduct, unreasonable annoyance or nuisance to exist or arise in the course of, or as a result of, the Work, nor permit any such activity. In particular, the Grantee shall not interfere with MassDOT's operation of the toll highway or harbor tunnels or any of its facilities in the performance of the Work, except as specifically provided herein, nor permit any such activity;

(f) in the event a public health or safety emergency should arise, as determined in the sole discretion of, MassDOT or its agents shall have the right to order the Grantee to interrupt the performance of the Work and to require the Grantee to vacate the Property. In addition, MassDOT or its agents may further undertake whatever action may be necessary, in MassDOT's sole discretion, to alleviate the emergency including, but not limited to, suspending or revoking this Permit;

(g) promptly upon completion (or discontinuance) of the Work, the Grantee, at its sole expense, shall remove or cause to be removed from the Property all materials, equipment, machinery and other items brought onto the Property by the Grantee, its agents or contractors, and shall promptly repair and restore the Property to the condition it was in immediately prior to the commencement of the Work;

(h) the Grantee shall indemnify MassDOT in accordance with Section 5 below and carry the insurance as provided in Section 4 below;

(i) the Grantee shall not, nor shall it permit third parties to, use, generate, store, release on, under or about the Property, or transport to the Property, any Hazardous Materials. The term "Hazardous Materials" shall mean any substance, material, waste, gas or particulate matter that is regulated by any local governmental MassDOT, the Commonwealth of Massachusetts or the United States Government including, but not limited to, any material or substance that is (i) defined as a "hazardous waste", "hazardous material", "hazardous substance", "toxic waste", "toxic material", or "toxic substance" under any provision of any federal, state or local law, (ii) petroleum, (iii) asbestos, (iv) polychlorinated biphenyl, or (v) radioactive material;

(j) all costs of any traffic control details, construction phase services and all third parties actual out-of-pocket costs reasonably incurred by or on behalf of MassDOT relating to any or all of the foregoing activities including, but not limited to, the costs of related traffic protection set-ups, and/or inspectors shall be paid in full by the Grantee. The Grantee shall also pay all fees, licenses, permits, taxes or other charges due to any person in the performance of the Work under this Permit including, but not limited to, taxes, fees, or other charges assessed to MassDOT or which any governmental jurisdiction demands that MassDOT pay in relation to the Work under this Permit.

The provisions of this Section 3 shall survive the expiration or revocation of this Permit.

4. Insurance Requirements: The Grantee shall purchase and maintain throughout the term of the Permit adequate insurance coverage, to include but not be limited to the following types and amounts of coverage:

a) The following minimum insurance coverage is required.

i) Workers' Compensation Insurance in compliance with applicable federal and state laws, including U.S. Longshoreman's and Jones Act coverage, and Employers Liability

Insurance with limits of at least One Million Dollars ($1,000,000) per occurrence. The policy must be endorsed to provide that the insurer waives all rights of subrogation against MassDOT.

ii) Automobile Liability Insurance covering owned, non-owned and hired vehicles.

iii) Commercial General Liability Insurance including contractual liability specifically covering this Permit and personal injury coverage, written on an occurrence form.

iv) Umbrella Liability Insurance (an excess liability policy is not acceptable). The combination of the policy limits of the underlying automobile liability and general liability policies and the umbrella liability policy shall provide overall limits of not less than $6,000,000 (six million dollars) per occurrence.

b) The policies listed in subsections ii, iii and iv above must be endorsed to name "MassDOT" as additional insured.

c) All insurance maintained by the Grantee pursuant to this Permit shall be written by insurance companies licensed to do business in the Commonwealth. If the Grantee determines that any such insurance needs to be placed with surplus lines carriers not licensed by the Commonwealth, written permission from MassDOT is required. All insurance companies to be used by the Grantee must have a Best's Rating of not less than A- and be reasonably acceptable to MassDOT.

d) If requested by MassDOT in writing, the Grantee will furnish certified copies of the aforementioned policies to MassDOT's designated representative.

e) All insurance maintained by the Grantee shall provide that insurance for the benefit of MassDOT shall be primary and MassDOT's own insurance shall be non-contributing.

f) The Grantee shall provide MassDOT with certificates of insurance evidencing the above referenced insurance policies prior the execution of this Permit. The certificates shall contain an unequivocal provision that MassDOT shall be given thirty (30) days prior written notice of cancellation, material change or non-renewal of the coverage.

5. Indemnity. The Grantee at its sole cost and expense shall defend and shall indemnify and hold harmless MassDOT, its members, officers, employees, agents, successors and assigns (the "Indemnified Parties") from and against all claims, causes of action, suits, losses, damages and expenses (including reasonable attorneys' fees and costs of investigation and litigation) of whatever nature to any person or property based upon or arising out of this Permit, unless caused solely by the gross negligence or willful misconduct of any one or more of the Indemnified Parties, or its agents or contractors. The foregoing express obligation of indemnification shall not be construed to negate or abridge any other obligation of indemnification running to MassDOT which would exist at common law or under other provisions of this Permit, and the extent of the obligation of indemnification shall not be limited by any provision of insurance undertaken in accordance with this Permit. Further, the Grantee shall indemnify and hold harmless MassDOT from and against all costs, reasonable counsel and expert fees, expenses, and disbursements incurred in connection with or in defending any such claim or any action or proceeding brought thereon; and in case any action or proceeding is brought against MassDOT by reason of any such claim, the Grantee, upon notice from MassDOT, shall resist or defend such action or proceeding with counsel reasonably acceptable to MassDOT. Without in any way limiting the scope of the foregoing, the Grantee shall defend, indemnify and hold harmless MassDOT, its members, officers, employees, agents, successors and assigns from and against any and all claims, liabilities, losses, damages, costs and expenses (including reasonable attorneys' fees and costs of investigation and litigation) relating to environmental contamination arising out or in any way related to the Work. MassDOT shall give the Grantee prompt written notice of any claims threatened or made or suits instituted against it which could result in a claim of indemnification hereunder. Each of the Indemnified Parties indemnified under any indemnity in this Permit shall cooperate in all reasonable respects (at the Grantee's cost and expense) in defense of the third-party claim pursuant to which the Grantee is alleged to have liability. The provisions of this Section 5 shall survive the revocation or expiration of this Permit.

6. Notice. All notices, demands, submissions, requests, consents, approvals and other instruments required or permitted to be given pursuant to the terms hereof shall be in writing and shall be deemed to have been properly given if delivered by hand during regular business hours, by any courier service providing

receipts, or sent by registered or certified United States mail, postage prepaid, return receipt requested, to the parties at the address first above written, or to such other addresses as may from time to time specified in writing by any party hereto given in accordance with this Section 6. A copy of each notice to MassDOT shall be sent to c/o District Highway Director, Massachusetts Department of Transportation, 185 Kneeland Street, Boston, MA 02111, with a copy to the MassDOT's General Counsel, at the address of MassDOT first above written. Any notice so addressed and so delivered and mailed shall be deemed given when delivery is tendered, whether or not tender of delivery is accepted. A copy of each notice to the Grantee shall be sent c/o **Mr. Matthew Ali [Telephone: (617) 945-4928 --- Email: matthew_ali@harvard.edu]** at the address of the Grantee first above written.

7. Successors and Assigns. The provisions of this Permit shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. Notwithstanding the foregoing, the Grantee may not assign its interest in this Permit without MassDOT's prior consent, which consent may be withheld or denied in MassDOT's sole and absolute discretion.

8. Governing Law. The parties agree that the laws of the Commonwealth of Massachusetts shall govern the interpretation and enforcement of this Permit. Any legal proceedings arising out of or under this Permit shall be brought in the Superior Court of Suffolk County in Boston, MA.

9. Counterparts. This Permit may be executed in one or more separate counterparts, each of which when so executed shall be deemed to be an original and together all of such counterparts shall constitute one and the same instrument.

10. Trench/Excavator Work. By signing the application, the applicant/excavator understands and agrees to comply with the following:

i. No trench may be excavated unless the requirements of sections 40 through 40D of chapter 82, and any accompanying regulations, have been met and this permit is invalid unless and until said requirements have been complied with by the excavator applying for the permit including, but not limited to, the establishment of a valid excavation number with the underground plant damage prevention system as said system is defined in section 76D of chapter 164 (DIG SAFE);

ii. Trenches may pose a significant health and safety hazard. Pursuant to Section 1 of Chapter 82 of the General Laws, an excavator shall not leave any open trench unattended without first making every reasonable effort to eliminate any recognized safety hazard that may exist as a result of leaving said open trench unattended. Excavators should consult regulations promulgated by the Department of Public Safety in order to familiarize themselves with the recognized safety hazards associated with excavations and open trenches and the procedures required or recommended by said department in order to make every reasonable effort to eliminate said safety hazards which may include covering, barricading or otherwise protecting open trenches from accidental entry.

iii. Persons engaging in any trenching operation shall familiarize themselves with the federal safety standards promulgated by the Occupational Safety and Health Administration on excavations: 29 CFR 1926.650 et.seq., entitled Subpart P "Excavations".

iv. Excavators engaging in any trenching operation who utilize hoisting or other mechanical equipment subject to chapter 146 shall only employ individuals licensed to operate said equipment by the Department of Public Safety pursuant to said chapter and this permit must be presented to said licensed operator before any excavation is commenced;

v. By applying for, accepting and signing this permit, the applicant hereby attests to the following: (1) that they have read and understands the regulations promulgated by the Department of Public Safety with regard to construction related excavations and trench safety; (2) that he has read and understands the federal safety standards promulgated by the Occupational Safety and Health Administration on excavations: 29 CMR 1926.650 et.seq., entitled Subpart P "Excavations" as well as any other excavation requirements established by this municipality; and

(3) that he is aware of and has, with regard to the proposed trench excavation on private property or proposed excavation of a city or town public way that forms the basis of the permit application, complied with the requirements of sections 40-40D of chapter 82A.

vi. The permit shall be posted in plain view on the site of the work.

Dated at Boston as of the date first written above.
By,

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

Walter P. Heller, P.E.
District Highway Director

ATTACHMENT A

PLAN OR SKETCH OF AUTHORIZED WORK AREA

MISCELLANEOUS ATTACHMENTS

Application for Permit to Access State Highway
Access Work Request Form
Notice of Completion of Work Form

6-2017-0013

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

27 January 2017
Revised 22 March 2017
File No. 129017-001

MassDOT – Highway Division
Disrict 6
185 Kneeland St
Boston, MA 02111

Attention: Vivek Trivedi, PE

Subject: Request for Approval of Temporary Construction Dewatering
District Energy Facility
Harvard University
Allston, Massachusetts

Dear Mr. Trivedi,

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 Application for Permit to Access State Highway (non-vehicular) for discharge of temporary construction dewatering during construction activities at the planned Harvard District Energy Facility (DEF) site located off of Western Avenue in Allston, Massachusetts, herein referred to as the "Work Area". The Work Area location is shown on Figure 1 and the proposed dewatering discharge route and MassDOT outfall location are shown on Figure 2.

The Work Area is a vacant portion of a larger property identified as 100 Western Avenue, located immediately north of the Massachusetts Turnpike, Interchange 18 Ramp D. The property was historically owned by the Massachusetts Turnpike Authority (MTA), and existing catch basins within and adjacent to the work area connect to the MassDOT drain manholes at the edge of Ramp D, as shown on Figure 2.

The proposed DEF building is a multi-story, pile supported, approximately 160 by 160-foot structure with no basement. Dewatering is not anticipated to be required for construction of the main structure, but several project elements, including a utility chase beneath the building slab, below ground fuel vaults located immediately west of the building, and certain utility connections, will extend into groundwater. Dewatering is necessary to enable construction in-the-dry, and is anticipated to begin in March 2017 and continue for up to 12 months. Due to ongoing groundwater remediation at the property by others, recharge of groundwater within the work area is not recommended. Discharge to the MassDOT system is the only practicable option for effluent discharge in the vicinity of the planned building. Permits are additionally being sought for discharge to the Boston Water and Sewer Commission (BWSC) system located north of the Work Area in Western Avenue, but due to the distance from the proposed building to Western Avenue, discharge to the BWSC outfall is a feasible alternative only for certain utility work in the northern portion of the work area.

Prior to discharge, collected water will be routed through at minimum a sedimentation tank and 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.

A letter requesting permission to discharge under the 2010 NPDES Remediation General Permit (RGP) has been submitted to the Environmental Protection Agency (EPA) and is attached. The new NPDES RGP will go into effect on April 8, 2017. A Notice of Intent (NOI) under the new RGP will be submitted to EPA prior to July 7, 2017 as required by the permit. We will comply with the NPDES RGP effluent discharge limits and other provisions of the permit.

Discharge of the dewatering effluent is also currently under review Department of Conservation and Recreation (DCR), and a BWSC Permit has been obtained. A copy of the submitted DCR application and the BWSC permit is attached. Plans showing existing and planned post construction conditions are also 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
Senior Scientist

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

Attachments:

- Application for Permit to Access State Highway
- Figure 1 – Site Locus
- Figure 2 – Proposed Discharge Route
- Existing Conditions Plan
- Site Plan
- Copy of NPDES RGP Application
- Copy of BWSC Permit

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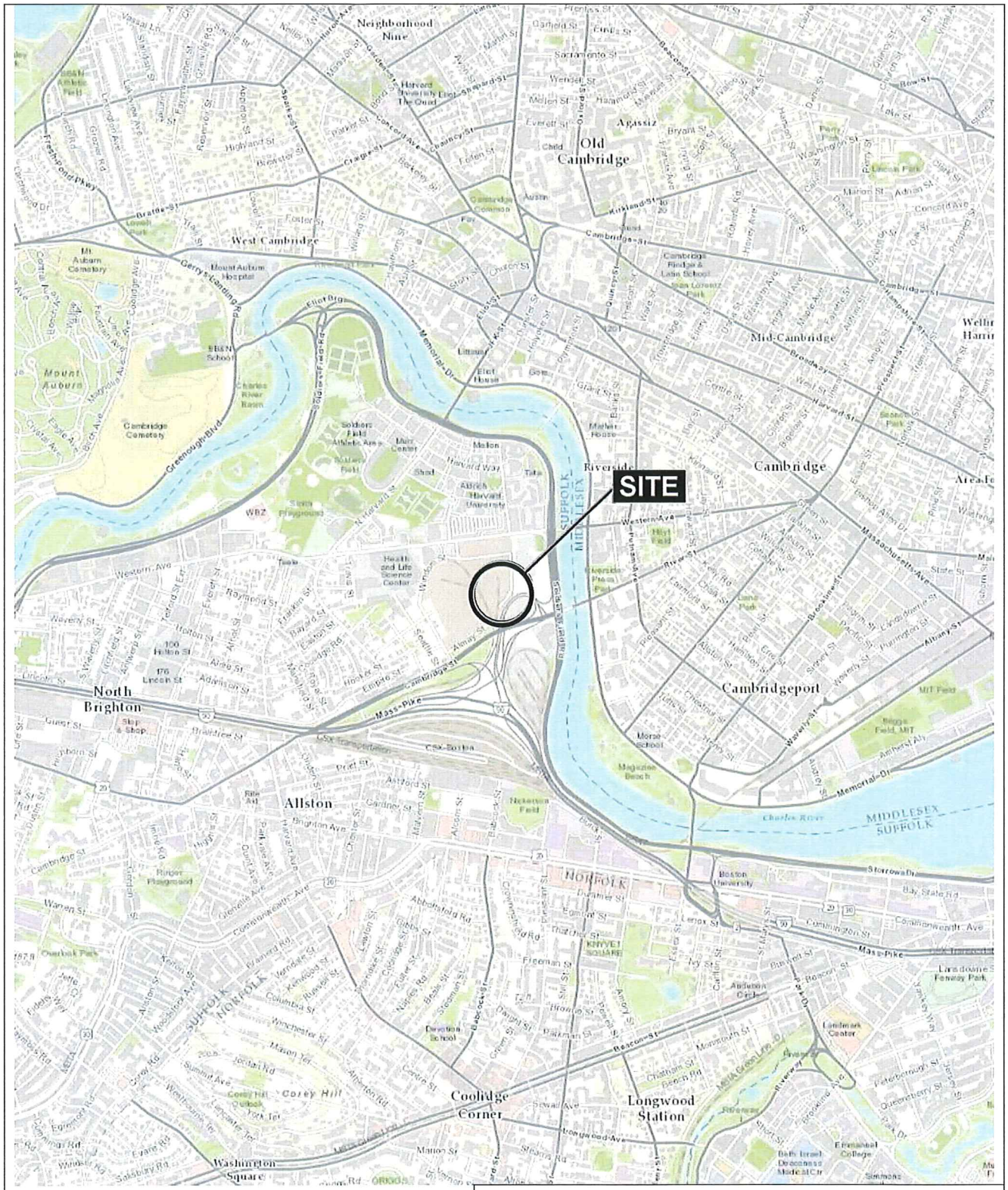
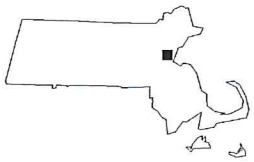
6-2017-0013



MAP SOURCE: ESRI

SITE COORDINATES: 42°21'42"N, 71°7'14"W



HALEY ALDRICH

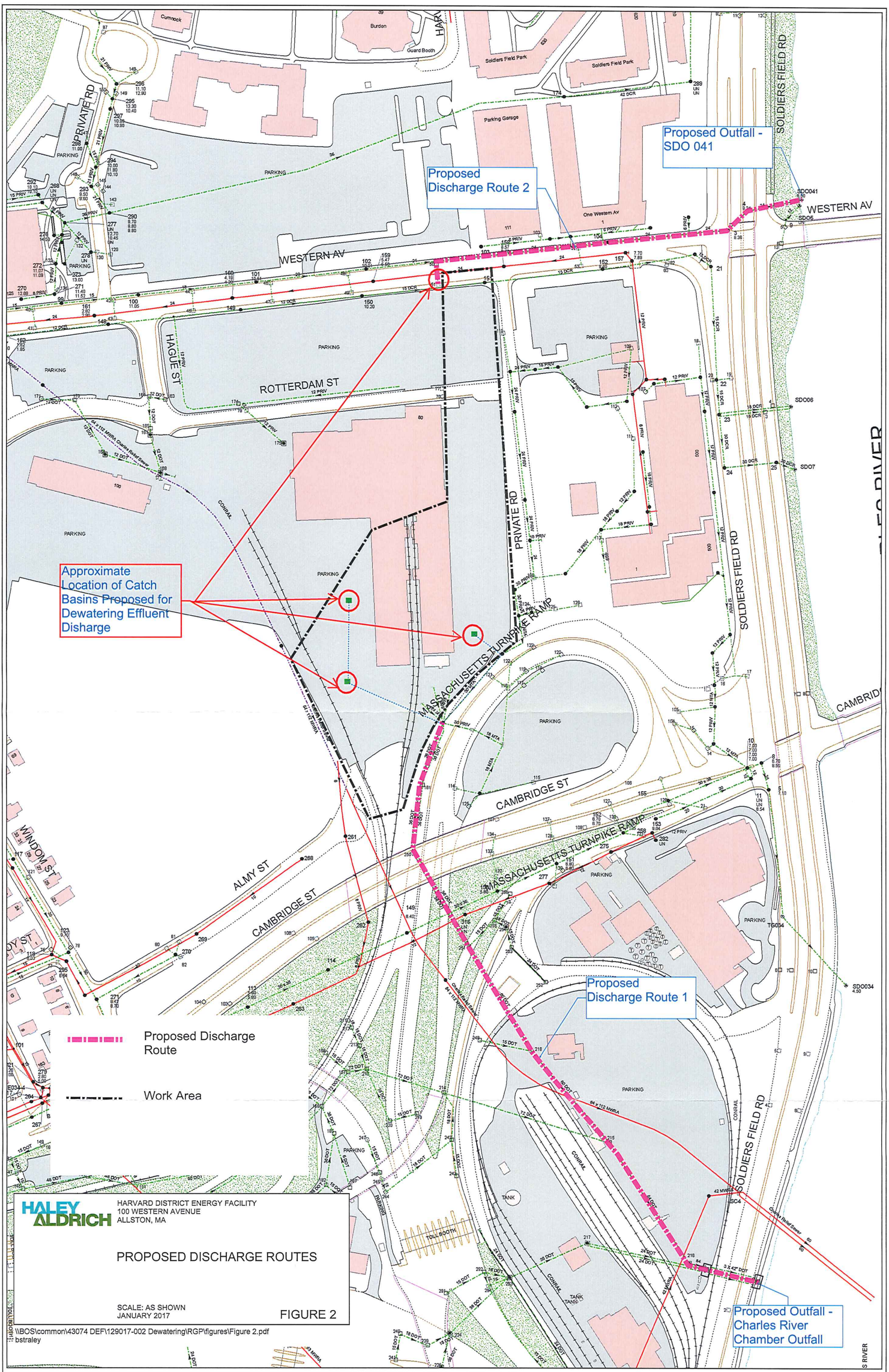
DISTICT ENERGY FACILITY
HARVARD UNIVERSITY
WESTERN AVENUE
ALLSTON, MASSACHUSETTS

PROJECT LOCUS

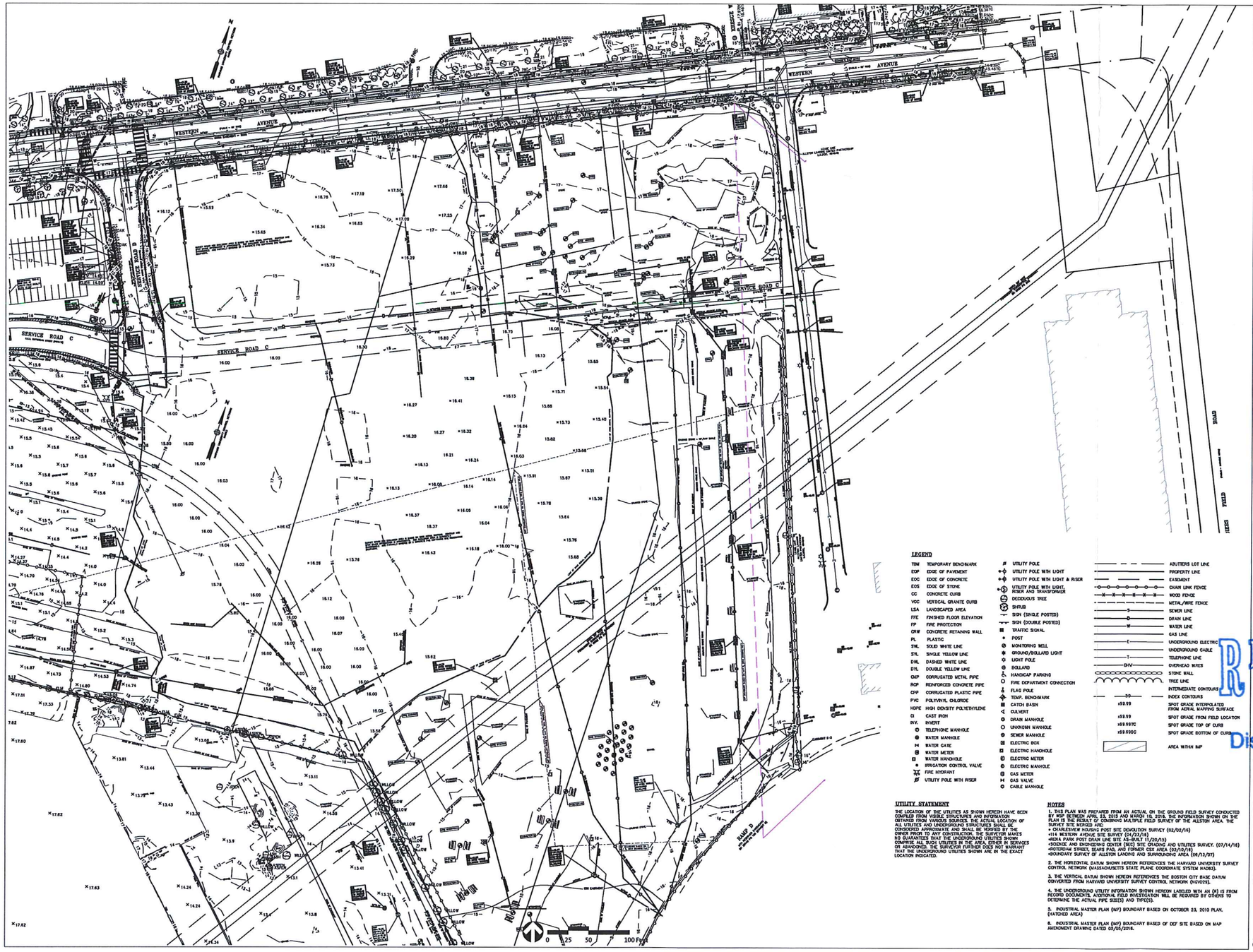
APPROXIMATE SCALE: 1 IN = 2000 FT
NOVEMBER 2016

FIGURE 1

129017-001 A004.PDF


Proposed Outfall - SDO 041
Proposed Discharge Route 2
Approximate Location of Catch Basins Proposed for Dewatering Effluent Disharge
Proposed Discharge Route 1
Proposed Outfall - Charles River Chamber Outfall
WESTERN AV
ROTTERDAM ST
HAGUE ST
PRIVATE RD
SOLDIERS FIELD RD
MASSACHUSETTS TURNPIKE RAMP
CAMBRIDGE ST
ALMY ST
WINDOM ST
CONRAIL
PARKING
Soldiers Field Park
Parking Garage
One Western Av
Guard Booth
Toll Booth
TANK
SDO041
SDO05
SDO06
SDO07
SDO034
Proposed Discharge Route
Work Area
HALEY ALDRICH
HARVARD DISTRICT ENERGY FACILITY
100 WESTERN AVENUE
ALLSTON, MA
PROPOSED DISCHARGE ROUTES
SCALE: AS SHOWN
JANUARY 2017
FIGURE 2
\\BOS\common\43074 DEF\129017-002 Dewatering\RGP\figures\Figure 2.pdf
bstraley
BOSTON WATER AND SEWER
Copyright © Boston Water and Sewer Commission. All rights reserved. Printed on: 1/13/2017
N
W
E
S
100 50 0 100 200 300 Feet
1 inch = 100 feet

6-2017-0013.



LEGEND

TBM	TEMPORARY BENCHMARK		UTILITY POLE
EOP	EDGE OF PAVEMENT		UTILITY POLE WITH LIGHT
EOC	EDGE OF CONCRETE		UTILITY POLE WITH LIGHT & RISER
EOS	EDGE OF STONE		UTILITY POLE WITH LIGHT, RISER AND TRANSFORMER
CC	CONCRETE CURB		DECIDUOUS TREE
VGC	VERTICAL GRANITE CURB		SHRUB
LSA	LANDSCAPED AREA		SIGN (SINGLE POSTED)
FFE	FINISHED FLOOR ELEVATION		SIGN (DOUBLE POSTED)
FP	FIRE PROTECTION		TRAFFIC SIGNAL
CRW	CONCRETE RETAINING WALL		POST
PL	PLASTIC		MONITORING WELL
SWL	SOLID WHITE LINE		GROUND/BOLLARD LIGHT
SYL	SINGLE YELLOW LINE		LIGHT POLE
DWL	DASHED WHITE LINE		BOLLARD
DYL	DOUBLE YELLOW LINE		HANDICAP PARKING
CMP	CORRUGATED METAL PIPE		FIRE DEPARTMENT CONNECTION
RCP	REINFORCED CONCRETE PIPE		FLAG POLE
CPP	CORRUGATED PLASTIC PIPE		TEMP. BENCHMARK
PVC	POLYVINYL CHLORIDE		CATCH BASIN
HDPE	HIGH DENSITY POLYETHYLENE		CULVERT
CI	CAST IRON		DRAIN MANHOLE
INV.	INVERT		UNKNOWN MANHOLE
	TELEPHONE MANHOLE		SEWER MANHOLE
	WATER MANHOLE		ELECTRIC BOX
	WATER GATE		ELECTRIC HANDHOLE
	WATER METER		ELECTRIC METER
	WATER HANDHOLE		ELECTRIC MANHOLE
	IRRIGATION CONTROL VALVE		GAS METER
	FIRE HYDRANT		GAS VALVE
	UTILITY POLE WITH RISER		CABLE MANHOLE

	ABUTTERS LOT LINE
	PROPERTY LINE
	EASEMENT
	CHAIN LINK FENCE
	WOOD FENCE
	METAL/WIRE FENCE
S	SEWER LINE
D	DRAIN LINE
W	WATER LINE
G	GAS LINE
E	UNDERGROUND ELECTRIC
C	UNDERGROUND CABLE
T	TELEPHONE LINE
OHW	OVERHEAD WIRES
	STONE WALL
	TREE LINE
	INTERMEDIATE CONTOURS
50	INDEX CONTOURS
x52.99	SPOT GRADE INTERPOLATED FROM AERIAL MAPPING SURFACE
x52.99	SPOT GRADE FROM FIELD LOCATION
x49.99TC	SPOT GRADE TOP OF CURB
x49.99BC	SPOT GRADE BOTTOM OF CURB
	AREA WITHIN IMP

UTILITY STATEMENT

THE LOCATION OF THE UTILITIES AS SHOWN HEREON HAVE BEEN COMPILED FROM THE BEST AVAILABLE INFORMATION OBTAINED FROM VARIOUS SOURCES. A PRECISE LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHALL BE CONSIDERED APPROXIMATE AND SHALL BE VERIFIED BY THE OWNER PRIOR TO ANY CONSTRUCTION. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICES OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED.

NOTES

1. THIS PLAN WAS PREPARED FROM AN ACTUAL ON THE GROUND FIELD SURVEY CONDUCTED BY VHB BETWEEN APRIL 15, 2015 AND MARCH 10, 2016. THE INFORMATION SHOWN ON THE PLAN IS THE RESULT OF COMBINING MULTIPLE FIELD SURVEY OF THE ALLSTON AREA. THE SURVEY SITE MERGED ARE:
   - CHARLESVIEW HOUSING POST SITE DEMOLITION SURVEY (02/03/14)
   - 116 WESTERN AVENUE SITE SURVEY (04/23/08)
   - RENA PARK POST DRAIN LINE SITE AS-BUILT (1/20/13)
   - SCIENCE AND ENGINEERING CENTER (SEC) SITE GRADING AND UTILITIES SURVEY. (07/14/16)
   - 60 THORNDIKE STREET, BEARS PAD, AND FORMER CEK AREA (03/10/16)
   - BOUNDARY SURVEY OF ALLSTON LANDING AND SURROUNDING AREA (06/13/07)
2. THE HORIZONTAL DATUM SHOWN HEREON REFERENCES THE HARVARD UNIVERSITY SURVEY CONTROL NETWORK (MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NAD83).
3. THE VERTICAL DATUM SHOWN HEREON REFERENCES THE BOSTON CITY BASE DATUM CONVERTED FROM HARVARD UNIVERSITY SURVEY CONTROL NETWORK (NGVD29).
4. THE UNDERGROUND UTILITY INFORMATION SHOWN HEREON LABELED WITH AN (E) IS FROM RECORD DOCUMENTS. ADDITIONAL FIELD INVESTIGATION WILL BE REQUIRED BY OTHERS TO DETERMINE THE ACTUAL PIPE SIZE(S) AND TYPE(S).
5. INDUSTRIAL MASTER PLAN (IMP) BOUNDARY BASED ON OCTOBER 23, 2010 PLAN. (HATCHED AREA)
6. INDUSTRIAL MASTER PLAN (IMP) BOUNDARY BASED OF DEP SITE BASED ON MAP AMENDMENT DRAWING DATED 03/05/2016.

LEERS WEINZAPFEL ASSOCIATES ARCHITECTS, INC.

75 Kneeland Street
Boston, Massachusetts 02111
617.423.5711

vhb

project name/owner's name

ALLSTON DISTRICT ENERGY FACILITY

HARVARD UNIVERSITY ENGINEERING & UTILITIES

12 WESTERN AVENUE, ALLSTON, MA 02134

project number

LEERS WEINZAPFEL 1604.00

owner's project identification number

seal/signature

FOR REFERENCE ONLY

issued for

FOUNDATION & SITE WORK

date

JANUARY 20, 2017

revisions

item	date

drawn by

checked by

scale

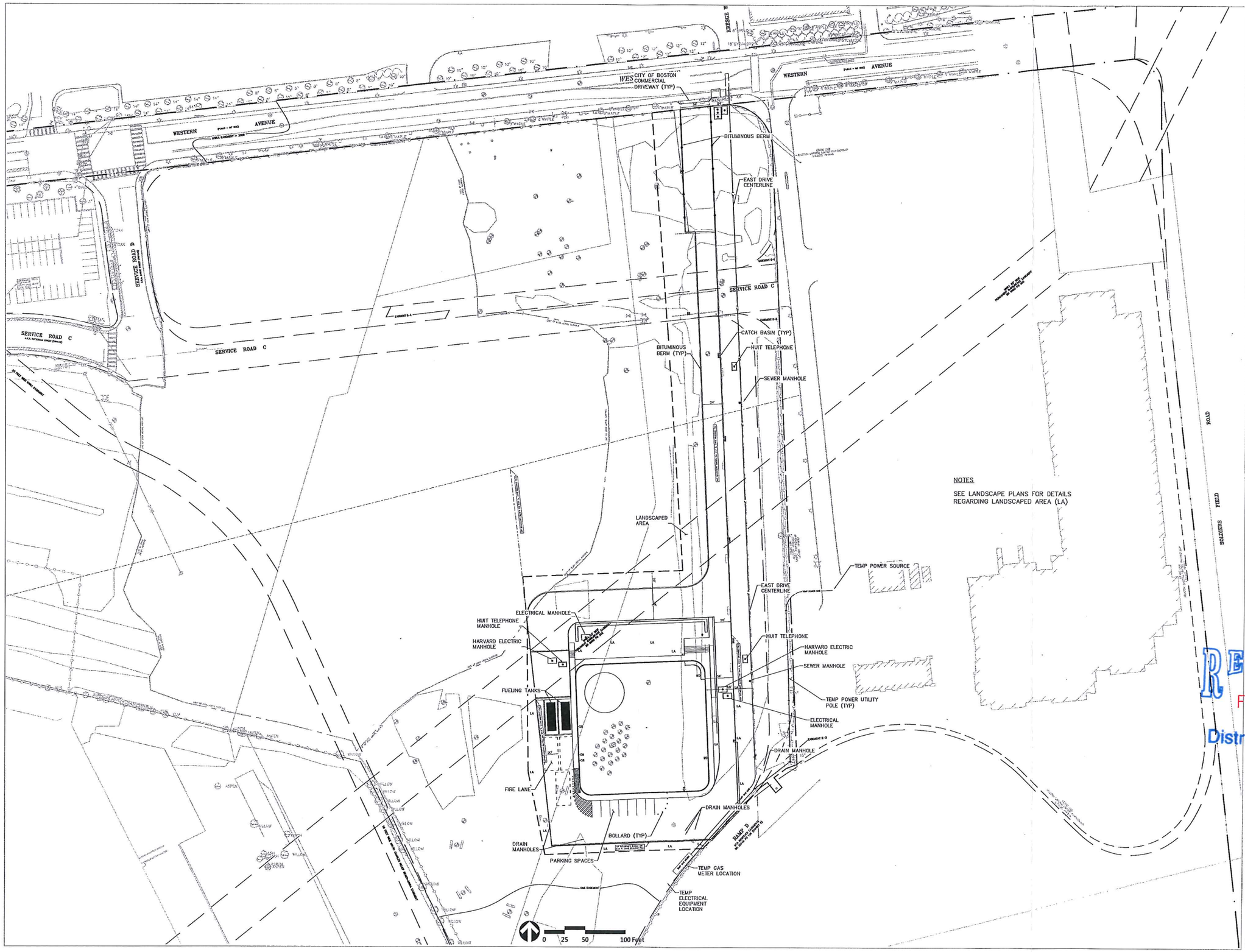
1" = 50'

sheet title

EXISTING CONDITIONS

sheet number

EX1.00



NOTES

SEE LANDSCAPE PLANS FOR DETAILS REGARDING LANDSCAPED AREA (LA)

LEERS WEINZAPFEL ASSOCIATES ARCHITECTS, INC.

75 Kneeland Street
Boston, Massachusetts 02111
617.423.5711

vhb

project name/owner's name

ALLSTON DISTRICT ENERGY FACILITY

HARVARD UNIVERSITY ENGINEERING & UTILITIES

12 WESTERN AVENUE, ALLSTON, MA 02134

project number

LEERS WEINZAPFEL 1604.00

owner's project identification number

seal/signature

COMMONWEALTH OF MASSACHUSETTS
MARK STEPHEN PFEIFFER
No. 39784
REGISTERED PROFESSIONAL ENGINEER

issued for

FOUNDATION & SITE WORK

date

JANUARY 20, 2017

revisions

item	date

drawn by

checked

scale

1" = 50'

sheet title

OVERALL SITE PLAN

sheet number

C0.01

6-2017-0013

massDOT
Massachusetts Department of Transportation
Highway Division

Application for Permit to Access State Highway

This Access Permit Application, including the attached Access Permit Submittal Checklist, must be completed in full by the Applicant. Instructions for this page are located on page 2. Descriptions of the two types of access permits and related categories are located on page 6. MassDOT will make the final determination regarding Access Permit Application type and category.

1. **Town/City:** Allston, MA
2. **State Highway route number and/or name:** Massachusetts Turnpike, Interchange 18, Ramp D
3. **Locus/Property Address:** 100 Western Avenue, Allston, MA
4. **Description of property and/or facility for which access is sought** (attach additional sheets if necessary):
   Construction of a District Energy Facility (DEF) on a portion of the 100 Western Avenue property, located adjacent to the north of the Massachusetts Turnpike ramp. The property is currently vacant.
5. **Description of work to be performed within State Highway Layout** (attach additional sheets if necessary):
   Temporary construction dewatering effluent to be discharged to existing on-site catch basins, which connect to the MassDOT drain manhole within Ramp D of the Massachusetts Turnpike.

☐ **Telecommunications** (wireless or wireline) or **Renewable Energy** (Solar, Wind, etc) – Agreement Process and OREAD* coordination required. (*see pg 2 Instruction)

6. **Dig Safe number:** To be obtained
7. **Applicant Information** [1] (See footnote below.)
   Name: The President and Fellows of Harvard University, through Harvard Engineering and Utilities (E&U)
   Mailing Address: 46 Blackstone Street, Cambridge, MA 02139
   Telephone: 617-945-4928
   Fax:
   E-Mail: matthew_ali@harvard.edu
   Signature: MA
   Print Name: Matthew Ali
   Date: 2/5/17
8. **Property Owner**
   Name: Same as applicant
   Mailing address:
   Telephone:
   Fax:
   E-Mail:
   Signature:
   Print Name:
   Date:

Return completed application, including Submittal Checklist, to the District Highway Director for your town/city. Refer to reverse side for appropriate address.

For office use only. Do not write below this line.

1. Application number: 6-2017-0013
2. Date received:
3. Fee amount (non-refundable) :
4. Completeness Pre-Review date:
5. MEPA required (yes or no):
   ENF-EOEEA Cert. #
   EIR-EOEEA Cert. #
   Other-EOEEA Cert. #
6. Section 61 Finding date:
7. Mass. Historic Action (yes or no):
8. Plans returned to DHD:
9. Permit Type/Category:
10. Application complete date:
11. Permit written date:
12. Permit issued date:
13. Permit denied:
14. Permit Recording date at Registry of Deeds

RECEIVED
FEB 06 2017
District 6 Permits

[1] If an agent is representing an Applicant, the application must include a notarized letter from the Applicant outlining the specified duties and responsibilities of the agent. Where work is proposed on a utility, the utility department must sign the application as the Applicant(s).

Instructions for Completing Application for Permit to Access State Highway

General Instructions

MassDOT's Highway Division is granted authority to issue **State Highway Access** Permits by M.G.L. Chapter 81, Sec. 21. MassDOT adopted 720 CMR 13.00 under the authority of M.G.L. c. 81, § 21 and M.G.L. c.85 §2. 720 CMR 13.00 supersedes the Standard Operating Procedures for Review of State Highway Access Permits dated November 30, 1971, and board vote of September 17, 1991.

ACCESS is generally defined, but not limited to:
Any physical work performed within the State Highway Layout.

This Application governs issuance of the two types of access permit Applications, Non-Vehicular and Vehicular, which are issued under three categories:

Category I	Minor Vehicle Access Permits
Category II	Major Vehicular Access Permits
Category III	Complex Vehicular Access Permits

Please refer to the **MassDOT Highway Access Permit Submittal Checklist** for details regarding permit types and submittals required.

FEES:
A Check payable to **MassDOT** for the appropriate permit application fee must accompany the permit application. Fees are non-refundable.

Fee schedule for access and Utility Payments:

Residential Access Permits

5 Units or less	$25.00
From 6 to 49 Units	$100.00
Greater than 49 Units	$2000.00

Non-Residential Access Permits

Less than 25,000 square feet	$500.00
From 25,000 to 300,000 square feet	$1000.00
From 300,000 to 750,000 square feet	$2000.00
Greater than 750,000 square feet	$3000.00

Non-Municipal Utility Permits not in conjunction With Access Permits:

Annual blanket utility permit	$500.00
Capital improvements to a utility	$500.00

Specific Instructions (print or type)

Line 1:
List name of municipality in which access is sought.
Line 2:
List name or number of State Highway Route(s) to which access is sought.
Line 3:
List Locus/Property address.
Line 4:
Describe property and/or facility. If access is sought under Category II above, briefly describe facility for which access is sought,

> ***Example 1:*** Private single family residence at 100 State Road. Approximate size of proposed building 2,500 s.f. Approximate lot size 0.75 acres.
>
> ***Example 2:*** 500,000 s.f. enclosed shopping mall adjacent to State Route I-290 and Route 20. Approx. lot size 67 acres.

Line 5:
Briefly describe the proposed work to be performed within the State Highway Layout.
*Office of Real Estate and Development (**OREAD**)

> ***Example 1:*** Remove 50 feet of existing granite curb on south side of highway in order to construct driveway access and modify the roadway geometry to accommodate left-hand turn.
>
> ***Example 2:*** Excavate 10 foot x 10 foot section of roadway at Station 100+00 in westbound lane in order to install water service to residence at 100 State Street.

Line 6:
A Dig Safe number must be provided if the work will commence within 30 days of the filing of the permit. **NOTE:** A Dig Safe number must be obtained by calling **1-888-DIG-SAFE** (1-888-344-7233). If construction within the State Highway Layout does not commence within the period allowed by Dig Safe, a new number must be obtained prior to beginning construction. (www.digsafe.com)

Line 7:
Individual or business making application must complete the required information, including application date and signature.

Line 8:
Complete this section only if the individual or business making application is other than the property owner of the land for which the permit applies.

Return completed application, submittal checklist and fee to appropriate District Office listed below. Please contact the Permit Engineer at this address if additional information is required.

District One
270 Main Street
Lenox, MA 01240
Tel. (413) 637-5700
Fax. (413) 637-0309

District Two
811 North King Street
Northampton, MA 01060
Tel. (413) 582-0599
Fax. (413) 582-0596

District Three
403 Belmont Street
Worcester, MA 01604
Tel. (508) 929-3800
Fax. (508) 799-9763

District Four
519 Appleton Street
Arlington, MA 02174
Tel. (781) 641-8300
Fax. (781) 646-5115

District Five
1000 County Street
Taunton, MA 02780
Tel. (508) 824-6633
Fax. (508) 880-6102

District Six
185 Kneeland Street
Boston, MA 02111
Tel. (857) 368-6100
Fax. (857) 368-0106

Highway Division Website:
www.massdot.state.ma.us/highway

massDOT
Massachusetts Department of Transportation
Highway Division

Access Permit Submittal Checklist

GREY: DOT USE ONLY

This checklist provides the Applicant with a list of required submittals to obtain an Access Permit. However, additional submittals may be required to issue an Access Permit. All Applicants must fill out Part A and one additional part that correlates to the selected application type. To help identify the application type, please see the descriptions on page 6. Check each box that pertains to your application. MassDOT will make the final determination regarding Access Permit Application type and category.

PART A: ALL APPLICANTS MUST FILL OUT

1. APPLICATION TYPE – CHECK ONE

☒ **NON-VEHICULAR:**

- ■ Non-Vehicular – Fill out Part B

☐ **VEHICULAR**

- ☐ **Category I** – Minor Vehicle Access Permits: Fill out Part C-1
- ☐ **Category II** – Major Vehicle Access Permits: Fill out Part C-1 and Part C-II
- ☐ **Category III** – Complex Vehicle Access Permits: Fill out Part C-1 and Part C-III

2. APPLICATION TYPE (Check all applicable boxes)

- ☒ Application Complete
- ☒ Permit corresponds to appropriate MassDOT District
- ☐ Non-refundable check or money order on correct amount payable to: **MassDOT**
- ☒ Evidence certifying property owner(s) consent
- ☐ Notarized Applicant Letter outlining agent's duties and responsibilities (if applicable)
- ☐ Utility department sign-off as the Applicant(s) (if applicable)

PART B: NON-VEHICULAR PERMITS

☐ **IF NO PHYSICAL MODIFICATION** ***to state highway layout*** – *i.e. parade, road race, traffic counts, etc.*

Required submittals:

- ☐ Map of route
- ☐ Traffic Management Plan (designed in accordance with the Road Flagger & Police Regulations: 701 CMR 7.00)
- ☐ Detour Plan(s) with municipal approval (if applicable)

☒ **IF DRAINAGE:**

- ■ If requesting connection or discharge to any MassDOT drainage system, contact District Personnel for additional information regarding required submittals.

☐ **IF CONSTRUCTION, RELOCATION OR REPAIR OF UTILITIES:**

Required submittals:

- ☐ **EXISTING PROJECT:** reference(s) to the documents and plans already filed with MassDOT for the affected project
- ☐ **NEW PROJECT/UTILITY WORK:**

Required submittals:

- ☐ Engineered Plan(s) including method of crossing Highway
- ☐ Traffic Management Plan (if applicable)
  (Designed in accordance with the Road Flagger & Police Regulations: 701 CMR 7.00)
- ☐ Detour Plan(s) with municipal approval (if applicable)
- ☐ Tree Cutting or Landscaping Plan (if applicable)
- ☐ Vegetative Plan including plant species and maturity size (if applicable)
- ☐ Blasting Plan (contact District Personnel for additional information)

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PART C-I: VEHICULAR PERMITS

CATEGORY I – Minor Vehicular Access Permits

Required submittals:

- ☐ Engineering Plans
- ☐ ENF - (Environmental Notification Form) Certificate (if applicable)

IF RESIDENTIAL DRIVEWAY:

- ☐ Detailed plan/sketch showing the drive location in relation to the property lines, MassDOT baselines, distance from nearest mile marker, and an easily identifiable fixed object (distance from telephone poles, mail boxes, other drives, etc.).
- ☐ If severe topographic conditions exist, an engineered plan showing the driveway layout, profile and storm water management may be necessary to show that the edge of the proposed drive is protected during and after construction to prevent sediment and debris from entering upon the State Highway Layout (SHLO).

IF COMMERCIAL DRIVEWAY: (where no MEPA review is required)

Required submittals:

- ☐ **Two (2) 40 scale plans that include:**
  - ☐ A. Route Number, Road Name, Property Address
  - ☐ B. Property Corners and Bounds
  - ☐ C. Lot Line Dimensions, Bearings and Distances
  - ☐ D. State Highway Layout Lines (both sides) and Nearest Massachusetts Highway Bounds (if found).
  - ☐ E. State Highway Baseline and both edges of roadway including any sidewalks and type of edging, if any, and shoulder information (grass, gravel etc.).
  - ☐ F. Any existing drive to be altered or closed shall be indicated. Existing and proposed dimensions should be included for altered drives.
  - ☐ G. Information on all proposed drives including radii, widths, handicap ramps, etc. must be shown.
  - ☐ H. All existing and proposed buildings, utilities, trees, stonewalls, fences etc., should be labeled and shown in their correct location.
  - ☐ I. It is required that all stands, buildings, gasoline pumps and structures of any kind be placed at least 12 feet back from the State Highway Layout Line, since conducting of business within a State Highway Layout is forbidden.
  - ☐ J. Complete detail on drainage; all drives should be constructed on a downgrade from the edge of the highway surface or shoulder to the State Highway Layout Line.
  - ☐ K. Engineered plans will be required to show that storm flows are not directed into the SHLO, using contour lines, where applicant/owner property elevations are raised from the edge of the highway.
  - ☐ L. The plans should identify measures to protect the edge of the proposed drive during and after construction to prevent sediment and debris from entering upon the SHLO.

IF NEW STREET / SUBDIVISION ROAD:

Minor Intersection and Roadway Reconstruction (where no MEPA review is required)

Required submittals:

- ☐ All Commercial Driveway requirements (above) apply in addition to the following: Evidence of acceptance, including its line, grade and proposed drainage, by a local planning board, or other City of Town official with such authority.
- ☐ A street/road profile from its nearest high point and plan of drainage.

Please be advised:

- It will be required that all such future street approaches be constructed on a downgrade, where possible, from the edge of highway surface or shoulder to the State Highway Layout Line.
- Common driveway criteria may apply and must be shown on plans as mentioned above.

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PART C-II: VEHICULAR PERMITS

CATEGORY II – Major Vehicular Access Permits

Required submittals:

☐ ☐ Engineering Plans based on the standards in the Manual On Uniform Traffic Control Devices (MUTCD), MassDOT's Project Development & Design Guide or its successor, MassDOT's Standard Specifications for Highway and Bridges, and any current technical policies or engineering directives Issued by MassDOT. All PS&E design submissions must be both in hard copy (one set) and electronic format. Electronic format includes PDF files transmitted to DHD or designee via USB Flash Drive, CD or posted to a FTP site.

☐ ☐ In cases where a proposed access is to be shared by multiple development sites, the Applicant(s) will provide evidence of the rights of access between the parties involved prior to the issuance of the Access Permit.

☐ ☐ MEPA Certificate

☐ ☐ Section 61 Finding

PART C-III: VEHICULAR PERMITS

CATEGORY III – Complex Vehicular Permits

Required submittals:

☐ ☐ Engineering Plans based on the standards in the Manual On Uniform Traffic Control Devices (MUTCD), MassDOT's Project Development & Design Guide or its successor, MassDOT's Standard Specifications for Highway and Bridges, and any current technical policies or engineering directives Issued by MassDOT. All PS&E design submissions must be both in hard copy (one set) and electronic format. Electronic format includes PDF files transmitted to DHD or designee via USB Flash Drive, CD or posted to a FTP site.

☐ ☐ In cases where a proposed access is to be shared by multiple development sites, the Applicant(s) will provide evidence of the rights of access between the parties involved prior to the issuance of the Access Permit.

☐ ☐ MEPA Certificate

☐ ☐ Section 61 Finding

Recording of Access Permits

Applicants must record any Vehicular Access Permit and plans or any Non-Vehicular Access Permit and plans involving drainage at the appropriate Registry of Deeds. Any Permit issued by MassDOT that requires recording will not be effective until recorded at the appropriate Registry of Deeds and a notice of recording is submitted to the District Highway Director (DHD). Changes may require the re-recording of permits and related documents. In those cases, permits will not be effective until re-recorded at the Registry of Deeds and a notice of recording is submitted to the DHD.

THERE ARE TWO TYPES OF ACCESS PERMIT APPLICATIONS: VEHICULAR, ISSUED UNDER THREE CATEGORIES & NON-VEHICULAR:

1. VEHICULAR ACCESS PERMITS:

Category I – Minor Vehicular Access Permits:
Access Permits for Projects that require entry to the State Highway Layout (SHLO), require little to no non-signalized modifications, and do not significantly alter the operating characteristics of traffic. These Projects ordinarily do not exceed the Massachusetts Environmental Policy Act (MEPA) transportation thresholds beyond the filing of an Environmental Notification Form (ENF).

Category II - Major Vehicular Access Permits:
Access Permits for Projects that require significant non-signalized modifications that may alter the operating characteristics of traffic at residential or commercial driveway intersecting with the SHLO; that require significant non-signalized modifications that may alter the operating characteristics of traffic at or upon any other intersection or roadway under the jurisdiction of MassDOT; that require the installation of a new traffic signal at a residential or commercial driveway intersecting with the SHLO or at any other intersection or roadway under the jurisdiction of MassDOT; or that require modification of structures, equipment, or hardware at an existing traffic signal at a residential or commercial driveway and its intersection with the SHLO or at any other intersection or roadway under the jurisdiction of MassDOT.

Category III – Complex Vehicular Permits
Access Permits for Complex Projects requiring actions similar to major Projects, but which require a new or altered SHLO; that require significant non-signalized and/or signalized modification within the SHLO over an extended distance or at a number of intersections that significantly alters the operating characteristics of traffic along a corridor; or that require the construction of a new, or modifications to an existing, bridge. These Projects generally require MEPA review and may require Federal review.

2. NON-VEHICULAR ACCESS PERMITS:

Access Permits for Projects that require access to the SHLO that do not involve physical modifications such as a parade or road race; construction, relocation or repair of utilities within the SHLO; tree cutting or landscaping within the SHLO; the use of explosives to remove material from within 250 feet of the SHLO; or connection to or discharge to any MassDOT drainage system (in cases where it can be shown that no practical alternative exists).

CONDITIONS REQUIRING AN ACCESS PERMIT

Vehicular Access Permits are required for:

- New residential or commercial driveways or streets intersecting the SHLO; or,
- Physical modifications to existing residential or commercial driveways or streets at their intersection with the SHLO; or,
- Change in use of an existing residential or commercial driveway onto SHLO that results in a **Substantial Increase in or Impact on Traffic** (as defined below) over the current use; or
- Construction of new or change in use of existing, residential or commercial driveway from properties that abut the SHLO to serve a building or facility, or expansion of a building or facility, that generates a Substantial Increase in or Impact on Traffic.

Substantial Increase in, or Impact on, Traffic as referenced above is defined as:
A Project that meets or exceeds any of the following thresholds:

(i) Generation of 2,000 or more new ADT on roadways providing access to a single location; or,
(ii) Generation of 1,000 or more new ADT on roadways providing access to a single location and construction of 150 or more new parking spaces at a single location; or,
(iii) Construction of 300 or more new parking spaces at a single location; or
(iv) Creation of a change in the type, pattern, or timing of traffic that is determined by MassDOT to generate a significant impact on traffic flow and safety.

Non-vehicular Access Permits are required for:

- Access to the SHLO for Projects that do not involve physical modifications; or
- Connection to or discharge to any MassDOT drainage system (in cases where it can be shown that no practical alternative exists); or
- Construction, relocation or repair of utilities within the SHLO; or
- Tree cutting or landscaping within the SHLO; or
- The use of explosives to remove material from within 250 feet of the SHLO.

In cases where a particular Project or activity may seek both vehicular and non-vehicular access, separate and distinct Permit Applications must be filed.

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Thomas J. Tinlin, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

ACCESS WORK REQUEST FORM

Document Number: _____ (MassDOT Use Only)

Day(s): S ☐ M ☐ T ☐ W ☐ Th ☐ F ☐ S ☐ Date(s): _____ Time (0-24 HR):_____

Area/Location of Work: _____

Description of Work: _____

Contract/Permit #:_____ Permittee: _____ Contractor: _____

Contractor Representative: _____ Cell: _____ Tel: _____

MassDOT Representative: _____ Cell: _____ Tel: _____

Traffic Control Setup: ☐ None Required ☐ by MassDOT ☐ by Permittee

Traffic setup Description: _____

_____

(MassDOT Use Only)

State Police Details: ☐ No ☐ Yes Number:_____ MassDOT Setup: ☐ M7 ☐ M8

Detail Sign In Location: _____ Time (0-24 HR): _____

Billing Information: Permittee:_____ MassDOT Billing No: _____

Trust Fund Reimbursable: ☐ No ☐ Yes _____

Special Instructions/Conditions

* Contractor responsible to ensure all secured doors be closed and locked at the end of each shift

Approvals

_____ Access Work Coordinator

_____ Division Engineering

☐ Confined Space entry ☐ See Attached ☐ Lockout/Tagout

FAILURE TO NOTIFY THE HOC (617-946-3150) BEFORE THE START OF WORK WILL RESULT IN REVOCATION OF THIS WORK REQUEST.

E-Mail Completed Form at Robert.hutcheon@state.ma.us or Fax at 857-368-0106

District 6 – OPERATIONS & MAINTENANCE
185 Kneeland Street, Boston, MA 02111
Tel: 857-368-6300, FAX: 857-368-0106/0105
www.mass.gov/massdot

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Thomas J. Tinlin, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

Notice of Completion of Work

You may proceed with the work described within the attached Permit, which has been issued to you by the Massachusetts Department of Transportation (MassDOT).

Your attention is called to the expiration date of said Permit. If an extension of time is required or an alteration to any of the Permit conditions becomes necessary, application for such changes should be made as soon as possible to the Permit Engineer.

Upon completion of the work, please complete this form and send it to:

MassDOT
District 6 – Permits
185 Kneeland Street
Boston, MA 02111

Or scan & e-mail at: dotd6permits@dot.state.ma.us

If this Notice is not returned, the liability assumed under this Permit will continue.

By Authority of the MassDOT District 6 Highway Director.

I HEREBY PROVIDE NOTIFICATION AS REQUIRED THAT THE WORK OUTLINED AND AUTHORIZED UNDER THE TERMS AND CONDITIONS OF MASSDOT PERMIT #_____ (CITY OR TOWN) _____ HAS BEEN COMPLETED IN ACCORDANCE WITH ALL REQUIREMENTS SET FORTH BY THE MASSDOT.

DATE OF COMPLETION: _____

PERMIT GRANTEE: _____

SIGNED: _____

PRINTED NAME/TITLE: _____

ADDRESS: _____ DATE: _____

District 6 – OPERATIONS & MAINTENANCE
185 Kneeland Street, Boston, MA 02111
Tel: 857-368-6300, FAX: 857-368-0106/0105
www.mass.gov/massdot

ATTACHMENT B

ORIGINAL CERTIFICATE OF INSURANCE

6-2017-0013

CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YYYY) 05/10/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Aon Risk Services Northeast, Inc.
Boston MA Office
One Federal Street
Boston MA 02110 USA

CONTACT NAME:
PHONE (A/C. No. Ext): (866) 283-7122 FAX (A/C. No.): (800) 363-0105
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A:	XL Specialty Insurance Co	37885
INSURER B:	Liberty Mutual Fire Ins Co	23035
INSURER C:		
INSURER D:		
INSURER E:		
INSURER F:		

INSURED
Bond Brothers, Inc.
145 Spring Street
Everett MA 02149 USA

COVERAGES **CERTIFICATE NUMBER:** 570066433191 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. **Limits shown are as requested**

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
B	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [X] LOC OTHER:			TB2611260804036	10/31/2016	10/31/2017	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$2,000,000 $300,000 $10,000 $2,000,000 $4,000,000 $4,000,000
B	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY HIRED AUTOS ONLY SCHEDULED AUTOS NON-OWNED AUTOS ONLY			AS2-611-260804-026	10/31/2016	10/31/2017	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000
A	X UMBRELLA LIAB [X] OCCUR EXCESS LIAB CLAIMS-MADE DED [X] RETENTION $10,000			US00066004LI16A	10/31/2016	10/31/2017	EACH OCCURRENCE AGGREGATE	$25,000,000 $25,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N [N] If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		WC2611260804016	10/31/2016	10/31/2017	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE-EA EMPLOYEE E.L. DISEASE-POLICY LIMIT	 $1,000,000 $1,000,000 $1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: 1-17-029 Harvard DEF. MassDOT is included as additional insured in accordance with the policy provisions of the general liability, automobile liability and umbrella liability policies. General liability, automobile liability and umbrella liability evidenced herein is primary and non-contributory to other insurance available to an Additional Insured, but only in accordance with the policy's provisions. A waiver of subrogation is granted in favor of MassDOT in accordance with the policy provisions of the general liability, automobile liability, umbrella liability and workers compensation policies.

CERTIFICATE HOLDER

MassDOT
10 Park Plaza
Boston MA 02116 USA

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Aon Risk Services Northeast, Inc.

Holder Identifier :

Certificate No : 570066433191

APPENDIX G

Laboratory Data Reports

HALEY ALDRICH

ANALYTICAL REPORT

Lab Number:	L1635028
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	HARVARD DISTRICT ENERGY FACIL.
Project Number:	129017-001
Report Date:	04/26/17

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 DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1635028-01	DEF-A2-OW	WATER	ALLSTON, MA	10/28/16 09:20	10/28/16

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1635028
Project Number:	129017-001	**Report Date:**	04/26/17

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 DISTRICT ENERGY FACIL.	**Lab Number:**	L1635028
Project Number:	129017-001	**Report Date:**	04/26/17

Case Narrative (continued)

Report Submission

This report replaces the report issued November 3, 2016. The Metals and Hexavalent Chromium Analytical Method References have been updated. In addition, the report includes the results of the Trivalent Chromium and Hardness analyses performed on L1635028-01 (DEF-A2-OW).

The Alcohol analysis was performed at our Mansfield facility. The results were issued under separate cover.

Sample Receipt

L1635028-01 (DEF-A2-OW): The sample was received without the container for Total Cyanide analysis. An aliquot was taken from an unpreserved container and preserved appropriately.

Semivolatile Organics

The WG947312-2/-3 LCS/LCSD recoveries, associated with L1635028-01 (DEF-A2-OW), are below the acceptance criteria for benzidine (2%/4%) and pyridine (1%/5%); however, they have been identified as "difficult" analytes. The results of the associated sample are reported.

Metals

The WG997330-2 LCS recovery, associated with L1635028-01, is above the acceptance criteria for selenium (116%); 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: Melissa Cripps Melissa Cripps

Title: Technical Director/Representative Date: 04/26/17

ORGANICS

VOLATILES

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01
Client ID: DEF-A2-OW
Sample Location: ALLSTON, MA
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 11/02/16 08:59
Analyst: PK

Date Collected: 10/28/16 09:20
Date Received: 10/28/16
Field Prep: None

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
trans-1,2-Dichloroethene	ND		ug/l	0.75	--	1
1,2-Dichloroethene, Total	ND		ug/l	0.50	--	1
Trichloroethene	ND		ug/l	0.50	--	1

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01 Date Collected: 10/28/16 09:20

Client ID: DEF-A2-OW Date Received: 10/28/16

Sample Location: ALLSTON, MA Field Prep: None

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
n-Propylbenzene	ND		ug/l	0.50	--	1

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01 Date Collected: 10/28/16 09:20

Client ID: DEF-A2-OW Date Received: 10/28/16

Sample Location: ALLSTON, MA Field Prep: None

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
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	103		70-130
Toluene-d8	96		70-130
4-Bromofluorobenzene	101		70-130
Dibromofluoromethane	113		70-130

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID:	L1635028-01	Date Collected:	10/28/16 09:20
Client ID:	DEF-A2-OW	Date Received:	10/28/16
Sample Location:	ALLSTON, MA	Field Prep:	None
Matrix:	Water		
Analytical Method:	1,8260C-SIM(M)		
Analytical Date:	11/02/16 08:59		
Analyst:	PK		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-SIM - Westborough Lab						
1,4-Dioxane	ND		ug/l	3.0	--	1

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID:	L1635028-01	Date Collected:	10/28/16 09:20
Client ID:	DEF-A2-OW	Date Received:	10/28/16
Sample Location:	ALLSTON, MA	Field Prep:	None
Matrix:	Water	Extraction Method:	EPA 504.1
Analytical Method:	14,504.1	Extraction Date:	11/01/16 12:28
Analytical Date:	11/01/16 15:47		
Analyst:	NS		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Microextractables by GC - Westborough Lab							
1,2-Dibromoethane	ND		ug/l	0.010	--	1	A

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001
Lab Number: L1635028
Report Date: 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 11/01/16 14:22
Analyst: NS

Extraction Method: EPA 504.1
Extraction Date: 11/01/16 12:28

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01 Batch: WG947925-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C-SIM(M)
Analytical Date: 11/02/16 05:06
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG948322-5					
1,4-Dioxane	ND		ug/l	3.0	--

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 11/02/16 05:06
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG948323-5					
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	--
trans-1,2-Dichloroethene	ND		ug/l	0.75	--
1,2-Dichloroethene, Total	ND		ug/l	0.50	--

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 11/02/16 05:06
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG948323-5					
Trichloroethene	ND		ug/l	0.50	--
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	--
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 DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 11/02/16 05:06
Analyst: MM

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG948323-5					
sec-Butylbenzene	ND		ug/l	0.50	--
tert-Butylbenzene	ND		ug/l	2.5	--
o-Chlorotoluene	ND		ug/l	2.5	--
p-Chlorotoluene	ND		ug/l	2.5	--
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	--
Hexachlorobutadiene	ND		ug/l	0.50	--
Isopropylbenzene	ND		ug/l	0.50	--
p-Isopropyltoluene	ND		ug/l	0.50	--
Naphthalene	ND		ug/l	2.5	--
n-Propylbenzene	ND		ug/l	0.50	--
1,2,3-Trichlorobenzene	ND		ug/l	2.5	--
1,2,4-Trichlorobenzene	ND		ug/l	2.5	--
1,3,5-Trimethylbenzene	ND		ug/l	2.5	--
1,2,4-Trimethylbenzene	ND		ug/l	2.5	--
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	--
Ethyl ether	ND		ug/l	2.5	--
Tert-Butyl Alcohol	ND		ug/l	10	--
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	105		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	104		70-130
Dibromofluoromethane	109		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab	Associated sample(s): 01		Batch: WG947925-2						
1,2-Dibromoethane	113		-		70-130	-		20	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG948322-3 WG948322-4								
1,4-Dioxane	100		120		70-130	18		25

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG948323-3 WG948323-4								
Methylene chloride	110		110		70-130	0		20
1,1-Dichloroethane	110		120		70-130	9		20
Chloroform	120		120		70-130	0		20
Carbon tetrachloride	120		120		63-132	0		20
1,2-Dichloropropane	110		110		70-130	0		20
Dibromochloromethane	90		95		63-130	5		20
1,1,2-Trichloroethane	91		95		70-130	4		20
Tetrachloroethene	99		99		70-130	0		20
Chlorobenzene	97		98		75-130	1		25
Trichlorofluoromethane	130		140		62-150	7		20
1,2-Dichloroethane	120		120		70-130	0		20
1,1,1-Trichloroethane	120		120		67-130	0		20
Bromodichloromethane	110		110		67-130	0		20
trans-1,3-Dichloropropene	87		92		70-130	6		20
cis-1,3-Dichloropropene	100		100		70-130	0		20
1,1-Dichloropropene	120		120		70-130	0		20
Bromoform	75		85		54-136	13		20
1,1,2,2-Tetrachloroethane	96		98		67-130	2		20
Benzene	120		120		70-130	0		25
Toluene	100		100		70-130	0		25
Ethylbenzene	99		100		70-130	1		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG948323-3 WG948323-4								
Chloromethane	120		130		64-130	8		20
Bromomethane	120		130		39-139	8		20
Vinyl chloride	130		120		55-140	8		20
Chloroethane	**140**	Q	**140**	Q	55-138	0		20
1,1-Dichloroethene	120		120		61-145	0		25
trans-1,2-Dichloroethene	120		120		70-130	0		20
Trichloroethene	120		120		70-130	0		25
1,2-Dichlorobenzene	96		100		70-130	4		20
1,3-Dichlorobenzene	93		98		70-130	5		20
1,4-Dichlorobenzene	93		99		70-130	6		20
Methyl tert butyl ether	100		110		63-130	10		20
p/m-Xylene	100		100		70-130	0		20
o-Xylene	95		100		70-130	5		20
cis-1,2-Dichloroethene	120		130		70-130	8		20
Dibromomethane	110		110		70-130	0		20
1,4-Dichlorobutane	96		98		70-130	2		20
1,2,3-Trichloropropane	95		98		64-130	3		20
Styrene	95		95		70-130	0		20
Dichlorodifluoromethane	130		130		36-147	0		20
Acetone	120		100		58-148	18		20
Carbon disulfide	120		120		51-130	0		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG948323-3 WG948323-4								
2-Butanone	100		100		63-138	0		20
Vinyl acetate	100		110		70-130	10		20
4-Methyl-2-pentanone	86		86		59-130	0		20
2-Hexanone	78		84		57-130	7		20
Acrylonitrile	99		100		70-130	1		20
Bromochloromethane	110		110		70-130	0		20
Tetrahydrofuran	110		110		58-130	0		20
2,2-Dichloropropane	110		110		63-133	0		20
1,2-Dibromoethane	91		94		70-130	3		20
1,3-Dichloropropane	93		94		70-130	1		20
1,1,1,2-Tetrachloroethane	89		95		64-130	7		20
Bromobenzene	92		94		70-130	2		20
n-Butylbenzene	110		110		53-136	0		20
sec-Butylbenzene	96		100		70-130	4		20
tert-Butylbenzene	92		97		70-130	5		20
o-Chlorotoluene	95		99		70-130	4		20
p-Chlorotoluene	96		100		70-130	4		20
1,2-Dibromo-3-chloropropane	92		84		41-144	9		20
Hexachlorobutadiene	98		110		63-130	12		20
Isopropylbenzene	97		100		70-130	3		20
p-Isopropyltoluene	96		100		70-130	4		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG948323-3 WG948323-4								
Naphthalene	88		98		70-130	11		20
n-Propylbenzene	100		100		69-130	0		20
1,2,3-Trichlorobenzene	91		94		70-130	3		20
1,2,4-Trichlorobenzene	90		95		70-130	5		20
1,3,5-Trimethylbenzene	99		100		64-130	1		20
1,2,4-Trimethylbenzene	98		98		70-130	0		20
trans-1,4-Dichloro-2-butene	**48**	Q	**48**	Q	70-130	0		20
Ethyl ether	120		110		59-134	9		20
Tert-Butyl Alcohol	100		100		70-130	0		20
Tertiary-Amyl Methyl Ether	100		100		66-130	0		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	102		100		70-130
Toluene-d8	95		95		70-130
4-Bromofluorobenzene	103		101		70-130
Dibromofluoromethane	108		103		70-130

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

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: WG947925-3 QC Sample: L1634966-01 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.252	0.287	114		-	-		70-130	-		20	A
1,2-Dibromo-3-chloropropane	ND	0.252	0.277	110		-	-		70-130	-		20	A

SEMIVOLATILES

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01
Client ID: DEF-A2-OW
Sample Location: ALLSTON, MA
Matrix: Water
Analytical Method: 1,8270D
Analytical Date: 11/02/16 16:32
Analyst: PS

Date Collected: 10/28/16 09:20
Date Received: 10/28/16
Field Prep: None
Extraction Method: EPA 3510C
Extraction Date: 10/30/16 08:37

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
3-Nitroaniline	ND		ug/l	5.0	--	1

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01 Date Collected: 10/28/16 09:20

Client ID: DEF-A2-OW Date Received: 10/28/16

Sample Location: ALLSTON, MA Field Prep: None

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
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	41		21-120
Phenol-d6	29		10-120
Nitrobenzene-d5	64		23-120
2-Fluorobiphenyl	72		15-120
2,4,6-Tribromophenol	67		10-120
4-Terphenyl-d14	73		41-149

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID:	L1635028-01	Date Collected:	10/28/16 09:20
Client ID:	DEF-A2-OW	Date Received:	10/28/16
Sample Location:	ALLSTON, MA	Field Prep:	None
Matrix:	Water	Extraction Method:	EPA 3510C
Analytical Method:	1,8270D-SIM	Extraction Date:	10/30/16 08:44
Analytical Date:	11/01/16 18:13		
Analyst:	KV		

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	0.20	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	0.20	--	1
Benzo(a)anthracene	ND		ug/l	0.20	--	1
Benzo(a)pyrene	ND		ug/l	0.20	--	1
Benzo(b)fluoranthene	ND		ug/l	0.20	--	1
Benzo(k)fluoranthene	ND		ug/l	0.20	--	1
Chrysene	ND		ug/l	0.20	--	1
Acenaphthylene	ND		ug/l	0.20	--	1
Anthracene	ND		ug/l	0.20	--	1
Benzo(ghi)perylene	ND		ug/l	0.20	--	1
Fluorene	ND		ug/l	0.20	--	1
Phenanthrene	ND		ug/l	0.20	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.20	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.20	--	1
Pyrene	ND		ug/l	0.20	--	1
1-Methylnaphthalene	ND		ug/l	0.20	--	1
2-Methylnaphthalene	ND		ug/l	0.20	--	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 DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01 Date Collected: 10/28/16 09:20

Client ID: DEF-A2-OW Date Received: 10/28/16

Sample Location: ALLSTON, MA Field Prep: None

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Semivolatile Organics by GC/MS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	46		21-120
Phenol-d6	30		10-120
Nitrobenzene-d5	82		23-120
2-Fluorobiphenyl	89		15-120
2,4,6-Tribromophenol	**162**	Q	10-120
4-Terphenyl-d14	119		41-149

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 10/31/16 18:55
Analyst: PS

Extraction Method: EPA 3510C
Extraction Date: 10/30/16 08:37

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG947312-1					
Benzidine	ND		ug/l	20	--
1,2,4-Trichlorobenzene	ND		ug/l	5.0	--
Bis(2-chloroethyl)ether	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	--
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	--
Hexachlorocyclopentadiene	ND		ug/l	20	--
Isophorone	ND		ug/l	5.0	--
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	--
Di-n-octylphthalate	ND		ug/l	5.0	--
Diethyl phthalate	ND		ug/l	5.0	--
Dimethyl phthalate	ND		ug/l	5.0	--
Biphenyl	ND		ug/l	2.0	--
Aniline	ND		ug/l	2.0	--
4-Chloroaniline	ND		ug/l	5.0	--
2-Nitroaniline	ND		ug/l	5.0	--

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 10/31/16 18:55
Analyst: PS

Extraction Method: EPA 3510C
Extraction Date: 10/30/16 08:37

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG947312-1					
3-Nitroaniline	ND		ug/l	5.0	--
4-Nitroaniline	ND		ug/l	5.0	--
Dibenzofuran	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	--
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	--
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	5.0	--

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001
Lab Number: L1635028
Report Date: 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 10/31/16 18:55
Analyst: PS

Extraction Method: EPA 3510C
Extraction Date: 10/30/16 08:37

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG947312-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	42		21-120
Phenol-d6	30		10-120
Nitrobenzene-d5	67		23-120
2-Fluorobiphenyl	73		15-120
2,4,6-Tribromophenol	78		10-120
4-Terphenyl-d14	70		41-149

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 11/01/16 10:11
Analyst: KV

Extraction Method: EPA 3510C
Extraction Date: 10/30/16 08:44

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG947313-1					
Acenaphthene	ND		ug/l	0.10	--
2-Chloronaphthalene	ND		ug/l	0.20	--
Fluoranthene	ND		ug/l	0.20	--
Hexachlorobutadiene	ND		ug/l	0.50	--
Naphthalene	ND		ug/l	0.20	--
Benzo(a)anthracene	ND		ug/l	0.20	--
Benzo(a)pyrene	ND		ug/l	0.20	--
Benzo(b)fluoranthene	ND		ug/l	0.20	--
Benzo(k)fluoranthene	ND		ug/l	0.20	--
Chrysene	ND		ug/l	0.20	--
Acenaphthylene	ND		ug/l	0.20	--
Anthracene	ND		ug/l	0.20	--
Benzo(ghi)perylene	ND		ug/l	0.20	--
Fluorene	ND		ug/l	0.20	--
Phenanthrene	ND		ug/l	0.20	--
Dibenzo(a,h)anthracene	ND		ug/l	0.20	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.20	--
Pyrene	ND		ug/l	0.20	--
1-Methylnaphthalene	ND		ug/l	0.20	--
2-Methylnaphthalene	ND		ug/l	0.20	--
Pentachlorophenol	ND		ug/l	0.80	--
Hexachlorobenzene	ND		ug/l	0.80	--
Hexachloroethane	ND		ug/l	0.80	--

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001
Lab Number: L1635028
Report Date: 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 11/01/16 10:11
Analyst: KV

Extraction Method: EPA 3510C
Extraction Date: 10/30/16 08:44

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG947313-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	43		21-120
Phenol-d6	27		10-120
Nitrobenzene-d5	75		23-120
2-Fluorobiphenyl	75		15-120
2,4,6-Tribromophenol	**139**	Q	10-120
4-Terphenyl-d14	108		41-149

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

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: WG947312-2 WG947312-3								
Benzidine	**2**	Q	**4**	Q	10-75	**48**	Q	30
1,2,4-Trichlorobenzene	52		52		39-98	0		30
Bis(2-chloroethyl)ether	66		63		40-140	5		30
1,2-Dichlorobenzene	50		50		40-140	0		30
1,3-Dichlorobenzene	46		47		40-140	2		30
1,4-Dichlorobenzene	47		48		36-97	2		30
3,3'-Dichlorobenzidine	66		65		40-140	2		30
2,4-Dinitrotoluene	69		69		48-143	0		30
2,6-Dinitrotoluene	74		75		40-140	1		30
Azobenzene	72		73		40-140	1		30
4-Chlorophenyl phenyl ether	66		67		40-140	2		30
4-Bromophenyl phenyl ether	70		71		40-140	1		30
Bis(2-chloroisopropyl)ether	65		65		40-140	0		30
Bis(2-chloroethoxy)methane	76		75		40-140	1		30
Hexachlorocyclopentadiene	40		41		40-140	2		30
Isophorone	77		77		40-140	0		30
Nitrobenzene	66		68		40-140	3		30
NDPA/DPA	71		71		40-140	0		30
n-Nitrosodi-n-propylamine	74		75		29-132	1		30
Bis(2-ethylhexyl)phthalate	81		80		40-140	1		30
Butyl benzyl phthalate	79		78		40-140	1		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

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: WG947312-2 WG947312-3								
Di-n-butylphthalate	76		74		40-140	3		30
Di-n-octylphthalate	79		78		40-140	1		30
Diethyl phthalate	74		74		40-140	0		30
Dimethyl phthalate	79		78		40-140	1		30
Biphenyl	71		70		40-140	1		30
Aniline	**20**	Q	**24**	Q	40-140	18		30
4-Chloroaniline	58		56		40-140	4		30
2-Nitroaniline	79		81		52-143	3		30
3-Nitroaniline	63		64		25-145	2		30
4-Nitroaniline	75		75		51-143	0		30
Dibenzofuran	66		66		40-140	0		30
n-Nitrosodimethylamine	40		40		22-74	0		30
2,4,6-Trichlorophenol	72		71		30-130	1		30
p-Chloro-m-cresol	77		77		23-97	0		30
2-Chlorophenol	66		64		27-123	3		30
2,4-Dichlorophenol	78		76		30-130	3		30
2,4-Dimethylphenol	63		68		30-130	8		30
2-Nitrophenol	75		77		30-130	3		30
4-Nitrophenol	42		42		10-80	0		30
2,4-Dinitrophenol	58		58		20-130	0		30
4,6-Dinitro-o-cresol	65		66		20-164	2		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

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: WG947312-2 WG947312-3								
Phenol	31		31		12-110	0		30
2-Methylphenol	61		61		30-130	0		30
3-Methylphenol/4-Methylphenol	58		57		30-130	2		30
2,4,5-Trichlorophenol	82		83		30-130	1		30
Benzoic Acid	41		37		10-164	10		30
Benzyl Alcohol	64		62		26-116	3		30
Carbazole	72		71		55-144	1		30
Pyridine	**1**	Q	**5**	Q	10-66	**158**	Q	30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	44		43		21-120
Phenol-d6	34		33		10-120
Nitrobenzene-d5	65		67		23-120
2-Fluorobiphenyl	70		70		15-120
2,4,6-Tribromophenol	79		79		10-120
4-Terphenyl-d14	69		67		41-149

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG947313-2 WG947313-3								
Acenaphthene	78		79		37-111	1		40
2-Chloronaphthalene	78		79		40-140	1		40
Fluoranthene	87		89		40-140	2		40
Hexachlorobutadiene	79		82		40-140	4		40
Naphthalene	69		70		40-140	1		40
Benzo(a)anthracene	87		87		40-140	0		40
Benzo(a)pyrene	78		79		40-140	1		40
Benzo(b)fluoranthene	81		81		40-140	0		40
Benzo(k)fluoranthene	76		77		40-140	1		40
Chrysene	76		77		40-140	1		40
Acenaphthylene	95		99		40-140	4		40
Anthracene	85		85		40-140	0		40
Benzo(ghi)perylene	94		93		40-140	1		40
Fluorene	95		97		40-140	2		40
Phenanthrene	79		80		40-140	1		40
Dibenzo(a,h)anthracene	92		95		40-140	3		40
Indeno(1,2,3-cd)pyrene	96		96		40-140	0		40
Pyrene	81		82		26-127	1		40
1-Methylnaphthalene	77		77		40-140	0		40
2-Methylnaphthalene	81		80		40-140	1		40
Pentachlorophenol	97		96		9-103	1		40

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG947313-2 WG947313-3								
Hexachlorobenzene	100		102		40-140	2		40
Hexachloroethane	72		75		40-140	4		40

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	43		43		21-120
Phenol-d6	29		26		10-120
Nitrobenzene-d5	71		68		23-120
2-Fluorobiphenyl	79		78		15-120
2,4,6-Tribromophenol	**153**	Q	**147**	Q	10-120
4-Terphenyl-d14	101		101		41-149

PCBS

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID:	L1635028-01	Date Collected:	10/28/16 09:20
Client ID:	DEF-A2-OW	Date Received:	10/28/16
Sample Location:	ALLSTON, MA	Field Prep:	None
Matrix:	Water	Extraction Method:	EPA 608
Analytical Method:	5,608	Extraction Date:	10/31/16 16:07
Analytical Date:	11/02/16 01:34	Cleanup Method:	EPA 3665A
Analyst:	JW	Cleanup Date:	10/31/16
		Cleanup Method:	EPA 3660B
		Cleanup Date:	11/01/16

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	123		30-150	A
Decachlorobiphenyl	91		30-150	A

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 5,608
Analytical Date: 11/02/16 02:16
Analyst: JW

Extraction Method: EPA 608
Extraction Date: 10/31/16 03:58
Cleanup Method: EPA 3665A
Cleanup Date: 10/31/16
Cleanup Method: EPA 3660B
Cleanup Date: 10/31/16

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG947399-1						
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	75		30-150	A
Decachlorobiphenyl	82		30-150	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

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: WG947399-2									
Aroclor 1016	93		-		40-140	-		50	A
Aroclor 1260	89		-		40-140	-		50	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	84				30-150	A
Decachlorobiphenyl	83				30-150	A

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

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: WG947399-3 QC Sample: L1634661-02 Client ID: MS Sample													
Aroclor 1016	ND	1	0.809	81		-	-		40-140	-		50	A
Aroclor 1260	ND	1	0.439	44		-	-		40-140	-		50	A

Surrogate	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	70				30-150	A
Decachlorobiphenyl	39				30-150	A

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits	
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947399-4 QC Sample: L1634661-01 Client ID: DUP Sample							
Aroclor 1016	ND	ND	ug/l	NC		50	A
Aroclor 1221	ND	ND	ug/l	NC		50	A
Aroclor 1232	ND	ND	ug/l	NC		50	A
Aroclor 1242	ND	ND	ug/l	NC		50	A
Aroclor 1248	ND	ND	ug/l	NC		50	A
Aroclor 1254	ND	ND	ug/l	NC		50	A
Aroclor 1260	ND	ND	ug/l	NC		50	A

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	78		70		30-150	A
Decachlorobiphenyl	57		53		30-150	A

METALS

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01 Date Collected: 10/28/16 09:20

Client ID: DEF-A2-OW Date Received: 10/28/16

Sample Location: ALLSTON, MA Field Prep: None

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Arsenic, Total	0.00244		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Cadmium, Total	ND		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Chromium, Total	0.00176		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Copper, Total	0.01261		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Iron, Total	0.266		mg/l	0.050	--	1	11/02/16 06:25	11/02/16 17:15	EPA 3005A	19,200.7	AB
Lead, Total	0.00330		mg/l	0.00050	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Mercury, Total	ND		mg/l	0.00020	--	1	11/01/16 10:11	11/02/16 12:06	EPA 245.1	3,245.1	BV
Nickel, Total	0.00231		mg/l	0.00200	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Selenium, Total	ND		mg/l	0.00500	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Silver, Total	ND		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Zinc, Total	0.06104		mg/l	0.01000	--	1	11/02/16 06:25	11/02/16 14:46	EPA 3005A	3,200.8	TT
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	80.8		mg/l	0.660	NA	1	11/02/16 06:25	11/02/16 17:15	EPA 3005A	19,200.7	AB
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		11/02/16 14:46	NA	107,-	

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

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: WG947856-1										
Mercury, Total	ND		mg/l	0.00020	--	1	11/01/16 10:11	11/02/16 11:53	3,245.1	BV

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: WG948182-1										
Iron, Total	ND		mg/l	0.050	--	1	11/02/16 06:25	11/02/16 15:26	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: WG948182-1										
Hardness	ND		mg/l	0.660	NA	1	11/02/16 06:25	11/02/16 15:26	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 Metals - Mansfield Lab for sample(s): 01 Batch: WG997330-1										
Antimony, Total	ND		mg/l	0.00400	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Lead, Total	ND		mg/l	0.00050	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Nickel, Total	ND	mg/l	0.00200	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Selenium, Total	ND	mg/l	0.00500	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Silver, Total	ND	mg/l	0.00100	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM
Zinc, Total	ND	mg/l	0.01000	--	1	11/02/16 06:25	11/02/16 11:57	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG947856-2								
Mercury, Total	102		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG948182-2								
Iron, Total	88		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG948182-2								
Hardness	93		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG997330-2								
Antimony, Total	98		-		85-115	-		
Arsenic, Total	111		-		85-115	-		
Cadmium, Total	101		-		85-115	-		
Chromium, Total	98		-		85-115	-		
Copper, Total	97		-		85-115	-		
Lead, Total	102		-		85-115	-		
Nickel, Total	103		-		85-115	-		
Selenium, Total	**116**	Q	-		85-115	-		
Silver, Total	96		-		85-115	-		
Zinc, Total	110		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

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: WG947856-3 QC Sample: L1635132-01 Client ID: MS Sample												
Mercury, Total	0.00171	0.005	0.00625	91		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG948182-3 QC Sample: L1634966-02 Client ID: MS Sample												
Iron, Total	0.133	1	0.961	83		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG948182-3 QC Sample: L1634966-02 Client ID: MS Sample												
Hardness	186	66.2	248	94		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG997330-3 QC Sample: L1700004-80 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.5659	113		-	-		70-130	-		20
Arsenic, Total	ND	0.12	0.1330	111		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05304	104		-	-		70-130	-		20
Chromium, Total	0.00156	0.2	0.2019	100		-	-		70-130	-		20
Copper, Total	0.00444	0.25	0.2720	107		-	-		70-130	-		20
Lead, Total	0.00060	0.51	0.5390	106		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.5253	105		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1366	114		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05170	103		-	-		70-130	-		20
Zinc, Total	ND	0.5	0.6169	123		-	-		70-130	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG947856-4 QC Sample: L1635132-01 Client ID: DUP Sample						
Mercury, Total	0.00171	0.00173	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG948182-4 QC Sample: L1634966-02 Client ID: DUP Sample						
Iron, Total	0.133	0.145	mg/l	9		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG997330-4 QC Sample: L1700004-80 Client ID: DUP Sample						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	ND	ND	mg/l	NC		20
Cadmium, Total	ND	0.00104	mg/l	NC		20
Chromium, Total	0.00156	0.00119	mg/l	**27**	Q	20
Copper, Total	0.00444	0.00449	mg/l	1		20
Lead, Total	0.00060	0.00067	mg/l	10		20
Nickel, Total	ND	ND	mg/l	NC		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001
Lab Number: L1635028
Report Date: 04/26/17

SAMPLE RESULTS

Lab ID: L1635028-01
Client ID: DEF-A2-OW
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 10/28/16 09:20
Date Received: 10/28/16
Field Prep: None

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	12.		mg/l	5.0	NA	1	-	11/01/16 02:30	121,2540D	MC
Cyanide, Total	0.075		mg/l	0.010	--	2	10/29/16 09:45	10/31/16 14:06	121,4500CN-CE	JO
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	10/29/16 04:11	121,4500CL-D	KA
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	11/01/16 12:04	11/01/16 23:53	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	--	1	10/31/16 17:00	10/31/16 21:41	74,1664A	ML
Phenolics, Total	ND		mg/l	0.030	--	1	11/02/16 10:52	11/02/16 23:07	4,420.1	AW
Chromium, Hexavalent	ND		mg/l	0.010	--	1	10/29/16 06:21	10/29/16 06:28	1,7196A	MC
Anions by Ion Chromatography - Westborough Lab										
Chloride	8.55		mg/l	0.500	--	1	-	10/30/16 01:47	44,300.0	JC

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635028

Project Number: 129017-001 **Report Date:** 04/26/17

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: WG947085-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	10/29/16 04:11	121,4500CL-D	KA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG947149-1										
Cyanide, Total	ND		mg/l	0.005	--	1	10/29/16 09:45	10/31/16 12:38	121,4500CN-CE	JO
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG947660-1										
Chloride	ND		mg/l	0.500	--	1	-	10/29/16 21:32	44,300.0	JC
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG947668-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	10/31/16 17:00	10/31/16 21:41	74,1664A	ML
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG947728-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	11/01/16 02:30	121,2540D	MC
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG947797-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	11/01/16 12:04	11/01/16 23:39	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG948338-1										
Phenolics, Total	ND		mg/l	0.030	--	1	11/02/16 10:52	11/02/16 20:24	4,420.1	AW
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG997402-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	10/29/16 06:21	10/29/16 06:28	1,7196A	MC

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635028

Report Date: 04/26/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG947085-2								
Chlorine, Total Residual	101		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG947149-2								
Cyanide, Total	102		-		90-110	-		
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG947660-2								
Chloride	101		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG947668-2								
TPH	85		-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG947797-2								
Nitrogen, Ammonia	92		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG948338-2								
Phenolics, Total	87		-		70-130	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG997402-2								
Chromium, Hexavalent	103		-		85-115	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

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: WG947149-4 QC Sample: L1634949-01 Client ID: MS Sample												
Cyanide, Total	5.81	0.2	6.30	**245**	Q	-	-		90-110	-		30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947660-3 QC Sample: L1634700-01 Client ID: MS Sample												
Chloride	13.0	4	16.9	97		-	-		40-151	-		18
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947668-4 QC Sample: L1634966-02 Client ID: MS Sample												
TPH	ND	20	17.8	89		-	-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947797-4 QC Sample: L1634893-03 Client ID: MS Sample												
Nitrogen, Ammonia	0.149	4	4.10	99		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG948338-4 QC Sample: L1600011-13 Client ID: MS Sample												
Phenolics, Total	ND	0.4	0.39	98		-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG997402-4 QC Sample: L1635028-01 Client ID: DEF-A2-OW												
Chromium, Hexavalent	ND	0.1	0.103	103		-	-		85-115	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947085-3 QC Sample: L1635028-01 Client ID: DEF-A2-OW						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947149-3 QC Sample: L1634946-01 Client ID: DUP Sample						
Cyanide, Total	ND	ND	mg/l	NC		30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947660-4 QC Sample: L1634700-01 Client ID: DUP Sample						
Chloride	13.0	13.0	mg/l	0		18
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947668-3 QC Sample: L1634641-01 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947728-2 QC Sample: L1634801-01 Client ID: DUP Sample						
Solids, Total Suspended	3000	6200	mg/l	**70**	Q	29
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG947797-3 QC Sample: L1634893-03 Client ID: DUP Sample						
Nitrogen, Ammonia	0.149	0.184	mg/l	**21**	Q	20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG948338-3 QC Sample: L1600011-13 Client ID: DUP Sample						
Phenolics, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG997402-3 QC Sample: L1635028-01 Client ID: DEF-A2-OW						
Chromium, Hexavalent	ND	ND	mg/l	NC		20

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635028
Report Date: 04/26/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information Custody Seal

Cooler	
A	Absent
B	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1635028-01A	Vial HCl preserved	B	N/A	2.4	Y	Absent	8260-SIM(14),8260(14)
L1635028-01B	Vial HCl preserved	B	N/A	2.4	Y	Absent	8260-SIM(14),8260(14)
L1635028-01C	Vial HCl preserved	B	N/A	2.4	Y	Absent	8260-SIM(14),8260(14)
L1635028-01D	Vial Na2S2O3 preserved	B	N/A	2.4	Y	Absent	504(14)
L1635028-01E	Vial Na2S2O3 preserved	B	N/A	2.4	Y	Absent	504(14)
L1635028-01F	Plastic 250ml HNO3 preserved	B	<2	2.4	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),TRICR-CALC(1),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1635028-01F1	Plastic 250ml HNO3 preserved	B	<2	2.4	Y	Absent	HOLD-METAL-DISSOLVED(180)
L1635028-01G	Plastic 250ml NaOH preserved spl	B	>12	2.4	Y	Absent	TCN-4500(14)
L1635028-01H	Plastic 950ml unpreserved	A	7	4.8	Y	Absent	CL-300(28),HEXCR-7196(1),TRC-4500(1)
L1635028-01H1	Plastic 120ml unpreserved	B	7	2.4	Y	Absent	TRC-4500(1)
L1635028-01I	Plastic 950ml unpreserved	B	7	2.4	Y	Absent	TSS-2540(7)
L1635028-01J	Amber 950ml H2SO4 preserved	A	<2	4.8	Y	Absent	TPHENOL-420(28)
L1635028-01K	Amber 1000ml HCl preserved	A	N/A	4.8	Y	Absent	TPH-1664(28)
L1635028-01L	Amber 1000ml HCl preserved	A	N/A	4.8	Y	Absent	TPH-1664(28)
L1635028-01M	Amber 1000ml Na2S2O3	A	7	4.8	Y	Absent	PCB-608(7)
L1635028-01N	Amber 1000ml Na2S2O3	A	7	4.8	Y	Absent	PCB-608(7)
L1635028-01O	Amber 1000ml unpreserved	B	7	2.4	Y	Absent	8270TCL(7),8270TCL-SIM(7)
L1635028-01P	Amber 1000ml unpreserved	B	7	2.4	Y	Absent	8270TCL(7),8270TCL-SIM(7)
L1635028-01Q	Plastic 500ml H2SO4 preserved	A	<2	4.8	Y	Absent	NH3-4500(28)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1635028
Project Number:	129017-001	**Report Date:**	04/26/17

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: Data Usability Report

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1635028
Project Number:	129017-001	**Report Date:**	04/26/17

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. 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 DISTRICT ENERGY FACIL.	**Lab Number:**	L1635028
Project Number:	129017-001	**Report Date:**	04/26/17

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.

Serial_No:04261710:14

mg 10/30/16 updated COC

L1635028

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 of

Date Rec'd in Lab: 10/28/16

ALPHA Job #: ~~L1634~~ RS 10/28/16

Project Information
- Project Name: Harvard District Energy Facility
- Project Location: Allston, MA
- Project # 129017-001
- (Use Project name as Project #) ☐
- Project Manager: Kate Dilawari/Andrew Chan
- ALPHAQuote #:

Turn-Around Time
- Standard ☑ Due Date:
- Rush (only if pre approved) ☐ # of Days: 5 Day

H&A Information
- H&A Client: Harvard
- H&A Address: 465 Medford Street
- Boston, MA 02129
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: echristmas@haleyaldrich.com

Deliverables
- ☑ Email ☐ Fax
- ☐ EQuIS (1 File) ☐ EQuIS (4 File)
- ☐ Other:

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Billing Information
- ☐ Same as Client Info
- PO #

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Hold Dissolved metals

Please specify Metals or TAL.

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. NPDES RGP Package	2. Ethanol (method 8015)	3. Ammonia	Sample Specific Comments	Total Bottles
35024101	DEF-A2 GW	10/28/16	0920	AQ	ARW	X	X	X		14

~~Total Metals by 200.8 Sb.As.Cd.Cr.Cu.Pb.Ni.Se.Ag.Zn~~
Hex Cr by 7196
Trivalent Chromium
Total Hardness
COC edits by Gina Hall 4/25/17

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
	10/28/16		10/28/16 16:30
	10/28/16 16:30	Rob Maestro AAL	10/28/16 16:30
Rob Maestro AAL	10/28/16 1850		10/28/16 18:50

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/28/2016)

L1635028

CHAIN OF CUSTODY

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430
Albany, NY 12205
Tonawanda, NY 14150 Holmes, PA 19043

Page of

Date Rec'd in Lab: 10/28/16

ALPHA Job #: ~~L1634~~ RS 10/28/16

Project Information
Project Name: Harvard District Energy Facility
Project Location: Allston, MA
Project #
(Use Project name as Project #) ☐
Project Manager: Kate Dilawari/Andrew Chan
ALPHAQuote #:

Turn-Around Time
Standard ☑ Due Date:
Rush (only if pre approved) ☐ # of Days: 5 Day

Deliverables
☑ Email ☐ Fax
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other:

Billing Information
☐ Same as Client Info
PO #

H&A Information
H&A Client: Harvard
H&A Address: 465 Medford Street
Boston, MA 02129
H&A Phone: 617-886-7400
H&A Fax:
H&A Email: echristmas@haleyaldrich.com

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS
Sample Filtration
☒ Done Dis Metals
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. NPDES RGP Package	2. Ethanol (method 8015)	3. Ammonia	Sample Specific Comments	Total Bottles
35024101	DEF-A2 GW	10/28/16	0920	AQ	ARW	X	X	X		14

Container Type
Preservative

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	10/28/16		10/28/16 16:30
	10/28/16 16:30		10/28/16 16:30
Rob Maestro AAL	10/28/16 1850		10/28/16 18:50

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/28/2016)

ANALYTICAL REPORT

Lab Number:	L1635035
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	HARVARD DISTRICT ENERGY FACIL.
Project Number:	129017-001
Report Date:	11/04/16

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635035
Report Date: 11/04/16

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1635035-01	DEF-A2-OW	WATER	ALLSTON, MA	10/28/16 09:20	10/28/16

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1635035
Project Number:	129017-001	**Report Date:**	11/04/16

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 DISTRICT ENERGY FACIL.	**Lab Number:**	L1635035
Project Number:	129017-001	**Report Date:**	11/04/16

Case Narrative (continued)

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: Elizabeth Porta

Title: Technical Director/Representative Date: 11/04/16

ORGANICS

VOLATILES

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635035

Project Number: 129017-001 **Report Date:** 11/04/16

SAMPLE RESULTS

Lab ID:	L1635035-01	Date Collected:	10/28/16 09:20
Client ID:	DEF-A2-OW	Date Received:	10/28/16
Sample Location:	ALLSTON, MA	Field Prep:	Not Specified
Matrix:	Water		
Analytical Method:	1,8015D		
Analytical Date:	11/03/16 17:38		
Analyst:	DP		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Alcohol Analysis by GC/FID - Mansfield Lab						
Ethyl Alcohol	ND		mg/l	2.00	--	1

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1635035

Project Number: 129017-001 **Report Date:** 11/04/16

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8015D
Analytical Date: 11/03/16 11:54
Analyst: DP

Parameter	Result	Qualifier	Units	RL	MDL
Alcohol Analysis by GC/FID - Mansfield Lab for sample(s): 01 Batch: WG948340-1					
Ethyl Alcohol	ND		mg/l	2.00	--

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1635035

Report Date: 11/04/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Alcohol Analysis by GC/FID - Mansfield Lab Associated sample(s): 01 Batch: WG948340-2 WG948340-3								
Ethyl Alcohol	96		101		70-130	5		30
Methyl Alcohol	93		100		70-130	7		30
iso-Propyl Alcohol	95		99		70-130	4		30
n-Propyl Alcohol	95		98		70-130	3		30
n-Butyl Alcohol	99		103		70-130	4		30
tert-Butyl Alcohol	98		100		70-130	2		30
2-Methyl-2-Butanol	98		102		70-130	4		30
iso-Butyl Alcohol	95		98		70-130	3		30
sec-Butyl Alcohol	98		100		70-130	2		30

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1635035
Report Date: 11/04/16

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(*)
L1635035-01A	Vial unpreserved	A	N/A	2.4	Y	Absent	A2-ALCOHOL(14)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1635035
Project Number:	129017-001	**Report Date:**	11/04/16

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: Data Usability Report

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1635035
Project Number:	129017-001	**Report Date:**	11/04/16

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. 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 DISTRICT ENERGY FACIL.	**Lab Number:**	L1635035
Project Number:	129017-001	**Report Date:**	11/04/16

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

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, SM9222D-MF**.

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 of

Date Rec'd in Lab: 10/28/16

ALPHA Job #: L1635035

Project Information
- Project Name: Harvard District Energy Facility
- Project Location: Allston, MA
- Project #
- (Use Project name as Project #) ☐
- Project Manager: Kate Dilawari/Andrew Chan
- ALPHAQuote #:

Turn-Around Time
- Standard ☑ Due Date:
- Rush (only if pre approved) ☐ # of Days: 5 Day

H&A Information
- H&A Client: Harvard
- H&A Address: 465 Medford Street
- Boston, MA 02129
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: echristmas@haleyaldrich.com

Deliverables
- ☑ Email ☐ Fax
- ☐ EQuIS (1 File) ☐ EQuIS (4 File)
- ☐ Other:

Billing Information
- ☐ Same as Client Info
- PO #

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

☐ These samples have been previously analyzed by Alpha

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. NPDES RGP Package	2. Ethanol (method 8015)	3. Ammonia	Sample Specific Comments	Total Bottles
35035-01	DEF-A2 GW	10/28/16	0920	AQ	ARW	X	X	X		14

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
	10/28/16		10/28/16 16:30
	10/28/16 16:32	Rob Maestro AAL	10/28/16 16:30
Rob Maestro AAL	10/28/16 1850		10/28/16 18:50

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/28/2016)

ANALYTICAL REPORT

Lab Number:	L1637400
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	HARVARD DISTRICT ENERGY FACIL.
Project Number:	129017-001
Report Date:	11/21/16

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1637400
Report Date: 11/21/16

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1637400-01	DEF-A2-OW	WATER	ALLSTON, MA	10/28/16 09:20	10/28/16

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1637400
Project Number:	129017-001	**Report Date:**	11/21/16

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: Susan E O'Neil Susan O' Neil

Title: Technical Director/Representative Date: 11/21/16

METALS

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1637400

Project Number: 129017-001 **Report Date:** 11/21/16

SAMPLE RESULTS

Lab ID: L1637400-01 Date Collected: 10/28/16 09:20

Client ID: DEF-A2-OW Date Received: 10/28/16

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

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab											
Copper, Dissolved	0.01184		mg/l	0.00100	--	1	11/18/16 09:00	11/18/16 14:14	EPA 3005A	1,6020A	BV
Lead, Dissolved	0.00086		mg/l	0.00050	--	1	11/18/16 09:00	11/18/16 14:14	EPA 3005A	1,6020A	BV

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1637400

Project Number: 129017-001 **Report Date:** 11/21/16

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: WG953680-1										
Copper, Dissolved	ND		mg/l	0.00100	--	1	11/18/16 09:00	11/18/16 12:15	1,6020A	BV
Lead, Dissolved	ND		mg/l	0.00050	--	1	11/18/16 09:00	11/18/16 12:15	1,6020A	BV

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-001

Lab Number: L1637400

Report Date: 11/21/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG953680-2								
Copper, Dissolved	103		-		80-120	-		
Lead, Dissolved	104		-		80-120	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1637400
Report Date: 11/21/16

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 QC Batch ID: WG953680-3 QC Sample: L1637094-01 Client ID: MS Sample												
Copper, Dissolved	ND	0.25	0.2369	95		-	-		75-125	-		20
Lead, Dissolved	ND	0.51	0.5342	105		-	-		75-125	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1637400
Report Date: 11/21/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG953680-4 QC Sample: L1637094-01 Client ID: DUP Sample						
Copper, Dissolved	ND	ND	mg/l	NC		20
Lead, Dissolved	ND	ND	mg/l	NC		20

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-001

Lab Number: L1637400
Report Date: 11/21/16

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information **Custody Seal**

Cooler	
B	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1637400-01A	Plastic 250ml HNO3 preserved	B	<2	2.4	Y	Absent	CU-6020S(180),PB-6020S(180)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1637400
Project Number:	129017-001	**Report Date:**	11/21/16

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: Data Usability Report

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1637400
Project Number:	129017-001	**Report Date:**	11/21/16

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. 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 DISTRICT ENERGY FACIL.	**Lab Number:**	L1637400
Project Number:	129017-001	**Report Date:**	11/21/16

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

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, SM9222D-MF**.

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.

L1637400 Serial_No:11211619:21

mg 10/30/16 updated COC

kb 11/17/16 ~~L1635028~~

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 of

Date Rec'd in Lab: 10/28/16

ALPHA Job #: ~~L1634~~ RS 10/28/16

Project Information
- Project Name: Harvard District Energy Facility
- Project Location: Allston, MA
- Project # 129017-001
- (Use Project name as Project #) ☐
- Project Manager: Kate Dilawari/Andrew Chan
- ALPHAQuote #:

Turn-Around Time
- Standard ☑ Due Date:
- Rush (only if pre approved) ☐ # of Days: 5 Day

H&A Information
- H&A Client: Harvard
- H&A Address: 465 Medford Street
- Boston, MA 02129
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: echristmas@haleyaldrich.com

Deliverables
- ☑ Email ☐ Fax
- ☐ EQuIS (1 File) ☐ EQuIS (4 File)
- ☐ Other:

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Billing Information
- ☐ Same as Client Info
- PO #

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
- ☐ NJ ☐ NY
- ☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Hold Dissolved metals

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
- ☒ Done D/S Metals
- ☐ Lab to do

Preservation
- ☐ Lab to do

(Please Specify below)

Dissolved Pb & Cu

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. NPDES RGP Package	2. Ethanol (method 8015)	3. Ammonia							Sample Specific Comments	Total Bottles
~~35024.01~~ 37400.01	DEF-A2 OW	10/28/16	0920	AQ	DRW	X	X	X		X						14

Container Type
Preservative

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	10/28/16		10/28/16 16:30
	10/28/16 16:30		10/28/16 16:30
Rob Maestro AAL	10/28/16 1850		10/28/16 18:50

Document ID: 20455 Rev 1 (1/28/2016)

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.

ANALYTICAL REPORT

Lab Number:	L1639588
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	HARVARD DISTRICT ENERGY FAC.
Project Number:	129017-001
Report Date:	12/13/16

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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

Project Name: HARVARD DISTRICT ENERGY FAC.
Project Number: 129017-001

Lab Number: L1639588
Report Date: 12/13/16

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1639588-01	DEF-A2-OW-20161207_PRESERVED	WATER	ALLSTON, MA	12/07/16 10:05	12/07/16
L1639588-02	DEF-A2-OW-20161207_UNPRESERVED	WATER	ALLSTON, MA	12/07/16 10:05	12/07/16

Project Name:	HARVARD DISTRICT ENERGY FAC.	**Lab Number:**	L1639588
Project Number:	129017-001	**Report Date:**	12/13/16

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:  Cristin Walker

Title: Technical Director/Representative Date: 12/13/16

INORGANICS
&
MISCELLANEOUS

Project Name: HARVARD DISTRICT ENERGY FAC.
Project Number: 129017-001
Lab Number: L1639588
Report Date: 12/13/16

SAMPLE RESULTS

Lab ID: L1639588-01
Client ID: DEF-A2-OW-20161207_PRESERVED
Sample Location: ALLSTON, MA
Matrix: Water
Date Collected: 12/07/16 10:05
Date Received: 12/07/16
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Cyanide, Total	ND		mg/l	0.005	--	1	12/07/16 17:00	12/08/16 13:47	121,4500CN-CE	ML
Cyanide, Free	ND		ug/l	2.00	--	1	12/12/16 16:30	12/12/16 23:24	109,9016	AT
Cyanide, Physiologically Available	ND		mg/l	0.005	--	1	12/12/16 10:15	12/12/16 15:19	64,9014(M)	JO

Project Name: HARVARD DISTRICT ENERGY FAC.
Project Number: 129017-001
Lab Number: L1639588
Report Date: 12/13/16

SAMPLE RESULTS

Lab ID: L1639588-02
Client ID: DEF-A2-OW-20161207_UNPRESERVED
Sample Location: ALLSTON, MA
Matrix: Water
Date Collected: 12/07/16 10:05
Date Received: 12/07/16
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Cyanide, Total	ND		mg/l	0.005	--	1	12/07/16 17:00	12/08/16 13:48	121,4500CN-CE	ML

Project Name: HARVARD DISTRICT ENERGY FAC. **Lab Number:** L1639588

Project Number: 129017-001 **Report Date:** 12/13/16

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG958973-1										
Cyanide, Total	ND		mg/l	0.005	--	1	12/07/16 17:00	12/08/16 13:41	121,4500CN-CE	ML
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG960242-1										
Cyanide, Physiologically Available	ND		mg/l	0.005	--	1	12/12/16 10:15	12/12/16 15:03	64,9014(M)	JO
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG960485-1										
Cyanide, Free	ND		ug/l	2.00	--	1	12/12/16 16:30	12/12/16 23:22	109,9016	AT

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FAC.

Project Number: 129017-001

Lab Number: L1639588

Report Date: 12/13/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG958973-2								
Cyanide, Total	103		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG960242-2								
Cyanide, Physiologically Available	98		-		80-120	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG960242-3								
Cyanide, Physiologically Available	**1**		-		0-10	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG960485-2								
Cyanide, Free	87		-		75-125	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FAC.
Project Number: 129017-001

Lab Number: L1639588
Report Date: 12/13/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG958973-4 QC Sample: L1639410-01 Client ID: MS Sample												
Cyanide, Total	ND	0.2	0.198	99		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG960242-5 QC Sample: L1639109-07 Client ID: MS Sample												
Cyanide, Physiologically Available	ND	0.2	0.202	101		-	-		75-125	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG960485-3 QC Sample: L1639588-01 Client ID: DEF-A2-OW-20161207_PRESERVED												
Cyanide, Free	ND	50	39.3	79		-	-		70-130	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FAC.
Project Number: 129017-001

Lab Number: L1639588
Report Date: 12/13/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG958973-3 QC Sample: L1639406-01 Client ID: DUP Sample						
Cyanide, Total	ND	ND	mg/l	NC		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG960242-4 QC Sample: L1639109-02 Client ID: DUP Sample						
Cyanide, Physiologically Available	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG960485-4 QC Sample: L1639588-01 Client ID: DEF-A2-OW-20161207_PRESERVED						
Cyanide, Free	ND	ND	ug/l	NC		20

Project Name: HARVARD DISTRICT ENERGY FAC.
Project Number: 129017-001

Lab Number: L1639588
Report Date: 12/13/16

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(*)
L1639588-01A	Plastic 250ml NaOH preserved	A	>12	2.2	Y	Absent	TCN-4500(14)
L1639588-01B	Plastic 250ml NaOH preserved	A	>12	2.2	Y	Absent	PACN(14)
L1639588-01C	Plastic 250ml NaOH preserved	A	>12	2.2	Y	Absent	FCN-9016(14)
L1639588-02A	Plastic 500ml unpreserved	A	7	2.2	Y	Absent	TCN-4500(14)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD DISTRICT ENERGY FAC.	**Lab Number:**	L1639588
Project Number:	129017-001	**Report Date:**	12/13/16

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: Data Usability Report

Project Name:	HARVARD DISTRICT ENERGY FAC.	**Lab Number:**	L1639588
Project Number:	129017-001	**Report Date:**	12/13/16

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. 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 DISTRICT ENERGY FAC.	**Lab Number:**	L1639588
Project Number:	129017-001	**Report Date:**	12/13/16

REFERENCES

64 Quality Assurance and Quality Control Requirements and Performance Standards for SW-846 Methods. MADEP BWSC. WSC-CAM-IIA (Revision 4), WSC-CAM-V C (Revision 2), WSC-CAM-IIIA (Revision 5). August 2004.

109 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Revision 0, June 2010.

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, SM9222D-MF**.

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.

COC edits by Gina Hall 12/8/16

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: 12/7/16

ALPHA Job #: L1639588

Project Information
- Project Name: Harvard District Energy Facility
- Project Location: Allston, MA
- Project #: 129017-001
- (Use Project name as Project #) ☐
- Project Manager: Kate Dilawari/Andrew Chan
- ALPHAQuote #:

Turn-Around Time
- Standard ☑ Due Date:
- Rush (only if pre approved) ☐ # of Days:

H&A Information
- H&A Client: Harvard
- H&A Address: 465 Medford Street
- Boston, MA 02129
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: bstraley@haleyaldrich.com

Deliverables
- ☑ Email ☐ Fax
- ☐ EQuIS (1 File) ☑ EQuIS (4 File)
- ☐ Other:

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Billing Information
- ☐ Same as Client Info
- PO #

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
- ☐ NJ ☐ NY
- ☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

FCN = 9016

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
- ☐ Done
- ☐ Lab to do

Preservation
- ☐ Lab to do

(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Free Cyanide- SM 4500	Physiologically Available Cyanide	Total Cyanide- SM 4500	Total Cyanide- SM 4500	Sample Specific Comments	Total Bottles
39588 01	DEF-A2-OW-20161207_PRESERVED	12/7/2016	1005	AQ	MJD	X	X		X		3
02	DEF-A2-OW-20161207_UNPRESERVED	12/7/2016	1005	AQ	MJD	X		X		DO NOT PRESERVE	1

Container Type	P	P	P	P	
Preservative	A	E	A	E	

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	12/7/16 1015		12/7/16 1015
	12/7/16 1300		12/7/16 1300

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 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: 12/7/16

ALPHA Job #: L1639588

Project Information
- Project Name: Harvard District Energy Facility
- Project Location: Allston, MA
- Project #: 129017-001
- (Use Project name as Project #) ☐
- Project Manager: Kate Dilawari/Andrew Chan
- ALPHAQuote #:

Turn-Around Time
- Standard ☑ Due Date:
- Rush (only if pre approved) ☐ # of Days:

H&A Information
- H&A Client: Harvard
- H&A Address: 465 Medford Street
- Boston, MA 02129
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: bstraley@haleyaldrich.com

Deliverables
- ☑ Email ☐ Fax
- ☐ EQuIS (1 File) ☑ EQuIS (4 File)
- ☐ Other:

Billing Information
- ☐ Same as Client Info
- PO #

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Free Cyanide- SM 4500	Physiologically Available Cyanide	Total Cyanide- SM 4500	Total Cyanide- SM 4500	Sample Specific Comments	Total Bottles
39588-01	DEF-A2-OW-20161207_PRESERVED	12/7/2016	1005	AQ	MJD		X		X		3
-02	DEF-A2-OW-20161207_UNPRESERVED	12/7/2016	1005	AQ	MJD	X		X		DO NOT PRESERVE	1
Container Type						P	P	P	P		
Preservative						A	E	A	E		

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	12/7/16 1015	DAR	12/7/16 1015
	12/7/16 1300	AM	12/7/16 1300

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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.

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
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: 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 #: L 711614

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 _____

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2
SVOC: ☐ ABN ☐ PAH
METALS: ☐ RCP 14 ☐ RCP 15
EPH: ☐ Ranges & Targets ☐ Ranges Only
VPH: ☐ Ranges & Targets ☐ Ranges Only
☐ PCB ☐ PEST
TPH: ☐ Quant Only ☐ Fingerprint
pH, Temp, [redacted]
Ammonia
Total chromium VI

SAMPLE INFO
Filtration
☐ Field
☐ Lab to do
Preservation
☐ Lab to do

Sample Comments

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC	SVOC	METALS	EPH	VPH	PCB	TPH	pH, Temp, [redacted]	Ammonia	Total chromium VI	Sample Comments	TOTAL # BOTTLES
711614-1	RIVER-041317	4/13/17	1005	SW	MV			X X					X	X	X		3

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

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

Relinquished By:	Date/Time	Received By:	Date/Time
Michael Ostrowski MCM	4/13/17 1400	MCM	4/13/17 1302
			4/13/17 1400

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:	L1712551
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Beck Straley
Phone:	(617) 886-7400
Project Name:	HARVARD DISTRICT ENERGY FACIL.
Project Number:	129017-003
Report Date:	04/26/17

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 DISTRICT ENERGY FACIL.
Project Number: 129017-003

Lab Number: L1712551
Report Date: 04/26/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1712551-01	DEF-A2-OW-20170420	WATER	ALLSTON, MA	04/20/17 10:30	04/20/17

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1712551
Project Number:	129017-003	**Report Date:**	04/26/17

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:  Amita Naik

Title: Technical Director/Representative Date: 04/26/17

ORGANICS

VOLATILES

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1712551

Project Number: 129017-003 **Report Date:** 04/26/17

SAMPLE RESULTS

Lab ID: L1712551-01
Client ID: DEF-A2-OW-20170420
Sample Location: ALLSTON, MA

Date Collected: 04/20/17 10:30
Date Received: 04/20/17
Field Prep: Field Filtered (Dissolved Metals)

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 04/26/17 15:57
Analyst: PK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Ethanol	ND		ug/l	250	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	100		70-130
Toluene-d8	102		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	99		70-130

Project Name: HARVARD DISTRICT ENERGY FACIL. **Lab Number:** L1712551

Project Number: 129017-003 **Report Date:** 04/26/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/26/17 14:05
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG997825-5					
Ethanol	ND		ug/l	250	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	101		70-130
Toluene-d8	97		70-130
4-Bromofluorobenzene	101		70-130
Dibromofluoromethane	100		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-003

Lab Number: L1712551

Report Date: 04/26/17

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: WG997825-3 WG997825-4								
Ethanol	98		120		70-130	**21**	Q	20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	101		103		70-130
Toluene-d8	102		103		70-130
4-Bromofluorobenzene	98		95		70-130
Dibromofluoromethane	99		100		70-130

INORGANICS
&
MISCELLANEOUS

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-003
Lab Number: L1712551
Report Date: 04/26/17

SAMPLE RESULTS

Lab ID: L1712551-01
Client ID: DEF-A2-OW-20170420
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 04/20/17 10:30
Date Received: 04/20/17
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										
pH (H)	6.9		SU	-	NA	1	-	04/21/17 00:47	121,4500H+-B	VB

Lab Control Sample Analysis

Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.

Project Number: 129017-003

Lab Number: L1712551

Report Date: 04/26/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG996217-1								
pH	100		-		99-101	-		5

Lab Duplicate Analysis
Batch Quality Control

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-003

Lab Number: L1712551
Report Date: 04/26/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG996217-2 QC Sample: L1712479-01 Client ID: DUP Sample						
pH	7.8	7.8	SU	0		5

Project Name: HARVARD DISTRICT ENERGY FACIL.
Project Number: 129017-003

Lab Number: L1712551
Report Date: 04/26/17

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(*)
L1712551-01A	Plastic 60ml unpreserved	A	7	2.1	Y	Absent	PH-4500(.01)
L1712551-01B	Plastic 250ml unpreserved	A	7	2.1	Y	Absent	HOLD-WETCHEM()
L1712551-01C	Vial HCl preserved	A	N/A	2.1	Y	Absent	8260(14)
L1712551-01D	Vial HCl preserved	A	N/A	2.1	Y	Absent	8260(14)
L1712551-01E	Vial HCl preserved	A	N/A	2.1	Y	Absent	8260(14)
L1712551-01F	Plastic 250ml HNO3 preserved	A	<2	2.1	Y	Absent	HOLD-METAL(180)
L1712551-01G	Plastic 250ml HNO3 preserved	A	<2	2.1	Y	Absent	HOLD-METAL(180)
L1712551-01H	Plastic 250ml HNO3 preserved	A	<2	2.1	Y	Absent	HOLD-METAL-DISSOLVED(180)

*Values in parentheses indicate holding time in days

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1712551
Project Number:	129017-003	**Report Date:**	04/26/17

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: Data Usability Report

Project Name:	HARVARD DISTRICT ENERGY FACIL.	**Lab Number:**	L1712551
Project Number:	129017-003	**Report Date:**	04/26/17

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. 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 DISTRICT ENERGY FACIL.	**Lab Number:**	L1712551
Project Number:	129017-003	**Report Date:**	04/26/17

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

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.

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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.

COC edits by Gina Hall AAL 4/25/17

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: 4/20/17

ALPHA Job #: L1712551

Project Information
- Project Name: Harvard District Energy Facility
- Project Location: Allston, MA
- Project #: 129017-003
- (Use Project name as Project #) ☐
- Project Manager: Beck Straley
- ALPHAQuote #:

Turn-Around Time
- Standard ☑ Due Date:
- Rush (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 Street
- Boston, MA 02129
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: bstraley@haleyaldrich.com

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY ☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:
Metals: antimony, arsenic, cadmium, chromium III, copper, lead, nickel, selenium, silver, zinc

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
- ☑ Done
- ☐ Lab to do

Preservation
- ☐ Lab to do

(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Hardness - 200.8 (1)	pH (1)	Metals by 200.8 -Total (1)	Metals by 200.8 -Dissolve (1)	Chromium VI - 7196 (1)	Ethyl Alcohol -8260 (3)			Sample Specific Comments	Total Bottles
12551 - 01	DEF-A2-OW-20170420	4/20/2017	1030	AQ	MD	X	X	X	X	X	X			Hold Metals, Ethanol	8

only report and analyze for pH and 8260 report Ethanol only

Container Type	P	P	P	P	A	V								
Preservative	C	A	C	C	A	B								

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	4/20/17	M. Gutt	4/20/17 16:30
M. Gutt	4/20/17 1630	AAL	4/20/17 1630
AAL	4/20/17 1751		4/20/17 17:51

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 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: 4/20/17

ALPHA Job #: L1712551

H&A Information
H&A Client: Harvard
H&A Address: 465 Medford Street
Boston, MA 02129
H&A Phone: 617-886-7400
H&A Fax:
H&A Email: bstraley@haleyaldrich.com

Project Information
Project Name: Harvard District Energy Facility
Project Location: Allston, MA
Project #: 129017-003
(Use Project name as Project #) ☐
Project Manager: Beck Straley
ALPHAQuote #:

Turn-Around Time
Standard ☑ Due Date:
Rush (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)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Metals: antimony, arsenic, cadmium, chromium III, copper, lead, nickel, selenium, silver, zinc

Please specify Metals or TAL.

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Hardness - 200.8 (1)	pH (1)	Metals by 200.8 -Total (1)	Metals by 200.8 -Dissolve (1)	Chromium VI - 7196 (1)	Ethyl Alcohol -8260 (3)			Sample Specific Comments	Total Bottles
12551 - 01	DEF-A2-OW-20170420	4/20/2017	1030	AQ	MD	X	X	X	X	X	X			Hold Metals, Ethanol	8

Container Type: P P P P A V
Preservative: C A C C A B

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	4/20/17	M. Gatto	4/20/17 16:30
M. Gatto	4/20/17 16:30	AAL	4/20/17 1630
AAL	4/20/17 1751		4/20/17 17:51

Document ID: 20455 Rev 1 (1/28/2016)

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.

ANALYTICAL REPORT

Lab Number:	L1715808
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	DISTRICT ENERGY FACILITY
Project Number:	129017-003
Report Date:	05/18/17

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: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1715808-01	HA17-DEF_INF	WATER	ALLSTON, MA	05/15/17 14:30	05/15/17
L1715808-02	HA17-DEF_EFF	WATER	ALLSTON, MA	05/15/17 14:45	05/15/17
L1715808-03	TRIP BLANK	WATER	ALLSTON, MA	05/15/17 00:00	05/15/17

Project Name:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1715808
Project Number:	129017-003	**Report Date:**	05/18/17

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:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1715808
Project Number:	129017-003	**Report Date:**	05/18/17

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.

Metals

The WG1003866-3 MS recovery for iron (0%), performed on L1715808-01 (HA17-DEF_INF), does not apply because the sample concentration is greater than four times the spike amount added.

Nitrogen, Ammonia

The HA17-DEF_EFF (L1715808-02) result is greater than the HA17-DEF_INF (L1715808-01) result. The sample containers were verified as being labeled correctly by the laboratory

Chloride

The HA17-DEF_EFF (L1715808-02) result is greater than the HA17-DEF_INF (L1715808-01) result. The sample containers were verified as being labeled correctly by the laboratory

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: 05/18/17

ORGANICS

VOLATILES

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-01
Client ID: HA17-DEF_INF
Sample Location: ALLSTON, MA

Date Collected: 05/15/17 14:30
Date Received: 05/15/17
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/17/17 17:58
Analyst: NL

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	0.68	1
1,1-Dichloroethane	ND		ug/l	0.75	0.21	1
Chloroform	ND		ug/l	0.75	0.16	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.8	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	0.75	0.14	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	0.50	0.18	1
Trichlorofluoromethane	ND		ug/l	2.5	0.16	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	0.50	0.16	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.17	1
Bromoform	ND		ug/l	2.0	0.25	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	0.75	0.16	1
Ethylbenzene	ND		ug/l	0.50	0.17	1
Chloromethane	ND		ug/l	2.5	0.18	1
Bromomethane	ND		ug/l	1.0	0.26	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	1.0	0.13	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
1,2-Dichloroethene, Total	ND		ug/l	0.50	0.16	1
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.18	1

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-01 Date Collected: 05/15/17 14:30

Client ID: HA17-DEF_INF Date Received: 05/15/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.19	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.19	1
Methyl tert butyl ether	ND		ug/l	1.0	0.17	1
p/m-Xylene	ND		ug/l	1.0	0.33	1
o-Xylene	ND		ug/l	1.0	0.33	1
Xylenes, Total	ND		ug/l	1.0	0.33	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	0.19	1
Dibromomethane	ND		ug/l	5.0	0.36	1
1,4-Dichlorobutane	ND		ug/l	5.0	0.46	1
1,2,3-Trichloropropane	ND		ug/l	5.0	0.18	1
Styrene	ND		ug/l	1.0	0.36	1
Dichlorodifluoromethane	ND		ug/l	5.0	0.24	1
Acetone	1.9	J	ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	0.30	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	0.31	1
4-Methyl-2-pentanone	ND		ug/l	5.0	0.42	1
2-Hexanone	ND		ug/l	5.0	0.52	1
Ethyl methacrylate	ND		ug/l	5.0	0.61	1
Acrylonitrile	ND		ug/l	5.0	0.43	1
Bromochloromethane	ND		ug/l	2.5	0.15	1
Tetrahydrofuran	ND		ug/l	5.0	0.83	1
2,2-Dichloropropane	ND		ug/l	2.5	0.20	1
1,2-Dibromoethane	ND		ug/l	2.0	0.19	1
1,3-Dichloropropane	ND		ug/l	2.5	0.21	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	0.16	1
Bromobenzene	ND		ug/l	2.5	0.15	1
n-Butylbenzene	ND		ug/l	0.50	0.19	1
sec-Butylbenzene	ND		ug/l	0.50	0.18	1
tert-Butylbenzene	ND		ug/l	2.5	0.18	1
o-Chlorotoluene	ND		ug/l	2.5	0.17	1
p-Chlorotoluene	ND		ug/l	2.5	0.18	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.35	1
Hexachlorobutadiene	ND		ug/l	0.50	0.22	1
Isopropylbenzene	ND		ug/l	0.50	0.19	1
p-Isopropyltoluene	ND		ug/l	0.50	0.19	1
Naphthalene	ND		ug/l	2.5	0.22	1
n-Propylbenzene	ND		ug/l	0.50	0.17	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.23	1

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-01 Date Collected: 05/15/17 14:30

Client ID: HA17-DEF_INF Date Received: 05/15/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.22	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.17	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.19	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	0.18	1
Ethyl ether	ND		ug/l	2.5	0.16	1
Tert-Butyl Alcohol	ND		ug/l	10	1.4	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	106		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	99		70-130

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-02
Client ID: HA17-DEF_EFF
Sample Location: ALLSTON, MA

Date Collected: 05/15/17 14:45
Date Received: 05/15/17
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/17/17 18:33
Analyst: NL

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	0.68	1
1,1-Dichloroethane	ND		ug/l	0.75	0.21	1
Chloroform	ND		ug/l	0.75	0.16	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.8	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	0.75	0.14	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	0.50	0.18	1
Trichlorofluoromethane	ND		ug/l	2.5	0.16	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	0.50	0.16	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.17	1
Bromoform	ND		ug/l	2.0	0.25	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	0.75	0.16	1
Ethylbenzene	ND		ug/l	0.50	0.17	1
Chloromethane	ND		ug/l	2.5	0.18	1
Bromomethane	ND		ug/l	1.0	0.26	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	1.0	0.13	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
1,2-Dichloroethene, Total	ND		ug/l	0.50	0.16	1
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.18	1

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-02 Date Collected: 05/15/17 14:45

Client ID: HA17-DEF_EFF Date Received: 05/15/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.19	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.19	1
Methyl tert butyl ether	ND		ug/l	1.0	0.17	1
p/m-Xylene	ND		ug/l	1.0	0.33	1
o-Xylene	ND		ug/l	1.0	0.33	1
Xylenes, Total	ND		ug/l	1.0	0.33	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	0.19	1
Dibromomethane	ND		ug/l	5.0	0.36	1
1,4-Dichlorobutane	ND		ug/l	5.0	0.46	1
1,2,3-Trichloropropane	ND		ug/l	5.0	0.18	1
Styrene	ND		ug/l	1.0	0.36	1
Dichlorodifluoromethane	ND		ug/l	5.0	0.24	1
Acetone	3.6	J	ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	0.30	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	0.31	1
4-Methyl-2-pentanone	ND		ug/l	5.0	0.42	1
2-Hexanone	ND		ug/l	5.0	0.52	1
Ethyl methacrylate	ND		ug/l	5.0	0.61	1
Acrylonitrile	ND		ug/l	5.0	0.43	1
Bromochloromethane	ND		ug/l	2.5	0.15	1
Tetrahydrofuran	ND		ug/l	5.0	0.83	1
2,2-Dichloropropane	ND		ug/l	2.5	0.20	1
1,2-Dibromoethane	ND		ug/l	2.0	0.19	1
1,3-Dichloropropane	ND		ug/l	2.5	0.21	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	0.16	1
Bromobenzene	ND		ug/l	2.5	0.15	1
n-Butylbenzene	ND		ug/l	0.50	0.19	1
sec-Butylbenzene	ND		ug/l	0.50	0.18	1
tert-Butylbenzene	ND		ug/l	2.5	0.18	1
o-Chlorotoluene	ND		ug/l	2.5	0.17	1
p-Chlorotoluene	ND		ug/l	2.5	0.18	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.35	1
Hexachlorobutadiene	ND		ug/l	0.50	0.22	1
Isopropylbenzene	ND		ug/l	0.50	0.19	1
p-Isopropyltoluene	ND		ug/l	0.50	0.19	1
Naphthalene	ND		ug/l	2.5	0.22	1
n-Propylbenzene	ND		ug/l	0.50	0.17	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.23	1

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-02 Date Collected: 05/15/17 14:45

Client ID: HA17-DEF_EFF Date Received: 05/15/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.22	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.17	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.19	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	0.18	1
Ethyl ether	ND		ug/l	2.5	0.16	1
Tert-Butyl Alcohol	ND		ug/l	10	1.4	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	108		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	101		70-130

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/17/17 09:41
Analyst: PK

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1004499-5					
Methylene chloride	ND		ug/l	3.0	0.68
1,1-Dichloroethane	ND		ug/l	0.75	0.21
Chloroform	ND		ug/l	0.75	0.16
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.8	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	0.75	0.14
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	0.50	0.18
Trichlorofluoromethane	ND		ug/l	2.5	0.16
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	0.50	0.16
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.17
Bromoform	ND		ug/l	2.0	0.25
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	0.75	0.16
Ethylbenzene	ND		ug/l	0.50	0.17
Chloromethane	ND		ug/l	2.5	0.18
Bromomethane	ND		ug/l	1.0	0.26
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	1.0	0.13
1,1-Dichloroethene	ND		ug/l	0.50	0.17
1,2-Dichloroethene, Total	ND		ug/l	0.50	0.16
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/17/17 09:41
Analyst: PK

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1004499-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.18
1,3-Dichlorobenzene	ND		ug/l	2.5	0.19
1,4-Dichlorobenzene	ND		ug/l	2.5	0.19
Methyl tert butyl ether	ND		ug/l	1.0	0.17
p/m-Xylene	ND		ug/l	1.0	0.33
o-Xylene	ND		ug/l	1.0	0.33
Xylenes, Total	ND		ug/l	1.0	0.33
cis-1,2-Dichloroethene	ND		ug/l	0.50	0.19
Dibromomethane	ND		ug/l	5.0	0.36
1,4-Dichlorobutane	ND		ug/l	5.0	0.46
1,2,3-Trichloropropane	ND		ug/l	5.0	0.18
Styrene	ND		ug/l	1.0	0.36
Dichlorodifluoromethane	ND		ug/l	5.0	0.24
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	0.30
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	0.31
4-Methyl-2-pentanone	ND		ug/l	5.0	0.42
2-Hexanone	ND		ug/l	5.0	0.52
Ethyl methacrylate	ND		ug/l	5.0	0.61
Acrylonitrile	ND		ug/l	5.0	0.43
Bromochloromethane	ND		ug/l	2.5	0.15
Tetrahydrofuran	ND		ug/l	5.0	0.83
2,2-Dichloropropane	ND		ug/l	2.5	0.20
1,2-Dibromoethane	ND		ug/l	2.0	0.19
1,3-Dichloropropane	ND		ug/l	2.5	0.21
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	0.16
Bromobenzene	ND		ug/l	2.5	0.15
n-Butylbenzene	ND		ug/l	0.50	0.19

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/17/17 09:41
Analyst: PK

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1004499-5					
sec-Butylbenzene	ND		ug/l	0.50	0.18
tert-Butylbenzene	ND		ug/l	2.5	0.18
o-Chlorotoluene	ND		ug/l	2.5	0.17
p-Chlorotoluene	ND		ug/l	2.5	0.18
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.35
Hexachlorobutadiene	ND		ug/l	0.50	0.22
Isopropylbenzene	ND		ug/l	0.50	0.19
p-Isopropyltoluene	ND		ug/l	0.50	0.19
Naphthalene	ND		ug/l	2.5	0.22
n-Propylbenzene	ND		ug/l	0.50	0.17
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.23
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.22
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.17
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.19
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	0.18
Ethyl ether	ND		ug/l	2.5	0.16
Tert-Butyl Alcohol	ND		ug/l	10	1.4
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	109		70-130
Toluene-d8	96		70-130
4-Bromofluorobenzene	101		70-130
Dibromofluoromethane	101		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1004499-3 WG1004499-4								
Methylene chloride	100		110		70-130	10		20
1,1-Dichloroethane	100		110		70-130	10		20
Chloroform	100		110		70-130	10		20
Carbon tetrachloride	100		110		63-132	10		20
1,2-Dichloropropane	100		110		70-130	10		20
Dibromochloromethane	95		96		63-130	1		20
1,1,2-Trichloroethane	100		100		70-130	0		20
Tetrachloroethene	100		100		70-130	0		20
Chlorobenzene	100		100		75-130	0		25
Trichlorofluoromethane	97		110		62-150	13		20
1,2-Dichloroethane	100		110		70-130	10		20
1,1,1-Trichloroethane	100		110		67-130	10		20
Bromodichloromethane	99		110		67-130	11		20
trans-1,3-Dichloropropene	83		83		70-130	0		20
cis-1,3-Dichloropropene	100		110		70-130	10		20
1,1-Dichloropropene	99		110		70-130	11		20
Bromoform	90		91		54-136	1		20
1,1,2,2-Tetrachloroethane	89		100		67-130	12		20
Benzene	100		120		70-130	18		25
Toluene	100		110		70-130	10		25
Ethylbenzene	110		110		70-130	0		20
Chloromethane	96		96		64-130	0		20
Bromomethane	100		98		39-139	2		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1004499-3 WG1004499-4								
Vinyl chloride	94		96		55-140	2		20
Chloroethane	100		120		55-138	18		20
1,1-Dichloroethene	96		100		61-145	4		25
Trichloroethene	100		110		70-130	10		25
1,2-Dichlorobenzene	99		100		70-130	1		20
1,3-Dichlorobenzene	100		100		70-130	0		20
1,4-Dichlorobenzene	100		100		70-130	0		20
Methyl tert butyl ether	110		120		63-130	9		20
p/m-Xylene	110		115		70-130	4		20
o-Xylene	105		110		70-130	5		20
cis-1,2-Dichloroethene	100		110		70-130	10		20
Dibromomethane	100		110		70-130	10		20
1,4-Dichlorobutane	98		110		70-130	12		20
1,2,3-Trichloropropane	85		93		64-130	9		20
Styrene	105		115		70-130	9		20
Dichlorodifluoromethane	100		110		36-147	10		20
Acetone	140		120		58-148	15		20
Carbon disulfide	89		110		51-130	**21**	Q	20
2-Butanone	100		100		63-138	0		20
Vinyl acetate	98		100		70-130	2		20
4-Methyl-2-pentanone	83		93		59-130	11		20
2-Hexanone	94		95		57-130	1		20
Ethyl methacrylate	88		95		70-130	8		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1004499-3 WG1004499-4								
Acrylonitrile	110		120		70-130	9		20
Bromochloromethane	100		120		70-130	18		20
Tetrahydrofuran	100		100		58-130	0		20
2,2-Dichloropropane	120		120		63-133	0		20
1,2-Dibromoethane	99		100		70-130	1		20
1,3-Dichloropropane	98		100		70-130	2		20
1,1,1,2-Tetrachloroethane	100		100		64-130	0		20
Bromobenzene	96		100		70-130	4		20
n-Butylbenzene	110		110		53-136	0		20
sec-Butylbenzene	100		110		70-130	10		20
tert-Butylbenzene	100		100		70-130	0		20
o-Chlorotoluene	92		94		70-130	2		20
p-Chlorotoluene	100		100		70-130	0		20
1,2-Dibromo-3-chloropropane	82		88		41-144	7		20
Hexachlorobutadiene	120		110		63-130	9		20
Isopropylbenzene	100		110		70-130	10		20
p-Isopropyltoluene	100		110		70-130	10		20
Naphthalene	120		110		70-130	9		20
n-Propylbenzene	99		100		69-130	1		20
1,2,3-Trichlorobenzene	130		130		70-130	0		20
1,2,4-Trichlorobenzene	110		110		70-130	0		20
1,3,5-Trimethylbenzene	99		100		64-130	1		20
1,2,4-Trimethylbenzene	100		100		70-130	0		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1004499-3 WG1004499-4								
trans-1,4-Dichloro-2-butene	89		89		70-130	0		20
Ethyl ether	100		110		59-134	10		20
Tert-Butyl Alcohol	116		120		70-130	3		20
Tertiary-Amyl Methyl Ether	98		110		66-130	12		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	100		104		70-130
Toluene-d8	97		97		70-130
4-Bromofluorobenzene	96		97		70-130
Dibromofluoromethane	94		102		70-130

METALS

Project Name: DISTRICT ENERGY FACILITY
Lab Number: L1715808
Project Number: 129017-003
Report Date: 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-01
Client ID: HA17-DEF_INF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/15/17 14:30
Date Received: 05/15/17
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											
Arsenic, Total	0.00351		mg/l	0.00100	0.00016	1	05/16/17 11:50	05/17/17 11:24	EPA 3005A	3,200.8	AM
Chromium, Total	0.00326		mg/l	0.00100	0.00017	1	05/16/17 11:50	05/17/17 11:24	EPA 3005A	3,200.8	AM
Copper, Total	0.02473		mg/l	0.00100	0.00038	1	05/16/17 11:50	05/17/17 11:24	EPA 3005A	3,200.8	AM
Iron, Total	11.5		mg/l	0.050	0.009	1	05/16/17 11:50	05/16/17 23:57	EPA 3005A	19,200.7	AB
Lead, Total	0.08972		mg/l	0.00050	0.00034	1	05/16/17 11:50	05/17/17 11:24	EPA 3005A	3,200.8	AM
Nickel, Total	0.00431		mg/l	0.00200	0.00055	1	05/16/17 11:50	05/17/17 11:24	EPA 3005A	3,200.8	AM
Zinc, Total	0.07324		mg/l	0.01000	0.00341	1	05/16/17 11:50	05/17/17 11:24	EPA 3005A	3,200.8	AM

Project Name: DISTRICT ENERGY FACILITY
Lab Number: L1715808
Project Number: 129017-003
Report Date: 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-02
Client ID: HA17-DEF_EFF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/15/17 14:45
Date Received: 05/15/17
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											
Arsenic, Total	0.00247		mg/l	0.00100	0.00016	1	05/16/17 11:50	05/17/17 11:27	EPA 3005A	3,200.8	AM
Chromium, Total	0.00257		mg/l	0.00100	0.00017	1	05/16/17 11:50	05/17/17 11:27	EPA 3005A	3,200.8	AM
Copper, Total	0.02140		mg/l	0.00100	0.00038	1	05/16/17 11:50	05/17/17 11:27	EPA 3005A	3,200.8	AM
Iron, Total	6.59		mg/l	0.050	0.009	1	05/16/17 11:50	05/17/17 02:46	EPA 3005A	19,200.7	AB
Lead, Total	0.03697		mg/l	0.00050	0.00034	1	05/16/17 11:50	05/17/17 11:27	EPA 3005A	3,200.8	AM
Nickel, Total	0.00332		mg/l	0.00200	0.00055	1	05/16/17 11:50	05/17/17 11:27	EPA 3005A	3,200.8	AM
Zinc, Total	0.1060		mg/l	0.01000	0.00341	1	05/16/17 11:50	05/17/17 11:27	EPA 3005A	3,200.8	AM

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

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): 01-02 Batch: WG1003866-1										
Iron, Total	ND		mg/l	0.050	0.009	1	05/16/17 11:50	05/16/17 23:49	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 Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1003869-1										
Arsenic, Total	ND		mg/l	0.00100	0.00016	1	05/16/17 11:50	05/17/17 11:02	3,200.8	AM
Chromium, Total	0.00018	J	mg/l	0.00100	0.00017	1	05/16/17 11:50	05/17/17 11:02	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	0.00038	1	05/16/17 11:50	05/17/17 11:02	3,200.8	AM
Lead, Total	ND		mg/l	0.00050	0.00034	1	05/16/17 11:50	05/17/17 11:02	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	0.00055	1	05/16/17 11:50	05/17/17 11:02	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	0.00341	1	05/16/17 11:50	05/17/17 11:02	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY

Project Number: 129017-003

Lab Number: L1715808

Report Date: 05/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1003866-2								
Iron, Total	96		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1003869-2								
Arsenic, Total	104		-		85-115	-		
Chromium, Total	92		-		85-115	-		
Copper, Total	94		-		85-115	-		
Lead, Total	102		-		85-115	-		
Nickel, Total	92		-		85-115	-		
Zinc, Total	98		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

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): 01-02 QC Batch ID: WG1003866-3 QC Sample: L1715808-01 Client ID: HA17-DEF_INF												
Iron, Total	11.5	1	11.5	**0**	Q	-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1003866-7 QC Sample: L1715810-01 Client ID: MS Sample												
Iron, Total	9.82	1	11.0	118		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1003869-3 QC Sample: L1715808-01 Client ID: HA17-DEF_INF												
Arsenic, Total	0.00351	0.12	0.1208	98		-	-		70-130	-		20
Chromium, Total	0.00326	0.2	0.1918	94		-	-		70-130	-		20
Copper, Total	0.02473	0.25	0.2665	97		-	-		70-130	-		20
Lead, Total	0.08972	0.51	0.6143	103		-	-		70-130	-		20
Nickel, Total	0.00431	0.5	0.4839	96		-	-		70-130	-		20
Zinc, Total	0.07324	0.5	0.5654	98		-	-		70-130	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1003866-4 QC Sample: L1715808-01 Client ID: HA17-DEF_INF						
Iron, Total	11.5	10.9	mg/l	5		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1003866-8 QC Sample: L1715810-01 Client ID: DUP Sample						
Iron, Total	9.82	10.3	mg/l	5		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1003869-4 QC Sample: L1715808-01 Client ID: HA17-DEF_INF						
Arsenic, Total	0.00351	0.00323	mg/l	8		20
Chromium, Total	0.00326	0.00321	mg/l	2		20
Copper, Total	0.02473	0.02274	mg/l	8		20
Lead, Total	0.08972	0.08554	mg/l	5		20
Nickel, Total	0.00431	0.00448	mg/l	4		20
Zinc, Total	0.07324	0.07066	mg/l	4		20

INORGANICS
&
MISCELLANEOUS

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003
Lab Number: L1715808
Report Date: 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-01
Client ID: HA17-DEF_INF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/15/17 14:30
Date Received: 05/15/17
Field Prep: Not Specified

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	-	05/16/17 03:55	121,2540D	VB
Cyanide, Total	0.004	J	mg/l	0.005	0.001	1	05/16/17 11:00	05/16/17 14:41	121,4500CN-CE	LK
Cyanide, Free	1.32	J	ug/l	2.00	0.544	1	05/16/17 17:30	05/16/17 23:49	109,9016	AT
pH (H)	7.2		SU	-	NA	1	-	05/15/17 22:50	121,4500H+-B	AS
Nitrogen, Ammonia	0.946		mg/l	0.075	0.022	1	05/15/17 23:00	05/16/17 21:40	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	5.20	1.61	1.3	05/16/17 17:30	05/16/17 23:00	74,1664A	ML
Anions by Ion Chromatography - Westborough Lab										
Chloride	35.9		mg/l	5.00	0.839	10	-	05/16/17 02:26	44,300.0	JC

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003
Lab Number: L1715808
Report Date: 05/18/17

SAMPLE RESULTS

Lab ID: L1715808-02
Client ID: HA17-DEF_EFF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/15/17 14:45
Date Received: 05/15/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	82.		mg/l	5.0	NA	1	-	05/16/17 03:55	121,2540D	VB
Cyanide, Total	0.004	J	mg/l	0.005	0.001	1	05/16/17 11:00	05/16/17 14:43	121,4500CN-CE	LK
Cyanide, Free	ND		ug/l	2.00	0.544	1	05/16/17 17:30	05/16/17 23:50	109,9016	AT
pH (H)	7.3		SU	-	NA	1	-	05/15/17 22:50	121,4500H+-B	AS
Nitrogen, Ammonia	1.20		mg/l	0.075	0.022	1	05/15/17 23:00	05/16/17 21:41	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.80	1.49	1.2	05/16/17 17:30	05/16/17 23:00	74,1664A	ML
Anions by Ion Chromatography - Westborough Lab										
Chloride	60.6		mg/l	5.00	0.839	10	-	05/16/17 02:38	44,300.0	JC

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1715808

Project Number: 129017-003 **Report Date:** 05/18/17

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): 01-02 Batch: WG1003679-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/16/17 03:55	121,2540D	VB
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1003684-1										
Nitrogen, Ammonia	ND		mg/l	0.075	0.022	1	05/15/17 23:00	05/16/17 21:28	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1003848-1										
Cyanide, Total	ND		mg/l	0.005	0.001	1	05/16/17 11:00	05/16/17 14:27	121,4500CN-CE	LK
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1004043-1										
TPH, SGT-HEM	ND		mg/l	4.00	1.24	1	05/16/17 17:30	05/16/17 23:00	74,1664A	ML
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1004054-1										
Cyanide, Free	ND		ug/l	2.00	0.544	1	05/16/17 17:30	05/16/17 23:44	109,9016	AT
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-02 Batch: WG1004104-1										
Chloride	ND		mg/l	0.500	0.083	1	-	05/15/17 23:02	44,300.0	JC

Lab Control Sample Analysis

Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY

Project Number: 129017-003

Lab Number: L1715808

Report Date: 05/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1003677-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1003684-2								
Nitrogen, Ammonia	98		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1003848-2								
Cyanide, Total	94		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1004043-2								
TPH	86		-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1004054-2								
Cyanide, Free	87		-		75-125	-		
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 Batch: WG1004104-2								
Chloride	103		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

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): 01-02 QC Batch ID: WG1003684-4 QC Sample: L1715808-02 Client ID: HA17-DEF_EFF												
Nitrogen, Ammonia	1.20	4	4.95	94		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1003848-4 QC Sample: L1715808-02 Client ID: HA17-DEF_EFF												
Cyanide, Total	0.004J	0.2	0.198	99		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004043-4 QC Sample: L1715771-01 Client ID: MS Sample												
TPH	ND	20	17.7	88		-	-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004054-3 QC Sample: L1715808-02 Client ID: HA17-DEF_EFF												
Cyanide, Free	ND	50	36.9	74		-	-		70-130	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004104-3 QC Sample: L1715734-02 Client ID: MS Sample												
Chloride	129.	100	238	109		-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1003677-2 QC Sample: L1715799-01 Client ID: DUP Sample						
pH	8.0	8.0	SU	0		5
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1003679-2 QC Sample: L1715520-01 Client ID: DUP Sample						
Solids, Total Suspended	420	370	mg/l	13		29
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1003684-3 QC Sample: L1715808-02 Client ID: HA17-DEF_EFF						
Nitrogen, Ammonia	1.20	1.21	mg/l	1		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1003848-3 QC Sample: L1715808-01 Client ID: HA17-DEF_INF						
Cyanide, Total	0.004J	0.004J	mg/l	NC		30
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004043-3 QC Sample: L1715328-01 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004054-4 QC Sample: L1715808-02 Client ID: HA17-DEF_EFF						
Cyanide, Free	ND	ND	ug/l	NC		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004104-4 QC Sample: L1715734-02 Client ID: DUP Sample						
Chloride	129.	129	mg/l	0		18

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1715808
Report Date: 05/18/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information Custody Seal

Cooler	
B	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1715808-01A	Vial HCl preserved	B	N/A	4.2	Y	Absent	8260(14)
L1715808-01B	Vial HCl preserved	B	N/A	4.2	Y	Absent	8260(14)
L1715808-01C	Vial HCl preserved	B	N/A	4.2	Y	Absent	8260(14)
L1715808-01D	Plastic 250ml HNO3 preserved	B	<2	4.2	Y	Absent	NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),AS-2008T(180),CR-2008T(180),PB-2008T(180)
L1715808-01E	Plastic 250ml NaOH preserved	B	>12	4.2	Y	Absent	TCN-4500(14)
L1715808-01F	Plastic 120ml unpreserved	B	7	4.2	Y	Absent	CL-300(28),PH-4500(.01)
L1715808-01G	Plastic 120ml NaOH preserved	B	>12	4.2	Y	Absent	FCN-9016(14)
L1715808-01H	Plastic 500ml H2SO4 preserved	B	<2	4.2	Y	Absent	NH3-4500(28)
L1715808-01J	Amber 1000ml HCl preserved	B	N/A	4.2	Y	Absent	TPH-1664(28)
L1715808-01K	Amber 1000ml HCl preserved	B	N/A	4.2	Y	Absent	TPH-1664(28)
L1715808-01L	Plastic 950ml unpreserved	B	7	4.2	Y	Absent	TSS-2540(7)
L1715808-02A	Vial HCl preserved	B	N/A	4.2	Y	Absent	8260(14)
L1715808-02B	Vial HCl preserved	B	N/A	4.2	Y	Absent	8260(14)
L1715808-02C	Vial HCl preserved	B	N/A	4.2	Y	Absent	8260(14)
L1715808-02D	Plastic 250ml HNO3 preserved	B	<2	4.2	Y	Absent	NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),AS-2008T(180),CR-2008T(180),PB-2008T(180)
L1715808-02E	Plastic 250ml NaOH preserved	B	>12	4.2	Y	Absent	TCN-4500(14)
L1715808-02F	Plastic 120ml unpreserved	B	7	4.2	Y	Absent	CL-300(28),PH-4500(.01)
L1715808-02G	Plastic 120ml NaOH preserved	B	>12	4.2	Y	Absent	FCN-9016(14)
L1715808-02H	Plastic 500ml H2SO4 preserved	B	<2	4.2	Y	Absent	NH3-4500(28)
L1715808-02J	Amber 1000ml HCl preserved	B	N/A	4.2	Y	Absent	TPH-1664(28)
L1715808-02K	Amber 1000ml HCl preserved	B	N/A	4.2	Y	Absent	TPH-1664(28)
L1715808-02L	Plastic 950ml unpreserved	B	7	4.2	Y	Absent	TSS-2540(7)
L1715808-03A	Vial HCl preserved	B	N/A	4.2	Y	Absent	HOLD-8260(14)
L1715808-03B	Vial HCl preserved	B	N/A	4.2	Y	Absent	HOLD-8260(14)

*Values in parentheses indicate holding time in days

Project Name:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1715808
Project Number:	129017-003	**Report Date:**	05/18/17

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

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:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1715808
Project Number:	129017-003	**Report Date:**	05/18/17

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:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1715808
Project Number:	129017-003	**Report Date:**	05/18/17

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.

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.

109 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Revision 0, June 2010.

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: 05/15/17

ALPHA Job #: L1715808

H&A Information
- H&A Client: Harvard
- H&A Address: 465 MEDFORD STREET
- BOSTON, MA 02129
- H&A Phone: 617-886-7581
- H&A Fax: N/A
- H&A Email: echristmas@haleyaldrich.com

Project Information
- Project Name: DISTRICT ENERGY FACILITY
- Project Location: ALLSTON, MA
- Project #: 129017-003
- (Use Project name as Project #) ☐
- Project Manager: A. Chan/B. Straley/K. Dilawari
- ALPHAQuote #:

Turn-Around Time
Standard ☑ Due Date:
Rush (only if pre approved) ☒ # of Days: ~~5 Day~~ 3day

Deliverables
☑ Email ☐ Fax
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other:

Billing Information
☐ Same as Client Info
PO #

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

1. Report only total arsenic, chromium, copper, iron, lead, nickel, and zinc

3-day TAT

Please specify Metals or TAL.

REPORT TOTAL ARSENIC, CHROMIUM, COPPER, IRON, LEAD, NICKEL, ZINC ONLY

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. VOCs	2. Total Metals (note 1)	3. Free Cyanide	4. Total Cyanide	5. TSS	6. pH, Chloride	7. Ammonia	8. TPH	Sample Specific Comments	Total Bottles
15808-01	MA17-DEF-INF	5/15/17	1430	AQ	RH	X	X	X	X	X	X	X	X	pH-6.8 temp-53°F	10
02	MA17-DEF-EFF	5/15/17	1445	AQ	RH	X	X	X	X	X	X	X	X	pH-6.9 temp-53°F	10
	Tripblank	5/15/17	00:00			HOLD TRIPBLANK									
														Totalizer = 7040,000	

COC edits by Gina Hall AAL 5/17/17

Container Type	A	P	P	P	P	P	P	A	
Preservative	B	C	E	E	A	A	D	B	

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	5/15/17	McCall	5/15/17 1630
McCall	5/15/17 1630	AAL	5/15/17 1630
	5/15/17 1824		5/15/17 1824

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 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: 05/15/17

ALPHA Job #: L1715808

H&A Information
- H&A Client: Harvard
- H&A Address: 465 MEDFORD STREET
- BOSTON, MA 02129
- H&A Phone: 617-886-7581
- H&A Fax: N/A
- H&A Email: echristmas@haleyaldrich.com

Project Information
- Project Name: DISTRICT ENERGY FACILITY
- Project Location: ALLSTON, MA
- Project #: 129017-003
- (Use Project name as Project #): ☐
- Project Manager: A. Chan/B. Straley/K. Dilawari
- ALPHAQuote #:

Turn-Around Time
- Standard ☑
- Rush (only if pre approved) ☒
- Due Date:
- # of Days: ~~5 Day~~ 3day

Deliverables
- ☑ Email ☐ Fax
- ☐ EQuIS (1 File) ☐ EQuIS (4 File)
- ☐ Other:

Regulatory Requirements (Program/Criteria)
EPA NPDES RGP

Note: Select State from menu & identify criteria.

Billing Information
☐ Same as Client Info
PO #

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

1. Report only total arsenic, chromium, copper, iron, lead, nickel, and zinc

3-day TAT

Please specify Metals or TAL.

REPORT TOTAL ARSENIC, CHROMIUM, COPPER, IRON, LEAD, NICKEL, ZINC ONLY

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. VOCs	2. Total Metals (note 1)	3. Free Cyanide	4. Total Cyanide	5. TSS	6. pH, Chloride	7. Ammonia	8. TPH	Sample Specific Comments	Total Bottles
15808-01	MA17-DEF-INF	5/15/17	1430	AQ	RH	X	X	X	X	X	X	X	X	pH-6.8 temp-53°F	10
02	MA17-DEF-EFF	5/15/17	1445	AQ	RH	X	X	X	X	X	X	X	X	pH-6.9 temp-53°F	10
														Totalizer = 7,040,000	

Container Type	A	P	P	P	P	P	P	A	
Preservative	B	C	E	E	A	A	D	B	

Preservative Code: A = None; B = HCl; C = HNO_3; D = H_2SO_4; E = NaOH; F = MeOH; G = $NaHSO_4$; H = $Na_2S_2O_3$; K/E = Zn Ac/NaOH; O = Other

Container Code: P = Plastic; A = Amber Glass; V = Vial; G = Glass; B = Bacteria Cup; C = Cube; O = Other; E = Encore; D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	5/15/17		5/15/17 1630
	5/15/17 1630	MAL	5/15/17 1630
	5/15/17 1824		5/15/17 1824

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)

ANALYTICAL REPORT

Lab Number:	L1716160
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	DISCTRICT ENERGY FACILITY
Project Number:	129017-003
Report Date:	05/22/17

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: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1716160-01	HA17-DEF_EFF	WATER	ALLSTON, MA	05/17/17 07:00	05/17/17
L1716160-02	HA17-DEF_INF	WATER	ALLSTON, MA	05/17/17 07:15	05/17/17

Project Name:	DISCTRICT ENERGY FACILITY	**Lab Number:**	L1716160
Project Number:	129017-003	**Report Date:**	05/22/17

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:	DISCTRICT ENERGY FACILITY	**Lab Number:**	L1716160
Project Number:	129017-003	**Report Date:**	05/22/17

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: Lisa Westerlind

Title: Technical Director/Representative Date: 05/22/17

ORGANICS

VOLATILES

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-01
Client ID: HA17-DEF_EFF
Sample Location: ALLSTON, MA

Date Collected: 05/17/17 07:00
Date Received: 05/17/17
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/20/17 03:13
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	0.68	1
1,1-Dichloroethane	ND		ug/l	0.75	0.21	1
Chloroform	ND		ug/l	0.75	0.16	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.8	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	0.75	0.14	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	0.50	0.18	1
Trichlorofluoromethane	ND		ug/l	2.5	0.16	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	0.50	0.16	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.17	1
Bromoform	ND		ug/l	2.0	0.25	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	0.17	J	ug/l	0.75	0.16	1
Ethylbenzene	ND		ug/l	0.50	0.17	1
Chloromethane	ND		ug/l	2.5	0.18	1
Bromomethane	ND		ug/l	1.0	0.26	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	1.0	0.13	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
1,2-Dichloroethene, Total	ND		ug/l	0.50	0.16	1
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.18	1

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-01 Date Collected: 05/17/17 07:00

Client ID: HA17-DEF_EFF Date Received: 05/17/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.19	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.19	1
Methyl tert butyl ether	ND		ug/l	1.0	0.17	1
p/m-Xylene	ND		ug/l	1.0	0.33	1
o-Xylene	ND		ug/l	1.0	0.33	1
Xylenes, Total	ND		ug/l	1.0	0.33	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	0.19	1
Dibromomethane	ND		ug/l	5.0	0.36	1
1,4-Dichlorobutane	ND		ug/l	5.0	0.46	1
1,2,3-Trichloropropane	ND		ug/l	5.0	0.18	1
Styrene	ND		ug/l	1.0	0.36	1
Dichlorodifluoromethane	ND		ug/l	5.0	0.24	1
Acetone	2.9	J	ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	0.30	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	0.31	1
4-Methyl-2-pentanone	ND		ug/l	5.0	0.42	1
2-Hexanone	ND		ug/l	5.0	0.52	1
Ethyl methacrylate	ND		ug/l	5.0	0.61	1
Acrylonitrile	ND		ug/l	5.0	0.43	1
Bromochloromethane	ND		ug/l	2.5	0.15	1
Tetrahydrofuran	ND		ug/l	5.0	0.83	1
2,2-Dichloropropane	ND		ug/l	2.5	0.20	1
1,2-Dibromoethane	ND		ug/l	2.0	0.19	1
1,3-Dichloropropane	ND		ug/l	2.5	0.21	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	0.16	1
Bromobenzene	ND		ug/l	2.5	0.15	1
n-Butylbenzene	ND		ug/l	0.50	0.19	1
sec-Butylbenzene	ND		ug/l	0.50	0.18	1
tert-Butylbenzene	ND		ug/l	2.5	0.18	1
o-Chlorotoluene	ND		ug/l	2.5	0.17	1
p-Chlorotoluene	ND		ug/l	2.5	0.18	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.35	1
Hexachlorobutadiene	ND		ug/l	0.50	0.22	1
Isopropylbenzene	0.25	J	ug/l	0.50	0.19	1
p-Isopropyltoluene	ND		ug/l	0.50	0.19	1
Naphthalene	12		ug/l	2.5	0.22	1
n-Propylbenzene	ND		ug/l	0.50	0.17	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.23	1

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-01 Date Collected: 05/17/17 07:00

Client ID: HA17-DEF_EFF Date Received: 05/17/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.22	1
1,3,5-Trimethylbenzene	0.21	J	ug/l	2.5	0.17	1
1,2,4-Trimethylbenzene	1.0	J	ug/l	2.5	0.19	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	0.18	1
Ethyl ether	ND		ug/l	2.5	0.16	1
Tert-Butyl Alcohol	ND		ug/l	10	1.4	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	105		70-130
4-Bromofluorobenzene	109		70-130
Dibromofluoromethane	98		70-130

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-02
Client ID: HA17-DEF_INF
Sample Location: ALLSTON, MA

Date Collected: 05/17/17 07:15
Date Received: 05/17/17
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/20/17 03:38
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	0.68	1
1,1-Dichloroethane	ND		ug/l	0.75	0.21	1
Chloroform	ND		ug/l	0.75	0.16	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.8	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	0.75	0.14	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	0.50	0.18	1
Trichlorofluoromethane	ND		ug/l	2.5	0.16	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	0.50	0.16	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.17	1
Bromoform	ND		ug/l	2.0	0.25	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	0.75	0.16	1
Ethylbenzene	ND		ug/l	0.50	0.17	1
Chloromethane	ND		ug/l	2.5	0.18	1
Bromomethane	ND		ug/l	1.0	0.26	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	1.0	0.13	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
1,2-Dichloroethene, Total	ND		ug/l	0.50	0.16	1
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.18	1

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-02 Date Collected: 05/17/17 07:15

Client ID: HA17-DEF_INF Date Received: 05/17/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.19	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.19	1
Methyl tert butyl ether	ND		ug/l	1.0	0.17	1
p/m-Xylene	ND		ug/l	1.0	0.33	1
o-Xylene	ND		ug/l	1.0	0.33	1
Xylenes, Total	ND		ug/l	1.0	0.33	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	0.19	1
Dibromomethane	ND		ug/l	5.0	0.36	1
1,4-Dichlorobutane	ND		ug/l	5.0	0.46	1
1,2,3-Trichloropropane	ND		ug/l	5.0	0.18	1
Styrene	ND		ug/l	1.0	0.36	1
Dichlorodifluoromethane	ND		ug/l	5.0	0.24	1
Acetone	2.9	J	ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	0.30	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	0.31	1
4-Methyl-2-pentanone	ND		ug/l	5.0	0.42	1
2-Hexanone	ND		ug/l	5.0	0.52	1
Ethyl methacrylate	ND		ug/l	5.0	0.61	1
Acrylonitrile	ND		ug/l	5.0	0.43	1
Bromochloromethane	ND		ug/l	2.5	0.15	1
Tetrahydrofuran	ND		ug/l	5.0	0.83	1
2,2-Dichloropropane	ND		ug/l	2.5	0.20	1
1,2-Dibromoethane	ND		ug/l	2.0	0.19	1
1,3-Dichloropropane	ND		ug/l	2.5	0.21	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	0.16	1
Bromobenzene	ND		ug/l	2.5	0.15	1
n-Butylbenzene	ND		ug/l	0.50	0.19	1
sec-Butylbenzene	ND		ug/l	0.50	0.18	1
tert-Butylbenzene	ND		ug/l	2.5	0.18	1
o-Chlorotoluene	ND		ug/l	2.5	0.17	1
p-Chlorotoluene	ND		ug/l	2.5	0.18	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.35	1
Hexachlorobutadiene	ND		ug/l	0.50	0.22	1
Isopropylbenzene	0.19	J	ug/l	0.50	0.19	1
p-Isopropyltoluene	ND		ug/l	0.50	0.19	1
Naphthalene	14		ug/l	2.5	0.22	1
n-Propylbenzene	ND		ug/l	0.50	0.17	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.23	1

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-02 Date Collected: 05/17/17 07:15

Client ID: HA17-DEF_INF Date Received: 05/17/17

Sample Location: ALLSTON, MA Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.22	1
1,3,5-Trimethylbenzene	0.17	J	ug/l	2.5	0.17	1
1,2,4-Trimethylbenzene	0.78	J	ug/l	2.5	0.19	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	0.18	1
Ethyl ether	ND		ug/l	2.5	0.16	1
Tert-Butyl Alcohol	ND		ug/l	10	1.4	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	108		70-130
Toluene-d8	105		70-130
4-Bromofluorobenzene	109		70-130
Dibromofluoromethane	100		70-130

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/19/17 20:34
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1005854-5					
Methylene chloride	ND		ug/l	3.0	0.68
1,1-Dichloroethane	ND		ug/l	0.75	0.21
Chloroform	ND		ug/l	0.75	0.16
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.8	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	0.75	0.14
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	0.50	0.18
Trichlorofluoromethane	ND		ug/l	2.5	0.16
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	0.50	0.16
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.17
Bromoform	ND		ug/l	2.0	0.25
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	0.75	0.16
Ethylbenzene	ND		ug/l	0.50	0.17
Chloromethane	ND		ug/l	2.5	0.18
Bromomethane	ND		ug/l	1.0	0.26
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	1.0	0.13
1,1-Dichloroethene	ND		ug/l	0.50	0.17
1,2-Dichloroethene, Total	ND		ug/l	0.50	0.16
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/19/17 20:34
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1005854-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.18
1,3-Dichlorobenzene	ND		ug/l	2.5	0.19
1,4-Dichlorobenzene	ND		ug/l	2.5	0.19
Methyl tert butyl ether	ND		ug/l	1.0	0.17
p/m-Xylene	ND		ug/l	1.0	0.33
o-Xylene	ND		ug/l	1.0	0.33
Xylenes, Total	ND		ug/l	1.0	0.33
cis-1,2-Dichloroethene	ND		ug/l	0.50	0.19
Dibromomethane	ND		ug/l	5.0	0.36
1,4-Dichlorobutane	ND		ug/l	5.0	0.46
1,2,3-Trichloropropane	ND		ug/l	5.0	0.18
Styrene	ND		ug/l	1.0	0.36
Dichlorodifluoromethane	ND		ug/l	5.0	0.24
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	0.30
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	0.31
4-Methyl-2-pentanone	ND		ug/l	5.0	0.42
2-Hexanone	ND		ug/l	5.0	0.52
Ethyl methacrylate	ND		ug/l	5.0	0.61
Acrylonitrile	ND		ug/l	5.0	0.43
Bromochloromethane	ND		ug/l	2.5	0.15
Tetrahydrofuran	ND		ug/l	5.0	0.83
2,2-Dichloropropane	ND		ug/l	2.5	0.20
1,2-Dibromoethane	ND		ug/l	2.0	0.19
1,3-Dichloropropane	ND		ug/l	2.5	0.21
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	0.16
Bromobenzene	ND		ug/l	2.5	0.15
n-Butylbenzene	ND		ug/l	0.50	0.19

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/19/17 20:34
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-02 Batch: WG1005854-5					
sec-Butylbenzene	ND		ug/l	0.50	0.18
tert-Butylbenzene	ND		ug/l	2.5	0.18
o-Chlorotoluene	ND		ug/l	2.5	0.17
p-Chlorotoluene	ND		ug/l	2.5	0.18
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.35
Hexachlorobutadiene	ND		ug/l	0.50	0.22
Isopropylbenzene	ND		ug/l	0.50	0.19
p-Isopropyltoluene	ND		ug/l	0.50	0.19
Naphthalene	ND		ug/l	2.5	0.22
n-Propylbenzene	ND		ug/l	0.50	0.17
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.23
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.22
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.17
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.19
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	0.18
Ethyl ether	ND		ug/l	2.5	0.16
Tert-Butyl Alcohol	ND		ug/l	10	1.4
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	110		70-130
Toluene-d8	103		70-130
4-Bromofluorobenzene	109		70-130
Dibromofluoromethane	99		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1005854-3 WG1005854-4								
Methylene chloride	110		100		70-130	10		20
1,1-Dichloroethane	110		110		70-130	0		20
Chloroform	110		100		70-130	10		20
Carbon tetrachloride	100		95		63-132	5		20
1,2-Dichloropropane	110		110		70-130	0		20
Dibromochloromethane	94		92		63-130	2		20
1,1,2-Trichloroethane	110		110		70-130	0		20
Tetrachloroethene	110		100		70-130	10		20
Chlorobenzene	110		100		75-130	10		25
Trichlorofluoromethane	100		96		62-150	4		20
1,2-Dichloroethane	110		110		70-130	0		20
1,1,1-Trichloroethane	110		110		67-130	0		20
Bromodichloromethane	100		100		67-130	0		20
trans-1,3-Dichloropropene	100		96		70-130	4		20
cis-1,3-Dichloropropene	97		94		70-130	3		20
1,1-Dichloropropene	110		110		70-130	0		20
Bromoform	87		86		54-136	1		20
1,1,2,2-Tetrachloroethane	120		120		67-130	0		20
Benzene	110		110		70-130	0		25
Toluene	110		110		70-130	0		25
Ethylbenzene	110		110		70-130	0		20
Chloromethane	110		100		64-130	10		20
Bromomethane	74		68		39-139	8		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1005854-3 WG1005854-4								
Vinyl chloride	120		110		55-140	9		20
Chloroethane	120		110		55-138	9		20
1,1-Dichloroethene	110		100		61-145	10		25
Trichloroethene	110		100		70-130	10		25
1,2-Dichlorobenzene	110		100		70-130	10		20
1,3-Dichlorobenzene	110		100		70-130	10		20
1,4-Dichlorobenzene	110		100		70-130	10		20
Methyl tert butyl ether	120		120		63-130	0		20
p/m-Xylene	110		110		70-130	0		20
o-Xylene	110		105		70-130	5		20
cis-1,2-Dichloroethene	110		100		70-130	10		20
Dibromomethane	110		100		70-130	10		20
1,4-Dichlorobutane	130		130		70-130	0		20
1,2,3-Trichloropropane	120		110		64-130	9		20
Styrene	115		110		70-130	4		20
Dichlorodifluoromethane	120		110		36-147	9		20
Acetone	100		100		58-148	0		20
Carbon disulfide	92		85		51-130	8		20
2-Butanone	110		110		63-138	0		20
Vinyl acetate	130		130		70-130	0		20
4-Methyl-2-pentanone	98		94		59-130	4		20
2-Hexanone	110		100		57-130	10		20
Ethyl methacrylate	100		98		70-130	2		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1005854-3 WG1005854-4								
Acrylonitrile	120		120		70-130	0		20
Bromochloromethane	100		100		70-130	0		20
Tetrahydrofuran	**140**	Q	**140**	Q	58-130	0		20
2,2-Dichloropropane	110		100		63-133	10		20
1,2-Dibromoethane	110		110		70-130	0		20
1,3-Dichloropropane	120		110		70-130	9		20
1,1,1,2-Tetrachloroethane	110		100		64-130	10		20
Bromobenzene	110		100		70-130	10		20
n-Butylbenzene	120		120		53-136	0		20
sec-Butylbenzene	120		120		70-130	0		20
tert-Butylbenzene	120		110		70-130	9		20
o-Chlorotoluene	110		110		70-130	0		20
p-Chlorotoluene	120		110		70-130	9		20
1,2-Dibromo-3-chloropropane	82		85		41-144	4		20
Hexachlorobutadiene	110		98		63-130	12		20
Isopropylbenzene	120		120		70-130	0		20
p-Isopropyltoluene	120		110		70-130	9		20
Naphthalene	100		91		70-130	9		20
n-Propylbenzene	120		120		69-130	0		20
1,2,3-Trichlorobenzene	99		87		70-130	13		20
1,2,4-Trichlorobenzene	100		94		70-130	6		20
1,3,5-Trimethylbenzene	120		110		64-130	9		20
1,2,4-Trimethylbenzene	120		110		70-130	9		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY

Project Number: 129017-003

Lab Number: L1716160

Report Date: 05/22/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-02 Batch: WG1005854-3 WG1005854-4								
trans-1,4-Dichloro-2-butene	120		120		70-130	0		20
Ethyl ether	110		110		59-134	0		20
Tert-Butyl Alcohol	**140**	Q	118		70-130	17		20
Tertiary-Amyl Methyl Ether	99		96		66-130	3		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	112		112		70-130
Toluene-d8	105		104		70-130
4-Bromofluorobenzene	112		110		70-130
Dibromofluoromethane	100		101		70-130

METALS

Project Name: DISCTRICT ENERGY FACILITY
Lab Number: L1716160
Project Number: 129017-003
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-01
Client ID: HA17-DEF_EFF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/17/17 07:00
Date Received: 05/17/17
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											
Arsenic, Total	0.00075	J	mg/l	0.00100	0.00016	1	05/18/17 11:17	05/19/17 09:07	EPA 3005A	3,200.8	AM
Chromium, Total	0.00037	J	mg/l	0.00100	0.00017	1	05/18/17 11:17	05/19/17 09:07	EPA 3005A	3,200.8	AM
Copper, Total	0.00376		mg/l	0.00100	0.00038	1	05/18/17 11:17	05/19/17 09:07	EPA 3005A	3,200.8	AM
Iron, Total	6.34		mg/l	0.050	0.009	1	05/18/17 11:17	05/19/17 11:00	EPA 3005A	19,200.7	PS
Lead, Total	0.00078		mg/l	0.00050	0.00034	1	05/18/17 11:17	05/19/17 09:07	EPA 3005A	3,200.8	AM
Nickel, Total	0.00145	J	mg/l	0.00200	0.00055	1	05/18/17 11:17	05/19/17 09:07	EPA 3005A	3,200.8	AM
Zinc, Total	0.02764		mg/l	0.01000	0.00341	1	05/18/17 11:17	05/19/17 09:07	EPA 3005A	3,200.8	AM

Project Name: DISCTRICT ENERGY FACILITY
Lab Number: L1716160
Project Number: 129017-003
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-02
Client ID: HA17-DEF_INF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/17/17 07:15
Date Received: 05/17/17
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											
Arsenic, Total	0.00158		mg/l	0.00100	0.00016	1	05/18/17 11:17	05/19/17 09:10	EPA 3005A	3,200.8	AM
Chromium, Total	0.00243		mg/l	0.00100	0.00017	1	05/18/17 11:17	05/19/17 09:10	EPA 3005A	3,200.8	AM
Copper, Total	0.00549		mg/l	0.00100	0.00038	1	05/18/17 11:17	05/19/17 09:10	EPA 3005A	3,200.8	AM
Iron, Total	7.56		mg/l	0.050	0.009	1	05/18/17 11:17	05/19/17 17:18	EPA 3005A	19,200.7	MC
Lead, Total	0.02087		mg/l	0.00050	0.00034	1	05/18/17 11:17	05/19/17 09:10	EPA 3005A	3,200.8	AM
Nickel, Total	0.00233		mg/l	0.00200	0.00055	1	05/18/17 11:17	05/19/17 09:10	EPA 3005A	3,200.8	AM
Zinc, Total	0.02190		mg/l	0.01000	0.00341	1	05/18/17 11:17	05/19/17 09:10	EPA 3005A	3,200.8	AM

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

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): 01-02 Batch: WG1004741-1										
Iron, Total	ND		mg/l	0.050	0.009	1	05/18/17 11:17	05/19/17 10:46	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1004743-1										
Arsenic, Total	ND		mg/l	0.00100	0.00016	1	05/18/17 11:17	05/19/17 08:55	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	0.00017	1	05/18/17 11:17	05/19/17 08:55	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	0.00038	1	05/18/17 11:17	05/19/17 08:55	3,200.8	AM
Lead, Total	ND		mg/l	0.00050	0.00034	1	05/18/17 11:17	05/19/17 08:55	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	0.00055	1	05/18/17 11:17	05/19/17 08:55	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	0.00341	1	05/18/17 11:17	05/19/17 08:55	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY

Project Number: 129017-003

Lab Number: L1716160

Report Date: 05/22/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1004741-2								
Iron, Total	109		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1004743-2								
Arsenic, Total	105		-		85-115	-		
Chromium, Total	97		-		85-115	-		
Copper, Total	97		-		85-115	-		
Lead, Total	101		-		85-115	-		
Nickel, Total	98		-		85-115	-		
Zinc, Total	101		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

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): 01-02 QC Batch ID: WG1004741-3 QC Sample: L1716160-01 Client ID: HA17-DEF_EFF												
Iron, Total	6.34	1	7.23	89		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1004741-7 QC Sample: L1716044-01 Client ID: MS Sample												
Iron, Total	0.024J	1	1.15	115		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1004743-3 QC Sample: L1716160-01 Client ID: HA17-DEF_EFF												
Arsenic, Total	0.00075J	0.12	0.1237	103		-	-		70-130	-		20
Chromium, Total	0.00037J	0.2	0.2022	101		-	-		70-130	-		20
Copper, Total	0.00376	0.25	0.2526	100		-	-		70-130	-		20
Lead, Total	0.00078	0.51	0.5178	101		-	-		70-130	-		20
Nickel, Total	0.00145J	0.5	0.4958	99		-	-		70-130	-		20
Zinc, Total	0.02764	0.5	0.5309	101		-	-		70-130	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1004741-4 QC Sample: L1716160-01 Client ID: HA17-DEF_EFF						
Iron, Total	6.34	6.49	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1004741-8 QC Sample: L1716044-01 Client ID: DUP Sample						
Iron, Total	0.024J	0.030J	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1004743-4 QC Sample: L1716160-01 Client ID: HA17-DEF_EFF						
Arsenic, Total	0.00075J	0.00086J	mg/l	NC		20
Chromium, Total	0.00037J	0.00056J	mg/l	NC		20
Copper, Total	0.00376	0.00391	mg/l	4		20
Lead, Total	0.00078	0.00081	mg/l	4		20
Nickel, Total	0.00145J	0.00135J	mg/l	NC		20
Zinc, Total	0.02764	0.02701	mg/l	2		20

INORGANICS
&
MISCELLANEOUS

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003
Lab Number: L1716160
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-01
Client ID: HA17-DEF_EFF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/17/17 07:00
Date Received: 05/17/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	14.		mg/l	5.0	NA	1	-	05/18/17 00:50	121,2540D	JT
Cyanide, Total	0.003	J	mg/l	0.005	0.001	1	05/19/17 14:15	05/22/17 11:55	121,4500CN-CE	LK
Cyanide, Free	ND		ug/l	2.00	0.544	1	05/18/17 17:00	05/18/17 23:48	109,9016	AT
pH (H)	7.0		SU	-	NA	1	-	05/17/17 23:32	121,4500H+-B	AS
Nitrogen, Ammonia	1.46		mg/l	0.075	0.022	1	05/18/17 14:01	05/18/17 21:19	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	5.20	1.61	1.3	05/18/17 19:00	05/18/17 21:30	74,1664A	ML
Anions by Ion Chromatography - Westborough Lab										
Chloride	119.		mg/l	5.00	0.839	10	-	05/18/17 18:43	44,300.0	AU

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003
Lab Number: L1716160
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716160-02
Client ID: HA17-DEF_INF
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/17/17 07:15
Date Received: 05/17/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	130		mg/l	5.0	NA	1	-	05/18/17 00:50	121,2540D	JT
Cyanide, Total	0.002	J	mg/l	0.005	0.001	1	05/19/17 14:15	05/22/17 11:56	121,4500CN-CE	LK
Cyanide, Free	ND		ug/l	2.00	0.544	1	05/18/17 17:00	05/18/17 23:49	109,9016	AT
pH (H)	7.0		SU	-	NA	1	-	05/17/17 23:32	121,4500H+-B	AS
Nitrogen, Ammonia	1.59		mg/l	0.075	0.022	1	05/18/17 14:01	05/18/17 21:19	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	1.24	1	05/18/17 19:00	05/18/17 21:30	74,1664A	ML
Anions by Ion Chromatography - Westborough Lab										
Chloride	100.		mg/l	5.00	0.839	10	-	05/18/17 18:55	44,300.0	AU

Project Name: DISCTRICT ENERGY FACILITY **Lab Number:** L1716160

Project Number: 129017-003 **Report Date:** 05/22/17

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): 01-02 Batch: WG1004563-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/18/17 00:50	121,2540D	JT
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1004872-1										
Nitrogen, Ammonia	ND		mg/l	0.075	0.022	1	05/18/17 14:01	05/18/17 21:13	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1004930-1										
TPH, SGT-HEM	ND		mg/l	4.00	1.24	1	05/18/17 19:00	05/18/17 21:30	74,1664A	ML
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1004966-1										
Cyanide, Free	ND		ug/l	2.00	0.544	1	05/18/17 17:00	05/18/17 23:37	109,9016	AT
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1005265-1										
Cyanide, Total	ND		mg/l	0.005	0.001	1	05/19/17 14:15	05/22/17 12:05	121,4500CN-CE	LK
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-02 Batch: WG1005389-1										
Chloride	ND		mg/l	0.500	0.083	1	-	05/18/17 18:19	44,300.0	AU

Lab Control Sample Analysis

Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY

Project Number: 129017-003

Lab Number: L1716160

Report Date: 05/22/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1004561-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1004872-2								
Nitrogen, Ammonia	95		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1004930-2								
TPH	92		-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1004966-2								
Cyanide, Free	85		-		75-125	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1005265-2								
Cyanide, Total	91		-		90-110	-		
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 Batch: WG1005389-2								
Chloride	103		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

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): 01-02 QC Batch ID: WG1004872-4 QC Sample: L1716131-19 Client ID: MS Sample												
Nitrogen, Ammonia	25.9	4	30.6	118		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004930-4 QC Sample: L1716066-05 Client ID: MS Sample												
TPH	ND	20	14.8	74		-	-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004966-3 QC Sample: L1716160-01 Client ID: HA17-DEF_EFF												
Cyanide, Free	ND	50	37.1	74		-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1005265-4 QC Sample: L1716027-01 Client ID: MS Sample												
Cyanide, Total	0.008	0.2	0.188	94		-	-		90-110	-		30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1005389-3 QC Sample: L1716214-06 Client ID: MS Sample												
Chloride	ND	4	4.16	104		-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004561-2 QC Sample: L1716146-01 Client ID: DUP Sample						
pH	6.6	6.5	SU	2		5
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004563-2 QC Sample: L1716162-01 Client ID: DUP Sample						
Solids, Total Suspended	1800	1800	mg/l	0		29
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004872-3 QC Sample: L1716131-19 Client ID: DUP Sample						
Nitrogen, Ammonia	25.9	25.6	mg/l	1		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004930-3 QC Sample: L1716066-05 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1004966-4 QC Sample: L1716160-01 Client ID: HA17-DEF_EFF						
Cyanide, Free	ND	ND	ug/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1005265-3 QC Sample: L1716027-01 Client ID: DUP Sample						
Cyanide, Total	0.008	0.007	mg/l	9		30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1005389-4 QC Sample: L1716214-06 Client ID: DUP Sample						
Chloride	ND	ND	mg/l	NC		18

Project Name: DISCTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716160
Report Date: 05/22/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information Custody Seal

Cooler	
B	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1716160-01A	Vial HCl preserved	B	N/A	4.6	Y	Absent	8260(14)
L1716160-01B	Vial HCl preserved	B	N/A	4.6	Y	Absent	8260(14)
L1716160-01C	Vial HCl preserved	B	N/A	4.6	Y	Absent	8260(14)
L1716160-01D	Plastic 250ml HNO3 preserved	B	<2	4.6	Y	Absent	NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),AS-2008T(180),CR-2008T(180),PB-2008T(180)
L1716160-01E	Plastic 250ml NaOH preserved	B	>12	4.6	Y	Absent	TCN-4500(14)
L1716160-01F	Plastic 120ml unpreserved	B	7	4.6	Y	Absent	CL-300(28),PH-4500(.01)
L1716160-01G	Plastic 120ml NaOH preserved	B	>12	4.6	Y	Absent	FCN-9016(14)
L1716160-01H	Plastic 500ml H2SO4 preserved	B	<2	4.6	Y	Absent	NH3-4500(28)
L1716160-01J	Amber 1000ml HCl preserved	B	N/A	4.6	Y	Absent	TPH-1664(28)
L1716160-01K	Amber 1000ml HCl preserved	B	N/A	4.6	Y	Absent	TPH-1664(28)
L1716160-01L	Plastic 950ml unpreserved	B	7	4.6	Y	Absent	TSS-2540(7)
L1716160-02A	Vial HCl preserved	B	N/A	4.6	Y	Absent	8260(14)
L1716160-02B	Vial HCl preserved	B	N/A	4.6	Y	Absent	8260(14)
L1716160-02C	Vial HCl preserved	B	N/A	4.6	Y	Absent	8260(14)
L1716160-02D	Plastic 250ml HNO3 preserved	B	<2	4.6	Y	Absent	NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),AS-2008T(180),CR-2008T(180),PB-2008T(180)
L1716160-02E	Plastic 250ml NaOH preserved	B	>12	4.6	Y	Absent	TCN-4500(14)
L1716160-02F	Plastic 120ml unpreserved	B	7	4.6	Y	Absent	CL-300(28),PH-4500(.01)
L1716160-02G	Plastic 120ml NaOH preserved	B	>12	4.6	Y	Absent	FCN-9016(14)
L1716160-02H	Plastic 500ml H2SO4 preserved	B	<2	4.6	Y	Absent	NH3-4500(28)
L1716160-02J	Amber 1000ml HCl preserved	B	N/A	4.6	Y	Absent	TPH-1664(28)
L1716160-02K	Amber 1000ml HCl preserved	B	N/A	4.6	Y	Absent	TPH-1664(28)
L1716160-02L	Plastic 950ml unpreserved	B	7	4.6	Y	Absent	TSS-2540(7)

*Values in parentheses indicate holding time in days

Project Name:	DISCTRICT ENERGY FACILITY	**Lab Number:**	L1716160
Project Number:	129017-003	**Report Date:**	05/22/17

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

Project Name:	DISCTRICT ENERGY FACILITY	**Lab Number:**	L1716160
Project Number:	129017-003	**Report Date:**	05/22/17

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:	DISCTRICT ENERGY FACILITY	**Lab Number:**	L1716160
Project Number:	129017-003	**Report Date:**	05/22/17

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.

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.

109 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Revision 0, June 2010.

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: 05/17/17

ALPHA Job #: L1716160

H&A Information

H&A Client: Harvard
H&A Address: 465 MEDFORD STREET
BOSTON, MA 02129
H&A Phone: 617-886-7581
H&A Fax: N/A
H&A Email: echristmas@haleyaldrich.com

Project Information

Project Name: DISTRICT ENERGY FACILITY
Project Location: ALLSTON, MA
Project #: 129017-003
(Use Project name as Project #) ☐
Project Manager: A. Chan/B. Straley/K. Dilawari
ALPHAQuote #:

Turn-Around Time

Standard ☒ Due Date: 3 Day
Rush (only if pre approved) ☐ # of Days: ~~5 Day~~ 3 Day

Deliverables

☑ Email ☐ Fax
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other:

Billing Information

☐ Same as Client Info
PO #

Regulatory Requirements (Program/Criteria)

EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

1. Report only total arsenic, chromium, copper, iron, lead, nickel, and zinc
* 3-day TAT

Please specify Metals or TAL.

REPORT TOTAL ARSENIC, CHROMIUM, COPPER, IRON, LEAD, NICKEL, ZINC ONLY

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. VOCs	2. Total Metals (note 1)	3. Free Cyanide	4. Total Cyanide	5. TSS	6. pH, Chloride	7. Ammonia	8. TPH	Sample Specific Comments	Total Bottles
L1716160-01	MW17-DEF_EFF	5/17/17	700	AQ	CRH	X	X	X	X	X	X	X	X	pH 6.8 temp 52°F	10
02	MW17-DEF_INF	5/17/17	715	AQ	CRH	X	X	X	X	X	X	X	X	pH 6.8 temp 52°F	10
														Totalizer =	

Container Type: A P P P P P P P A
Preservative: B C E E A A D B

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	5/17/17	Matt	5/17/17 1630
Matt	5/17/17 1630	AAL	5/17/17 1630
AAL	5/17/17 1813		5/17/17 1813

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)

ANALYTICAL REPORT

Lab Number:	L1716556
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	DISTRICT ENERGY FACILITY
Project Number:	129017-003
Report Date:	05/22/17

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: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716556
Report Date: 05/22/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1716556-01	2017-0519-DEF-INFLUENT	WATER	ALLSTON, MA	05/19/17 14:15	05/19/17
L1716556-02	2017-0519-DEF-EFFLUENT	WATER	ALLSTON, MA	05/19/17 14:30	05/19/17

Project Name:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1716556
Project Number:	129017-003	**Report Date:**	05/22/17

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:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1716556
Project Number:	129017-003	**Report Date:**	05/22/17

Case Narrative (continued)

Metals

The WG1005508-3 MS recovery for iron (56%), performed on L1716556-01, does not apply because the sample concentration is greater than four times the spike amount added.

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: Cristin Walker

Title: Technical Director/Representative Date: 05/22/17

METALS

Project Name: DISTRICT ENERGY FACILITY
Lab Number: L1716556
Project Number: 129017-003
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716556-01
Client ID: 2017-0519-DEF-INFLUENT
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/19/17 14:15
Date Received: 05/19/17
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											
Iron, Total	8.09		mg/l	0.050	--	1	05/20/17 11:42	05/22/17 12:16	EPA 3005A	19,200.7	PS

Project Name: DISTRICT ENERGY FACILITY
Lab Number: L1716556
Project Number: 129017-003
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716556-02
Client ID: 2017-0519-DEF-EFFLUENT
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/19/17 14:30
Date Received: 05/19/17
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											
Iron, Total	3.51		mg/l	0.050	--	1	05/20/17 11:42	05/22/17 12:44	EPA 3005A	19,200.7	PS

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003
Lab Number: L1716556
Report Date: 05/22/17

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): 01-02 Batch: WG1005508-1										
Iron, Total	ND		mg/l	0.050	--	1	05/20/17 11:42	05/22/17 11:38	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY

Project Number: 129017-003

Lab Number: L1716556

Report Date: 05/22/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1005508-2								
Iron, Total	110		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716556
Report Date: 05/22/17

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): 01-02 QC Batch ID: WG1005508-3 QC Sample: L1716556-01 Client ID: 2017-0519-DEF-INFLUENT												
Iron, Total	8.09	1	8.65	**56**	Q	-	-		75-125	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716556
Report Date: 05/22/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1005508-4 QC Sample: L1716556-01 Client ID: 2017-0519-DEF-INFLUENT						
Iron, Total	8.09	7.80	mg/l	4		20

INORGANICS
&
MISCELLANEOUS

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003
Lab Number: L1716556
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716556-01
Client ID: 2017-0519-DEF-INFLUENT
Sample Location: ALLSTON, MA
Matrix: Water

Date Collected: 05/19/17 14:15
Date Received: 05/19/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	110		mg/l	5.0	NA	1	-	05/20/17 04:45	121,2540D	VB

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003
Lab Number: L1716556
Report Date: 05/22/17

SAMPLE RESULTS

Lab ID: L1716556-02
Client ID: 2017-0519-DEF-EFFLUENT
Sample Location: ALLSTON, MA
Matrix: Water
Date Collected: 05/19/17 14:30
Date Received: 05/19/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	16.		mg/l	5.0	NA	1	-	05/20/17 04:45	121,2540D	VB

Project Name: DISTRICT ENERGY FACILITY **Lab Number:** L1716556

Project Number: 129017-003 **Report Date:** 05/22/17

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): 01-02 Batch: WG1005407-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/20/17 04:45	121,2540D	VB

Lab Duplicate Analysis
Batch Quality Control

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716556
Report Date: 05/22/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1005407-2 QC Sample: L1716229-01 Client ID: DUP Sample						
Solids, Total Suspended	550	500	mg/l	10		29

Project Name: DISTRICT ENERGY FACILITY
Project Number: 129017-003

Lab Number: L1716556
Report Date: 05/22/17

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(*)
L1716556-01A	Plastic 250ml HNO3 preserved	A	<2	3.3	Y	Absent	FE-UI(180)
L1716556-01B	Plastic 950ml unpreserved	A	7	3.3	Y	Absent	TSS-2540(7)
L1716556-02A	Plastic 250ml HNO3 preserved	A	<2	3.3	Y	Absent	FE-UI(180)
L1716556-02B	Plastic 950ml unpreserved	A	7	3.3	Y	Absent	TSS-2540(7)

*Values in parentheses indicate holding time in days

Project Name:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1716556
Project Number:	129017-003	**Report Date:**	05/22/17

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: Data Usability Report

Project Name:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1716556
Project Number:	129017-003	**Report Date:**	05/22/17

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. 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:	DISTRICT ENERGY FACILITY	**Lab Number:**	L1716556
Project Number:	129017-003	**Report Date:**	05/22/17

REFERENCES

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.

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: 5/19/17

ALPHA Job #: L1716556

H&A Information

H&A Client: Harvard
H&A Address: 465 MEDFORD STREET
BOSTON, MA 02129
H&A Phone: 617-886-7581
H&A Fax: N/A
H&A Email: echristmas@haleyaldrich.com

Project Information

Project Name: DISTRICT ENERGY FACILITY
Project Location: ALLSTON, MA
Project #: 129017-003
(Use Project name as Project #) ☐
Project Manager: A. Chan/B. Straley/K. Dilawari
ALPHAQuote #:

Turn-Around Time

Standard ☐ Due Date:
Rush (only if pre approved) ☑ # of Days: 1 Day

Deliverables

☑ Email ☐ Fax
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other:

Billing Information

☐ Same as Client Info
PO #

Regulatory Requirements (Program/Criteria)

EPA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. Total Iron	2. TSS	Sample Specific Comments	Total Bottles
L1716556-01	2017-0519-DEF-INFLUENT	5/19/17	1415	AQ	URH	X	X		2
-02	2017-0519-DEF-EFFLUENT	5/19/17	1430	AQ	URH	X	X		2
								Totalizer = 7317.15	

4 pcs

Container Type: P P
Preservative: C A

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

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

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	5/19/17		5/19/17 1625
	5/19/17 1625		5/19/17 1625
AAC	5/19/17 1817		5/19/17 1817

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)