HALEY ALDRICH

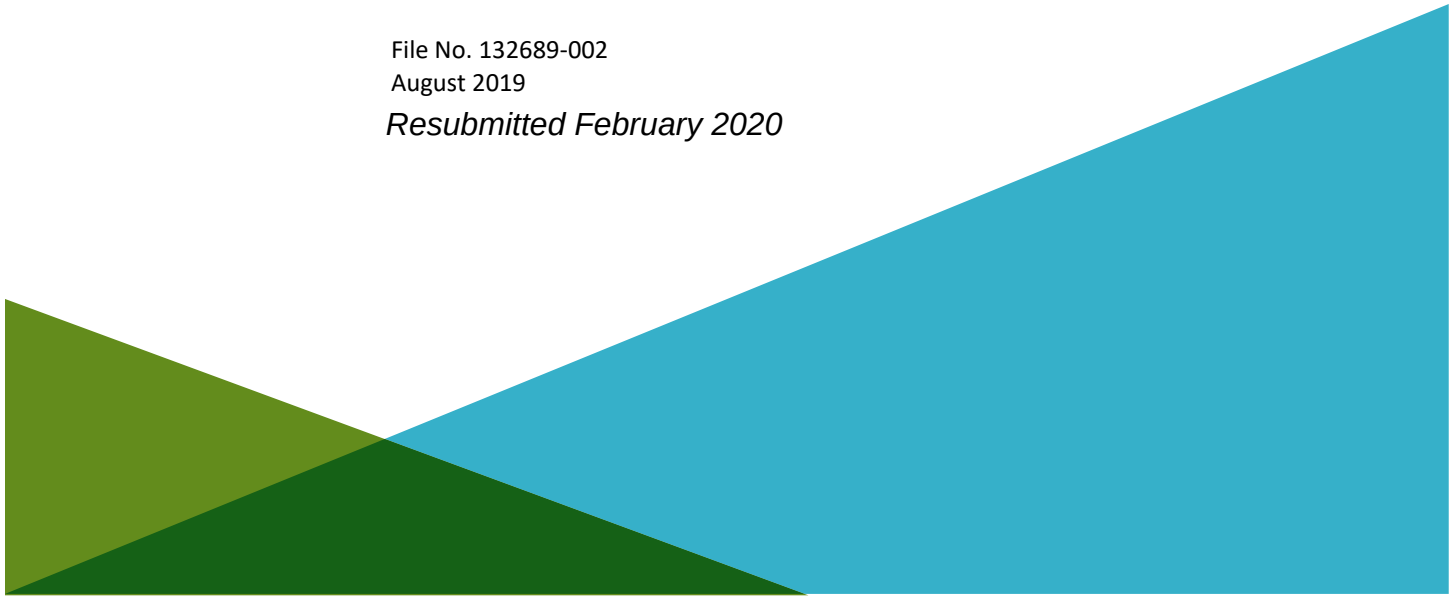
www.haleyaldrich.com

NPDES RGP PERMIT APPLICATION
TEMPORARY CONSTRUCTION DEWATERING
341 SECOND AVENUE
WALTHAM, MASSACHUSETTS

by
Haley & Aldrich, Inc.
Boston, Massachusetts

for
US Environmental Protection Agency
Boston, Massachusetts

File No. 132689-002
August 2019
Resubmitted February 2020



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

Resubmitted 03 February 2020
21 August 2019
File No. 132689-002

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

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

Subject: NPDES RGP Permit Application – Temporary Construction Dewatering
341 Second Avenue
Waltham, Massachusetts

Dear Ms. Puleo:

On behalf of our client, CRP/AR [Watch City] Venture, LLC (owner), Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this submission for a National Pollutant Discharge Elimination System (NPDES) Remediation General Permit (RGP) temporary construction dewatering permit for the subject site located at 341 Second Avenue (the "site") in Waltham, Massachusetts. The general site location is shown on Figure 1. The information presented herein has been prepared to follow the requirements of the 2017 US Environmental Protection Agency (EPA) NPDES RGP. A copy of the completed Notice of Intent (NOI) form is included as Appendix A.

As this site is not a listed Massachusetts of Department of Environmental Protection (MassDEP) Massachusetts Contingency Plan (MCP) Disposal Site and as this project will be discharging to an Outstanding Resource Water (ORW), a WM15 Transmittal Form and $500 fee have been submitted to MassDEP concurrently with this application; a copy of the WM15 Transmittal Form is included in Appendix B.

DISCHARGE TO AN OUTSTANDING RESOURCE WATER APPLICABILITY

We understand that discharges to ORWs are typically ineligible under the NPDES RGP in Massachusetts; however, based on conversations with MassDEP, we understand that an authorization may be issued if the criteria listed under 314 CMR 4.04(5)(a) are met. Responses to these criteria are provided below:

1. *The discharge is necessary to accommodate important economic or social development in the area in which the waters are located*: This construction project will redevelop a currently vacant warehouse into viable housing, and the construction will provide jobs for the community. Temporary discharge of construction dewatering effluent is necessary for this construction

project to enable construction-in-the-dry, manage stormwater runoff, prevent disturbance to subgrade bearing soils, and maintain stability of slopes and excavation support systems.

2. *No less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably viable or feasible*: There are no feasibly available alternative locations for this construction project, and there are no other feasible means for management of construction dewatering effluent. Due to the site constraints, subsurface conditions, potential for significant dewatering pumping rates, and the geometry of the proposed construction, on-site recharge of construction dewatering effluent is infeasible. Discharge to a sewer is also infeasible as the nearby sewer system is not adequately sized to manage the anticipated volume of construction dewatering effluent in addition to the normal sewer flow. It is also infeasible and cost-prohibitive to containerize the dewatering effluent and dispose of it off-site due to the anticipated pumping rate and duration. Installation of a groundwater cut-off (i.e., concrete-diaphragm wall, steel sheeting) is infeasible due to the large volume of cobbles and boulders in the site soils which prevents installation of sheeting or concrete diaphragm wall.

3. *To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices:* Prior to discharge, construction dewatering effluent will be routed through an on-site treatment system to meet NPDES RGP Effluent Criteria. Routine compliance sampling is planned to monitor system performance.

4. *The discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class:* As noted for 314 CMR 4.04(5)(a)(3), construction dewatering effluent will be routed through an on-site treatment system prior to discharge and routine compliance sampling performed to monitor system performance in order to prevent impairment of the receiving water body.

Additional information regarding the above responses are provided herein.

EXISTING SITE CONDITIONS

The subject 1.79-acre site is partially occupied by a vacant single-level high-bay warehouse building surrounded by bituminous-paved driveways, parking lots, and small landscaped areas. Second Avenue abuts the site to the south, and a commercial building abuts the north and east property lines. Existing site grades are relatively flat, ranging from about El. 157 to El. 158[1]. A utility (storm drainage) easement is positioned parallel to and just outside the west site boundary. Existing site conditions are shown on Figure 2.

[1] Elevations are given in feet and reference the North American Vertical Datum of 1988 (NAVD88).

SITE HISTORY

Haley & Aldrich assessed past and present usage of the site through a review of historical records including topographic maps dated 1893 to 2012, aerial photographs dated 1938 to 2016, city directories dated 1968 to 2014, municipal records, and previous reports.

The site was reportedly undeveloped wooded land prior to approximately 1959 when the original, eastern portion of current building was constructed. In 1959, the property was identified as "Garage and Repair shop" and owned by Greenough Bros. The subsequent portions (central and western) of the subject building were constructed in 1963 and 1966, respectively. The building was primarily utilized as an aluminum product warehousing and distribution center from construction until 2001 when Pierce Aluminum Co. Inc. vacated the subject site. The subject building remained vacant until approximately 2012 when a landscaper leased the warehouse portion of the building until 2013 and utilized it as a storage facility for landscaping materials. The subject building has been vacant since 2013.

ENVIRONMENTAL CONDITIONS AND REGULATORY BACKGROUND

Haley & Aldrich conducted subsurface investigations at the site in 2019 as part of a soil and groundwater precharacterization program in advance of site redevelopment. Based on the results of the soil and groundwater sampling conducted at the site to date, no MCP regulatory compliance is required.

The results of the groundwater sampling performed at the site indicated concentrations below applicable MCP RCGW-2 Reportable Concentrations.

Soil sampling performed at the site indicated concentrations of benzo(a)pyrene (in one out of 63 total soil samples) and total petroleum hydrocarbons (TPH) (in two out of 63 total soil samples) greater than the applicable MCP RCS-1 Reportable Concentrations. The detections are exempt from reporting based on the following:

- **Benzo(a)pyrene**: For the one sample with concentrations greater than MCP RCS-1, the detected compound is attributed to the presence of asphalt and tar (asphalt binder) in the sample (presence determined by microscopy analysis); this condition is exempt from reporting to MassDEP in accordance with 310 CMR 40.0317(12).
- **TPH**: For the two samples indicating concentrations of TPH greater than MCP RCS-1, the concentrations of extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) aliphatic and aromatic fractions in these samples were less than MCP RCS-1 concentrations. In accordance with 310 CMR 40.0360(2), notification to MassDEP is not required.

PROPOSED CONSTRUCTION

The proposed construction consists of a new six-story, approximately 54,000 square foot (sf) residential building with five levels of residential space above a podium structure and two levels of below grade space (basement and sub-basement). The proposed construction also includes installation of new utilities and a subsurface infiltration system.

Excavation for the below grade space is anticipated to extend up to 21 feet below pre-construction site grades. Support of excavation is planned to be performed using drilled in solder pile and lagging and open cut slope methods. Due to the nature of the glacial deposits at the site and the presence of frequent cobbles and boulders, groundwater cut-off through the use of sheeting or concrete diaphragm wall construction is not feasible. Groundwater control is planned to include a combination of deep dewatering wells and shallow sumps, pits, and trenches. Stormwater from the site is routed from catch basins located around the property to a buried headwall near the northwest corner of the property (Figure 2) which discharges into the wetland to the north.

GROUNDWATER QUALITY INFORMATION

To evaluate groundwater quality at the site, a groundwater sample was collected from a well located approximately in the center of the planned excavation (HA15-5(OW), Figure 2) to evaluate groundwater quality and meet the requirements of the 2017 NPDES RGP NOI. The sample was collected on 25 March 2019 and submitted to Alpha Analytical (Alpha) of Westborough, Massachusetts for analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total metals, total petroleum hydrocarbons (TPH), pesticides, polychlorinated biphenyls (PCBs), total suspended solids (TSS), total residual chlorine, chloride, total cyanide, ammonia, total phenolics, and hardness. Temperature and pH were measured in the field at the time of sampling. The tabulated results are provided in Table I, and the laboratory data reports are included in Appendix G.

The results indicated concentrations below applicable RCGW-2 Reportable Concentrations, however, concentrations of pentachlorophenol and iron were above the calculated NPDES RGP discharge criteria for the site. pH also did not meet NPDES RGP discharge criteria. On-site treatment of dewatering influent will be conducted to meet NPDES permit effluent criteria.

RECEIVING WATER SAMPLING AND DILUTION FACTOR

On 5 August 2019, one sample was collected from Hobb's Pond and submitted to Alpha for analysis of hardness, ammonia, total metals, and pH. Temperature was measured in the field at the time of sampling. The laboratory data report is included in Appendix G, and the tabulated results are provided in Table II.

Hobb's Pond was selected as the receiving water body due to the ephemeral (i.e., mostly dry) nature of the wetland where the buried headwall discharges. There is no available upstream water body. The next physically available and hydraulically connected sampling location is Hobb's Pond.

The seven-day-ten-year flow (7Q10) of the receiving water was established to be 0 based on the ephemeral nature of the wetland; this value was confirmed by MassDEP via email on 2 July 2019. We have additionally confirmed with MassDEP that the dilution factor for the receiving waters is 1. The StreamStats Report, Dilution Factor calculations, and confirmation from MassDEP are included in Appendix C.

EFFLUENT CRITERIA DETERMINATION

Groundwater and Receiving Water data were input into the WQBEL Calculation spreadsheet and used to calculate the effluent criteria for the site. Copies of the "EnterData" and "FreshwaterResults" tabs from the excel file provided as an additional resource by EPA are included in Appendix C. The effluent limitations calculated are included for reference in Table I.

DEWATERING SYSTEM AND OFF-SITE DISCHARGE

During construction of the building, it will be necessary to perform temporary dewatering to enable construction-in-the-dry, manage stormwater runoff, prevent disturbance to subgrade bearing soils, and maintain stability of slopes and excavation support systems. Construction and construction dewatering activities are currently anticipated to be required for a period of up to 18 months. We estimate effluent discharge rates of about 300 to 400 gallons per minute (gpm) or less. Temporary dewatering will be conducted from deep dewatering wells and shallow sumps, pits, and trenches.

Construction dewatering will include piping and discharging to on-site catch basins that discharge to a buried headwall located on the edge of the property. The headwall discharges into a wetland that is part of the City of Waltham's stormwater conveyance system. The headwall and proposed discharge route are shown on Figure 2. Prior to discharge, collected water will be routed through a minimum of sedimentation tank and bag filters and other necessary treatment components (ion exchange, activated carbon canisters, and pH adjustment), to remove suspended solids and undissolved chemical constituents, as shown on Figure 3. The contractor's proposed dewatering treatment system and design submittal documents are included in Appendix D. A Notice of Change (NOC) will be submitted to EPA if additional treatment components need to be mobilized at the site.

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

pH adjustment will be conducted using sodium hydroxide (70-100%) that will be dosed to increase pH using a metered system. Product information, including chemical formula, SDS, CAS registry number, manufacturer, and associated hazards, toxicological and ecological information, and manufacturer information, including dosing and metering, are provided in Appendix D. The sodium hydroxide will be stored in 55-gallon drums with secondary containment systems in place; a summary of control measures for proper handling and spill prevention is provided in Appendix D. The addition of sodium hydroxide to increase 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.

DOCUMENTATION OF NATIONAL HISTORIC PRESERVATION ACT ELIGIBILITY REQUIREMENTS

Based on a review of the resources provided by the U.S. National Register of Historic Places and a review of the Massachusetts Cultural Resource Information System (MACRIS), no historic properties have been

established to be present at the project site, and discharges and discharge-related activities are not considered to have the potential to affect historic properties. The discharge is considered to meet Criterion A. Documentation is included in Appendix E.

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 F. The Northern Long-Eared Bat, a "threatened" species, was identified as potentially living in the project area, however the discharge activities are not anticipated to impact the habitat or activities of these mammals. 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 are expected to be in proximity of the discharges or action area.

SUPPLEMENTAL INFORMATION

The City of Waltham City Engineering Department has been notified of this proposed discharge. A Best Management Practices Plan (BMPP), which outlines the proposed discharge operations covered under the RGP, will be available at the site.

Owner and Operator Information

Owner:
CRP/AR [Watch City] Venture, LLC
184 High Street, Suite 401
Boston, MA 02110
Attn: Michael Boujoulian

Operator:
Callahan Construction Managers
80 First Street
Bridgewater, MA 02324
Attn: Robert Sanda

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, P.E. (NH)
Senior Environmental Engineer

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

Enclosures:

Table I – Summary of Groundwater Quality Data
Table II – Summary of Surface Water Quality Data
Figure 1 – Project Locus
Figure 2 – Site Plan
Figure 3 – LRT Water Treatment System Schematic
Appendix A – Notice of Intent
Appendix B – Copy of WM15 Transmittal Form
Appendix C – Dilution Factor and Effluent Limit Calculations
Appendix D – Contractor's Dewatering Submittal
Appendix E – National Register of Historic Places Documentation
Appendix F – Endangered Species Act Documentation
Appendix G – Laboratory Data Reports

TABLE I
SUMMARY OF GROUNDWATER QUALITY DATA
341 SECOND AVENUE
WALTHAM, MA
FILE NO. 132689-002

Location Name Sample Name Sample Date Lab Sample ID	MCP Reportable Concentration RCGW-2 2014	NPDES RGP Effluent Limits	HA15-5 HA15-5 3/25/2019 L1911827-01
Volatile Organic Compounds (ug/L)			
SUM of BTEX Compounds	NA	100	ND
SUM of VOCs	NA	NA	ND
Volatile Organic Compounds (SIM) (ug/L)			
1,4-Dioxane	6000	200	ND(50)
Semi-Volatile Organic Compounds (ug/L)			
Total Phthalates	NA	190	ND
SUM of SVOCs	NA	NA	ND
Semi-Volatile Organic Compounds (SIM) (ug/L)			
Pentachlorophenol	200	1	6.5
SUM of Group I PAHs	NA	1	ND
SUM of Group II PAHs	NA	100	6.5
SUM of SVOCs (SIM)	NA	NA	ND
Petroleum Hydrocarbons (ug/L)			
Total Petroleum Hydrocarbons	5000	5000	ND(4400)
Ethanol	NA	Report Only	ND(2000)
Total Metals (ug/L)			
Antimony	8000	206	ND(4)
Arsenic	900	104	1.57
Cadmium	4	10.2	ND(0.2)
Total Chromium	300	NA	ND(1)
Trivalent Chromium	600	323	ND(10)
Copper	100000	242	3.21
Iron	NA	1000	11000
Lead	10	1.32	1.54
Mercury	20	0.739	ND(0.2)
Nickel	200	1450	2.75
Selenium	100	235.8	ND(5)
Silver	7	35.1	ND(0.4)
Zinc	900	420	ND(10)
Dissolved Metals (ug/L)			
Hexavalent Chromium	300	323	ND(10)
PCBs (ug/L)			
Aroclor 1016	5	0.000064	ND(0.25)
Aroclor 1221	5	0.000064	ND(0.25)
Aroclor 1232	5	0.000064	ND(0.25)
Aroclor 1242	5	0.000064	ND(0.25)
Aroclor 1248	5	0.000064	ND(0.25)
Aroclor 1254	5	0.000064	ND(0.25)
Aroclor 1260	5	0.000064	ND(0.2)
Other			
pH (SU)	NA	6.5 to 8.3	5.28
Temperature (C)	NA	NA	7.34
Chloride (ug/L)	NA	Report Only	35200
Hardness (ug/L)	NA	Report Only	50100
Total Residual Chlorine (ug/L)	NA	11	ND(20)
Total Cyanide (ug/L)	30	0.178	ND(5)
Ammonia Nitrogen (ug/L)	NA	Report Only	1420
Total Phenolics (ug/L)	NA	1080	ND(30)
Total Suspended Solids (ug/L)	NA	30000	ND(5000)

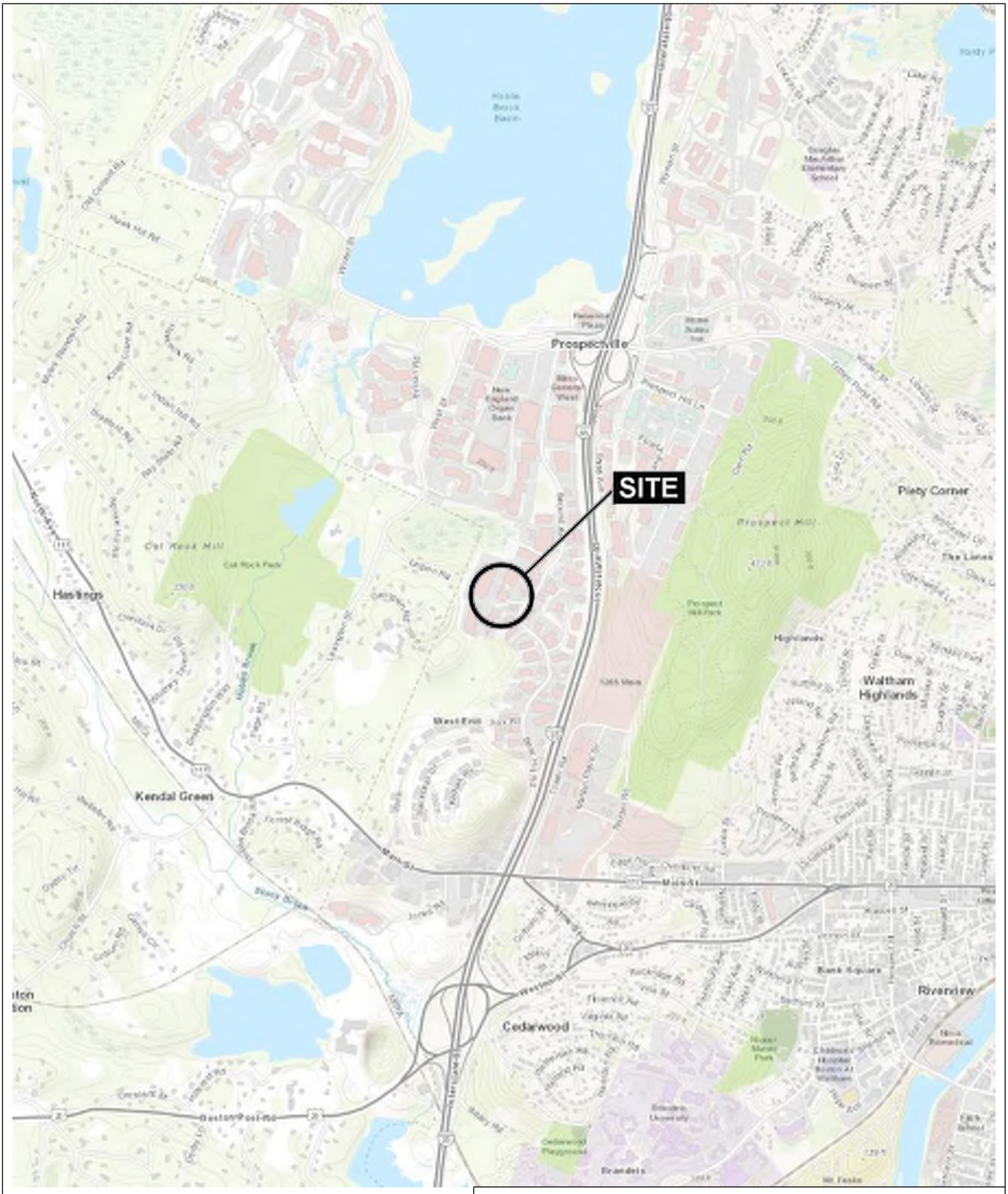
ABBREVIATIONS AND NOTES:
NA: Not Applicable
ND (2.5): Not detected, number in parentheses is the laboratory detection limit

- Volatile and Semi-Volatile Organic analytes detected in at least one sample are reported herein.
  For a complete list of analytes, see the laboratory data sheets.
- Bold values indicate an exceedance of the **RCGW-2** criteria. RCGW-2 for metals is based on dissolved concentrations.
- Underlined values indicate an exceedance of the **NPDES RGP** criteria.
- Bold underlined values indicate an exceedance of the **RCGW-2 and NPDES RGP** criteria.
  RCGW-2 for metals is based on dissolved concentrations.
- Temperature and pH were measured in the field on 25 March 2019.

TABLE II
SUMMARY OF SURFACE WATER QUALITY DATA
341 SECOND AVENUE
WALTHAM, MA
FILE NO. 132689-002

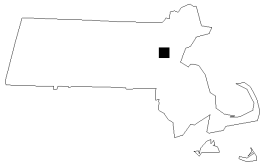
Location Name	Hobb's Pond
Sample Name	2019-0805-SW
Sample Date	8/5/2019
Lab Sample ID	L1934877-01
Total Metals (ug/L)	
Antimony	ND(4)
Arsenic	ND(1)
Cadmium	ND(0.2)
Total Chromium	ND(1)
Trivalent Chromium	ND(10)
Copper	1.03
Iron	402
Lead	ND(1)
Mercury	ND(0.2)
Nickel	ND(2)
Selenium	ND(5)
Silver	ND(0.4)
Zinc	11.99
Dissolved Metals (ug/L)	
Hexavalent Chromium	ND(10)
Other	
pH (SU)	7.1
Hardness (mg/L)	76.2
Ammonia Nitrogen (mg/L)	0.144

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



MAP SOURCE: ESRI

SITE COORDINATES: 42°23'15"N, 71°16'0"W



HALEY ALDRICH

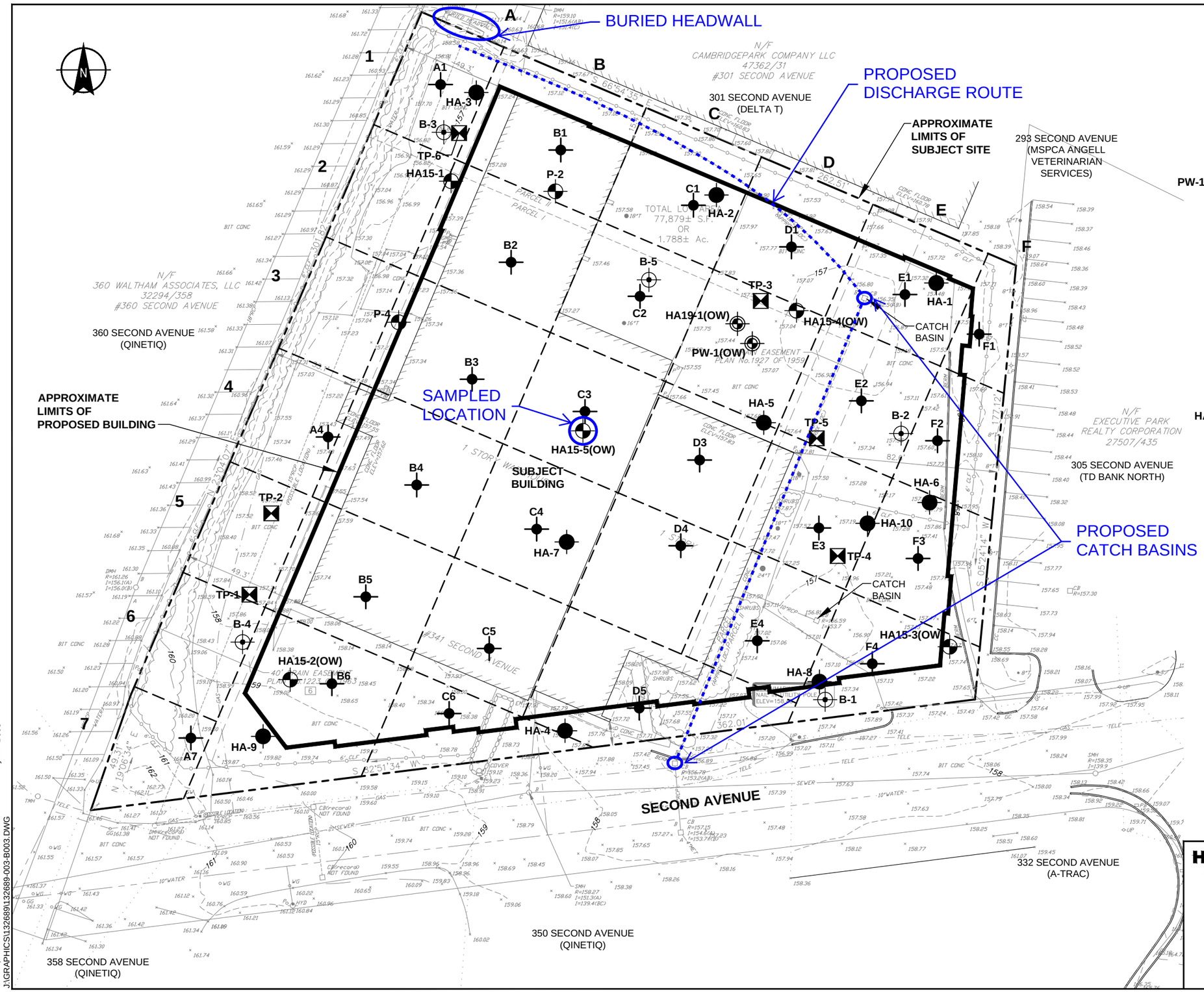
341 SECOND AVENUE
WALTHAM, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
AUGUST 2019

FIGURE 1

132689-002_1_LOCUS.PDF



LEGEND

PW-1(OW)	DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING COMPLETED BY NORTHERN DRILL SERVICE FROM 27 TO 29 MARCH 2019 AND MONITORED BY HALEY & ALDRICH, INC.
A7	DESIGNATION AND APPROXIMATE LOCATION OF GEOPROBE ADVANCED BY NORTHERN DRILL SERVICE FROM 21 TO 26 MARCH 2019 AND MONITORED BY HALEY & ALDRICH, INC.
HA-1	DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING COMPLETED BY NORTHERN DRILL SERVICES, INC. FROM 4 TO 14 DECEMBER 2018 AND MONITORED BY HALEY & ALDRICH, INC.
TP-1	DESIGNATION AND APPROXIMATE LOCATION OF TEST PIT EXCAVATED BY EARTHWORK INDUSTRIES, INC. FROM 3 TO 4 DECEMBER 2018 AND MONITORED BY HALEY & ALDRICH, INC.
HA15-1	DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING COMPLETED BY NEW HAMPSHIRE BORING, INC. FROM 5 TO 7 MAY 2015 AND MONITORED BY HALEY & ALDRICH, INC.
B-1	REPORTED LOCATION AND DESIGNATION OF TEST BORING PERFORMED IN 2001 BY SOIL EXPLORATION CORPORATION
(OW)	INDICATES GROUNDWATER OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE.

NOTE

1. BASE PLAN TAKEN FROM AN ELECTRONIC FILE TITLED "5-18-15-Second Ave-Waltham.dwg", PROVIDED BY PRECISION LAND SURVEYING, INC. ON18 MAY 2015.

HALEY ALDRICH

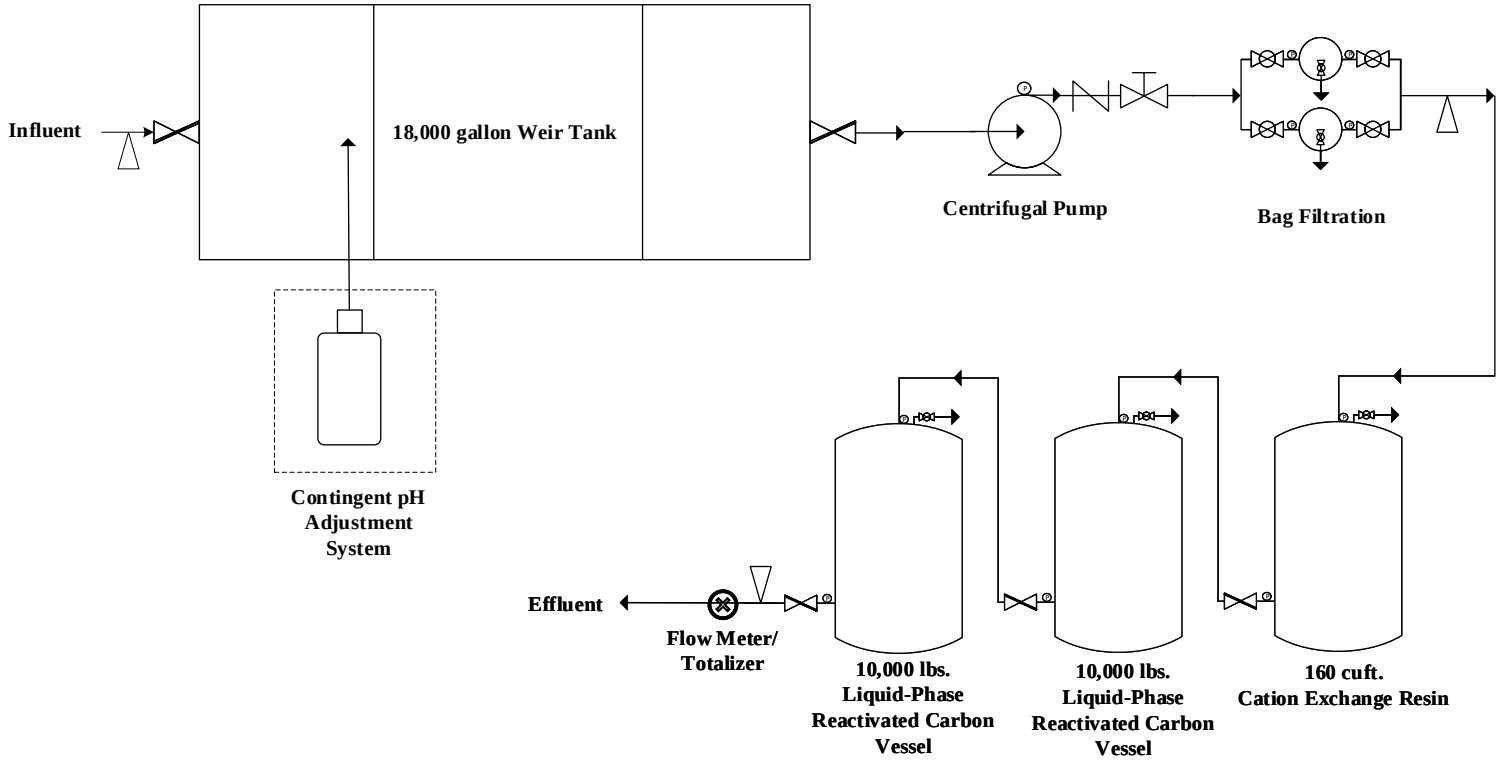
341 SECOND AVENUE
WALTHAM, MASSACHUSETTS

SITE PLAN

SCALE: AS SHOWN
AUGUST 2019

FIGURE 2

ERVIN, DAYNA
J:\GRAPHICS\132689\132689-003-B003.DWG
Printed:5/3/2019 8:54 AM
Layout: B003



Key:

- Piping/Hose
- Pressure Gauge
- Ball Valve
- Butterfly Valve
- Check Valve
- Gate Valve
- Contingent
- Sample Port

Notes:

1.) Figure is not to scale
2.) System rated for 500 GPM

LRT Lockwood Remediation Technologies LLC	**Lockwood Remediation Technologies, LLC** **89 Crawford Street** **Leominster, MA 01453** **Office: 774-450-7177** **DESIGNED BY:** LRT **DRAWN BY:** JHJ **CHECKED BY:** Rev1 **DATE:**	**Water Treatment System Schematic**	**341 Second Avenue** **Waltham, MA**	**PROJECT No.** 3331.rev.1	**FIGURE No.** 3

APPENDIX A

Notice of Intent

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:
Broadstone Watch City</td><td colspan="3">Site address: 341 Second Avenue
Street:</td></tr>
<tr><td>City: Waltham</td><td>State: MA</td><td>Zip: 02451</td></tr>
<tr><td rowspan="4">2. Site owner
CRP/AR [Watch City] Venture, LLC

Owner is (check one): ☐ Federal ☐ State/Tribal ■ Private
☐ Other; if so, specify:</td><td colspan="3">Contact Person: Michael Boujoulian</td></tr>
<tr><td colspan="2">Telephone: 617-356-1000</td><td>Email: mboujoulian@allresco.com</td></tr>
<tr><td colspan="3">Mailing address: 184 High Street, Suite 401
Street:</td></tr>
<tr><td>City: Boston</td><td>State: MA</td><td>Zip: 02110</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Callahan Construction Managers</td><td colspan="3">Contact Person: Robert Sanda</td></tr>
<tr><td colspan="2">Telephone: 508-279-0012</td><td>Email: rsanda@callahan-inc.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 80 First Street</td></tr>
<tr><td>City: Bridgewater</td><td>State: MA</td><td>Zip: 02324</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):

☐ 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):
Stony Brook	MA72-26	Class A

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. No approved TMDLs for this segment.

4. Indicate the seven day-ten-year low flow (7Q10) of the receiving water determined in accordance with the instructions in Appendix V for sites located in Massachusetts and Appendix VI for sites located in New Hampshire.	0
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.	1

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: 07/02/2019

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: pentachlorophenol, arsenic, copper, iron, lead, nickel, ammonia, chloride, pH	
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): unnamed buried headwall	Outfall location(s): (Latitude, Longitude) 42.388843 N, 71.266343 W
Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ■ Indirect discharge, if so, specify: Dewatering effluent will be routed through piping to a buried headwall which discharges to a wetland which, based on conversations with DEP, is understood to eventually discharge to Hobbs Brook Pond followed by Hobbs Brook, Stony Brook, and then to Stony Brook Reservoir. ☐ 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: the owner has been notified concurrently with this submittal; authorization will be obtained prior to the start of discharge. 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): October 2019 through March 2021 (18 months) Indicate if the discharge is expected to occur over a duration of: ☐ less than 12 months ■ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No	

<table>
<tr><td>2. Activity Category: (check all that apply)</td><td colspan="2">3. Contamination Type Category: (check all that apply)</td></tr>
<tr><td rowspan="5">☐ I – Petroleum-Related Site Remediation
☐ II – Non-Petroleum-Related Site Remediation
■ III – Contaminated Site Dewatering
☐ IV – Dewatering of Pipelines and Tanks
☐ V – Aquifer Pump Testing
☐ VI – Well Development/Rehabilitation
☐ VII – Collection Structure Dewatering/Remediation
☐ VIII – Dredge-Related Dewatering</td><td colspan="2">a. If Activity Category I or II: (check all that apply)

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

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

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		✓	1	4500NH3	75	1420	1420	Report mg/L	---
Chloride		✓	1	300.0	500	35200	35200	Report µg/l	---
Total Residual Chlorine	✓		1	4500CL	20	0	0	0.2 mg/L	
Total Suspended Solids	✓		1	2540D	5000	0	0	30 mg/L	---
Antimony	✓		1	200.8	4	0	0	206 µg/L	
Arsenic		✓	1	200.8	1	1.57	1.57	104 µg/L	
Cadmium	✓		1	200.8	0.2	0	0	10.2 µg/L	
Chromium III		✓	1	NA	10	0	0	323 µg/L	
Chromium VI	✓		1	7196A	10	0	0	323 µg/L	
Copper		✓	1	200.8	1	3.21	3.21	242 µg/L	
Iron		✓	1	200.7	50	11000	11000	5,000 µg/L	
Lead		✓	1	200.8	1	1.54	1.54	160 µg/L	
Mercury		✓	1	245.1	0.2	0	0	0.739 µg/L	
Nickel		✓	1	200.8	2	2.75	2.75	1,450 µg/L	
Selenium	✓		1	200.8	5	0	0	235.8 µg/L	
Silver	✓		1	200.8	0.4	0	0	35.1 µg/L	
Zinc		✓	1	200.8	10	0	0	420 µg/L	
Cyanide	✓		1	4500CN	5	0	0	178 mg/L	
B. Non-Halogenated VOCs									
Total BTEX		✓	1	624.1	1	0	0	100 µg/L	---
Benzene		✓	1	624.1	1	0	0	5.0 µg/L	---
1,4 Dioxane	✓		1	624.1-SIM	50	0	0	200 µg/L	---
Acetone		✓	1	624.1	10	0	0	7.97 mg/L	---
Phenol	✓		1	420.1	30	0	0	1,080 µg/L	

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
C. Halogenated VOCs									
Carbon Tetrachloride	✔		1	624.1	1	0	0	4.4 µg/L	
1,2 Dichlorobenzene	✔		1	624.1	5	0	0	600 µg/L	---
1,3 Dichlorobenzene	✔		1	624.1	5	0	0	320 µg/L	---
1,4 Dichlorobenzene	✔		1	624.1	5	0	0	5.0 µg/L	---
Total dichlorobenzene	✔		1	624.1	5	0	0	763 µg/L in NH	---
1,1 Dichloroethane	✔		1	624.1	1.5	0	0	70 µg/L	---
1,2 Dichloroethane	✔		1	624.1	1.5	0	0	5.0 µg/L	---
1,1 Dichloroethylene	✔		1	624.1	1	0	0	3.2 µg/L	---
Ethylene Dibromide	✔		1	504.1	0.01	0	0	0.05 µg/L	---
Methylene Chloride	✔		1	624.1	1	0	0	4.6 µg/L	---
1,1,1 Trichloroethane	✔		1	624.1	2	0	0	200 µg/L	---
1,1,2 Trichloroethane	✔		1	624.1	1.5	0	0	5.0 µg/L	---
Trichloroethylene	✔		1	624.1	1	0	0	5.0 µg/L	---
Tetrachloroethylene	✔		1	624.1	1	0	0	5.0 µg/L	
cis-1,2 Dichloroethylene		✔	1	624.1	1	0	0	70 µg/L	---
Vinyl Chloride	✔		1	624.1	1	0	0	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✔		1	625.1	5	0	0	190 µg/L	
Diethylhexyl phthalate	✔		1	625.1	2.2	0	0	101 µg/L	
Total Group I PAHs		✔	1	625.1-SIM	0.1	0	0	1.0 µg/L	---
Benzo(a)anthracene		✔	1	625.1-SIM	0.1	0	0	As Total PAHs	
Benzo(a)pyrene		✔	1	625.1-SIM	0.1	0	0		
Benzo(b)fluoranthene		✔	1	625.1-SIM	0.1	0	0		
Benzo(k)fluoranthene		✔	1	625.1-SIM	0.1	0	0		
Chrysene		✔	1	625.1-SIM	0.1	0	0		
Dibenzo(a,h)anthracene		✔	1	625.1-SIM	0.1	0	0		
Indeno(1,2,3-cd)pyrene		✔	1	625.1-SIM	0.1	0	0		

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
Total Group II PAHs		✔	1	625.1-SIM	0.1	0	0	100 µg/L	---
Naphthalene		✔	1	625.1-SIM	0.1	0	0	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs		✔	1	608.3	0.25	0	0	0.000064 µg/L	---
Pentachlorophenol		✔	1	625.1-SIM	1	6.5	6.5	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons		✔	1	1664A	4400	0	0	5.0 mg/L	---
Ethanol	✔		0	1671A	2000	0	0	Report mg/L	---
Methyl-tert-Butyl Ether	✔		1	624.1	10	0	0	70 µg/L	
tert-Butyl Alcohol	✔		1	624.1	100	0	0	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		1	624.1	20	0	0	90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
pH		✔	1	field		5.28	5.28		
temperature (C)		✔	1	field		7.34	7.34		
hardness		✔	1	200.7	660	50100	50100		

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:
pH adjustment will be used to meet 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 will be routed through a sedimentation/fractionation tank, bag filters (5-micron), activated carbon canisters, ion exchange, and pH adjustment to remove suspended solids and undissolved chemical constituents.

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: activated carbon, ion exchange, and pH adjustment

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: pumps Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	500
Provide the proposed maximum effluent flow in gpm.	400
Provide the average effluent flow in gpm.	350
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:

2. Provide the following information for each chemical/additive, using attachments, if necessary:

Refer to attached Haley & Aldrich, Inc. letter

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

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

(check one): ☐ Yes ☐ No

G. Endangered Species Act eligibility determination

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

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

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

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

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

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

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

H. National Historic Preservation Act eligibility determination

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

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

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

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

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

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

I. Supplemental information

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

Refer to attached Haley & Aldrich, Inc. letter

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

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

J. Certification requirement

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

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

BMPP certification statement:

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

Signature: [signature] Date: 8/7/19

Print Name and Title: Michael Boujoulian

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

January 31, 2020

Michael Boujoulian
CRP/AR [Watch City] Venture, LLC
184 High Street, Suite 401
Boston, MA 02110

RE: Remediation General Permit- MassDEP Approval for Discharge to Outstanding Resource Waters
Name of Site: Proposed Broadstone Watch City, 341 Second Avenue, Waltham, MA 02451
Name of Receiving Water(s) and Town: Wetland that flows to Hobbs Brook Pond followed by Hobbs Brook, Stony Brook and then to Stony Brook Reservoir, Weston/Waltham, MA
MassDEP Transmittal No.: X284087

Dear Mr. Boujoulian,

The Massachusetts Department of Environmental Protection ("MassDEP") received a National Pollutant Discharge Elimination System Remediation General Permit ("RGP") Notice of Intent ("NOI") on August 21, 2019 prepared by Haley & Aldrich on behalf of CRP/AR [Watch City] Venture, LLC requesting discharge to a wetland that flows to Hobbs Brook Pond followed by Hobbs Brook, Stony Brook and then to Stony Brook Reservoir, which MassDEP classifies as an Outstanding Resource Water ("ORW") according to 314 CMR 4.06. The RGP, jointly signed by EPA and MassDEP on March 9, 2017, with an effective date of April 8, 2017, states that discharges to ORWs are ineligible for coverage unless an Antidegradation Authorization is granted by MassDEP.

Based on the NOI and additional communications with Haley & Aldrich, MassDEP prepared the document, "Tentative Determination to Issue an Antidegradation Authorization to Discharge to an Outstanding Resource Water," which was available for public comment in the MEPA Environmental Monitor from September 25, 2019, to October 25, 2019, in accordance with 314 CMR 4.00 and 314 CMR 2.06. Comments were received from the City of Cambridge Water Department and the Charles River Watershed Association. Attached is the Response to Public Comments document addressing the comments received. No requests for a public hearing were received.

Upon deliberation, MassDEP has decided to issue the attached document "Determination to Issue an Antidegradation Authorization to Discharge to an Outstanding Resource Water." **To obtain coverage to discharge under the 2017 RGP, please include this Determination, the Response to Public Comments document, and Haley & Aldrich's response letter to MassDEP's questions in the NOI**

that you submit to EPA. The discharge may not commence until EPA has issued an authorization letter with permit limits.

If you have any questions or require any additional information, please contact Xiaodan Ruan at 617-654-6517 or xiaodan.ruan@mass.gov.

Sincerely,

Lealdon Langley, Director
Division of Watershed Management
Department of Environmental Protection

Enclosures: Determination to Issue an Antidegradation Authorization to Discharge to an Outstanding Resource Water
Response to Public Comments Regarding MassDEP's Tentative Determination to Issue an Antidegradation Authorization to Discharge to an Outstanding Resource water
Attachments A-C: Supporting Documentation

ecc: Elizabeth E. Mack, Locke Lord LLP
Kate Dilawari, Haley & Aldrich, Inc.
Shauna Little, EPA Region 1
Stephen A. Casazza, Waltham City Engineer

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

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Secretary

Martin Suuberg
Commissioner

DETERMINATION TO ISSUE AN ANTIDEGRADATION AUTHORIZATION TO DISCHARGE TO AN OUTSTANDING RESOURCE WATER

NAME OF SITE:	Broadstone Watch City
SITE OWNER:	CRP/AR [Watch City] Venture, LLC
SITE OPERATOR (if different than owner):	Callahan Construction Managers
MASSDEP TRANSMITTAL NUMBER:	X284087
NAME OF RECEIVING WATER(S) AND TOWN:	Wetland that flows to Hobbs Brook Pond followed by Hobbs Brook, Stony Brook and then to Stony Brook Reservoir, Weston/Waltham, MA
PERMIT AUTHORITY FOR DISCHARGE:	NPDES Remediation General Permit (RGP), effective April 8, 2017

The 2017 RGP was issued by both the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) on March 9, 2017, with an effective date of April 8, 2017. The RGP is available for sites located in Massachusetts and New Hampshire that discharge 1.0 million gallons per day or less as a result of remediation activities from eight general categories, including contaminated site dewatering.

As required by the RGP, Haley & Aldrich on behalf of CRP/AR [Watch City] Venture, LLC submitted a Notice of Intent (NOI) dated August 21, 2019, requesting discharge to a wetland that flows to Hobbs Brook Pond followed by Hobbs Brook, Stony Brook and then to Stony Brook Reservoir. Stony Brook Reservoir, and its tributaries thereto, are classified as Class A, Public Water Supplies, and are protected as Outstanding Resource Waters (ORW). Section 1.3 of the 2017 RGP states that discharges to ORWs are ineligible for coverage unless an

authorization is granted by MassDEP. Therefore, MassDEP is required to perform an additional review in accordance with the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards (MA SWQS) (314 CMR 4.00) and MassDEP policy, "Implementation Procedures for the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards, 314 CMR 4.00" ("the Policy") prior to authorizing this discharge to an ORW. Also, according to 314 CMR 4.04(5)(c), "Where an authorization is at issue, the Department shall circulate a public notice in accordance with 314 CMR 2.06. Said notice shall state an authorization is under consideration by the Department, and indicate the Department's tentative determination. The applicant shall have the burden of justifying the authorization. Any authorization granted pursuant to 314 CMR 4.04 shall not extend beyond the expiration date of the permit."

Based on the NOI and additional information provided in letters from Haley & Aldrich dated August 21, 2019, and November 7, 2019, and information provided through emails (from Katherine Dilawari from Haley & Aldrich, and Elizabeth Mack from Locke Lord LLP), and pursuant to the authority granted by Chapter 21, §§ 26-53 of the Massachusetts General Laws, as amended, 314 CMR 2.00, and 314 CMR 4.00, MassDEP is authorizing this discharge to an ORW.

It should be noted that MassDEP's decision to allow this discharge to an ORW does not provide authorization to discharge. With this MassDEP Antidegradation Authorization, the EPA may now proceed with authorizing the discharge under the 2017 RGP.

Project and Site Description

As described in the NOI, the subject site is 1.79 acres and was partially occupied by a vacant single-level high-bay warehouse building surrounded by bituminous-paved driveways, parking lots, and small landscaped areas. The proposed construction consists of a new six-story, approximately 54,000 square foot residential building with five levels of residential space above a podium structure and two levels of below grade space (basement and sub-basement). It also includes installation of new utilities and a subsurface infiltration system.

The discharge will consist of treated construction dewatering. Pipes will discharge to two on-site catch basins that are part of the Waltham Municipal Separate Storm Sewer System (MS4). This will flow to a buried headwall located on the edge of the property and then to a wetland that is part of the City of Waltham's stormwater conveyance system. Prior to discharge, collected water will be routed through a sedimentation tank, bag filters, ion exchange, two activated carbon canisters, and pH adjustment, to remove suspended solids, undissolved chemical constituents, and per- and polyfluoroalkyl substances (PFAS) compounds. Construction and construction dewatering activities are anticipated to be required for a period of 8 to 12

months but may extend as long as 18 months, and the estimated effluent discharge rates will be up to 400 gallons per minute (gpm) with an average of 200 gpm.

Jurisdiction

The EPA RGP authorization will include pollutant effluent limits based on submitted groundwater data and water quality criteria for freshwater in the MA SWQS (which reference USEPA's *National Water Quality Criteria: 2002*), and available dilution at the point of discharge. The NOI included a dilution factor of 1 for the point of discharge to a wetland, i.e. no dilution.

According to the NOI, the activity is categorized as contaminated site dewatering and the contaminants that are known or believed present at the site include inorganics, halogenated and non-halogenated volatile organic compounds (VOCs) and semi-VOCs, and fuels. A groundwater sample was collected from well HA15-5 on March 25, 2019, and results indicate that the potential contaminants in the groundwater include inorganics and halogenated semi-volatile organic compounds. As described above, prior to discharge, the dewatering will be treated through sedimentation, filtration, and other necessary treatments to remove suspended solids and undissolved chemical constituents. EPA will determine appropriate effluent limits and include these limits in their authorization to discharge under the RGP. In addition, the applicant collected one (1) sample from well HA 15-4 (OW) and one (1) surface water sample from Hobbs Brook Pond for analysis of six PFAS compounds based on the final PFAS-related revisions to the Massachusetts Contingency Plan (MCP) dated December 27, 2019[1]. Analytical results indicate that the sum of the concentrations of the listed PFAS compounds is 0.017 µg/L in groundwater and 0.0194 µg/L in Hobbs Brook Pond. MassDEP has included requirements for monitoring, treatment, and effluent limitation in the section Additional State Requirements.

MA SWQS and the RGP state that discharges to ORWs in Massachusetts are ineligible for coverage unless an authorization is granted by MassDEP. Haley & Aldrich on behalf of CRP/AR [Watch City] Venture, LLC submitted a description of how the project would demonstrate compliance with the MASWQS requirements for authorization listed in 314 CMR 4.04(5)(a)(2) through 4.04(5)(a)(4). These responses are presented below.

- Item 1, based on 314 CMR 4.04(5)(a)(2):
  Are there less environmentally damaging alternative sites for the discharge, sources of disposal, or methods to eliminate the discharge that are reasonably available or feasible?

[1] Final PFAS-Related changes to the Massachusetts Contingency Plan – 2019-12-13 ("MCP", 310 CMR 40.0000): https://www.mass.gov/doc/final-pfas-related-changes-to-the-mcp-2019-12-13/download.

- Response:
  - "There are no feasibly available alternative locations for this construction project.
  - The City of Waltham played a large role in mandating the project's design, including specifically the need for the lowest level of parking, as a condition to their approval.
  - Installation of a groundwater cut-off (i.e., concrete-diaphragm wall, steel sheeting) is infeasible due to the large volume of cobbles and boulders in the site soils which prevents installation of sheeting or concrete diaphragm wall.
  - There is no rate or volume of groundwater discharge that the City of Waltham would allow to their municipal sewer system due to a MassDEP Administrative Consent Order dated February 22, 2010. Per order #8 of the ACO "…the City shall not…allow an increase in flow to any sewer…if the existing discharge would result in the sanitary waste design flow component for the…downstream sewer owned and/or operated by the City of Waltham to be exceeded". Additionally, the ACO Order #8 specifically notes "a prohibition on stormwater or groundwater connections."
  - A typical dewatering frac tank holds up to 21,000 gallons of water and is typically about 45 ft long by 8 ft wide. At a pumping rate of 200 gpm, the site will produce at least 288,000 gallons per day, enough to fill 14 frac tanks per day. Considering that dewatering is necessary to be conducted continuously for 8 to 12 months, it is not feasible to store the pumped dewatering effluent onsite. On a recent project, Haley & Aldrich, Inc. and Callahan Construction obtained a 2019 quote from Globalcycle, Inc., a fully permitted industrial/commercial wastewater treatment and recycling plant located in Taunton, Massachusetts. Globalcycle removes water from frac tanks at the site in 9,000-gal tanker trucks. Based on the anticipated pumping rate at the subject site, 32 tanker trucks (one trip every 45 minutes) would be required around the clock daily, or more than 7,680 round trips over the duration of the project, which would have a detrimental effect on the environment and on the neighborhood. In addition, the cost for offsite trucking, treatment and discharge of dewatering effluent is $0.33 to $0.37 per gallon, which would be approximately $100,000 per day, or $24 million to $36 million over the duration of construction dewatering. It is not feasible to truck the dewatering effluent offsite.
  - After reassessing all the options, the hydrogeologist and engineering teams have determined that limited infiltration is feasible. As a consequence, we have made plans to install the permanent stormwater infiltration gallery (shown on Figure 2) prior to the building excavation, in order to allow for the infiltration system to be used to recharge a portion of the dewatering effluent during construction. This sequencing had not previously been planned since the location of the infiltration gallery is at the main entrance to the construction site and is a necessary

construction staging area; special precautions will be necessary above the newly constructed infiltration gallery to protect it from damage by the loads of heavy construction cranes and other equipment during construction. Based on the calculations provided as Attachment 2 to this letter, we estimate that approximately 20 to 25 gpm of dewatering effluent can be recharged using this infiltration gallery. In addition, the new construction sequencing plan (construction of site stormwater management prior to building construction) has the added benefit of further reducing offsite discharge of dewatering effluent. Dewatering effluent pumped during this utility construction will be recharged onsite within the footprint of the proposed future building, reducing both the duration and total volume of discharge offsite."[2]

- Item 2, based on 314 CMR 4.04(5)(a)(3):
  To the maximum extent feasible, are the discharge and activity designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices?

  - Response: "Prior to discharge, construction dewatering effluent will be routed through an on-site treatment system to meet NPDES RGP Effluent Criteria. Routine compliance sampling is planned to monitor system performance."

- Item 3, based on 314 CMR 4.04(5)(a)(4):
  Will the discharge impair existing uses of the receiving water or result in a level of water quality less than the specified for the Class?

  - Response: "As noted for 314 CMR 4.04(5)(a)(3), construction dewatering effluent will be routed through an on-site treatment system prior to discharge and routine compliance sampling performed to monitor system performance in order to prevent impairment of the receiving water body."

- Item 4, based on the first part of 314 CMR 4.04(3)(b)(1):
  Will the discharge maintain or enhance the water quality in the ORW?

  - Response:
    - "Regarding maintenance or enhancement of water quality, the treatment system will enhance or maintain the water quality in the wetland and Hobbs Pond in two

[2] Note that MassDEP has determined that treating all of the dewatering flow and discharging to surface waters is more beneficial to the receiving waters and thus is not allowing the onsite infiltration of untreated construction dewatering.

very important ways. First, it will treat the collected groundwater so that any effluent discharge will not have any contaminants above existing water quality standards or permit standards. Second and equally important, the effluent will be cleaner than the currently existing water in the wetland, which will create a dilutive effect and enhance the existing overall water quality in the outstanding water resources. Quite simply, the treatment and discharge have the express purpose and intent to maintain or enhance the Stony Brook Reservoir and its tributaries for their designated use as a Public Water Supply. Indeed, this treatment system and companion effluent discharge are expressly designed to maintain or improve water quality in the outstanding water resources, and by design, no burdens will be placed on downstream users."

- As stated above, the analytical results of the groundwater and receiving water samples indicate that the sum of the concentrations of the listed PFAS compounds is 0.017 µg/L in groundwater and 0.0194 µg/L in Hobbs Brook Pond. MassDEP is including monitoring requirements and effluent limitations for the six PFAS compounds (see Additional State Requirements). These requirements will ensure that the discharge of the treated effluent will improve the water quality in the ORW by removing PFAS in the groundwater.

- Item 5, based on the second part of 314 CMR 4.04(3)(b)1:
  The Department's determination to allow a new or increased discharge shall be made in agreement with the federal, state, local or private entity recognized by the Department as having direct control of the water resource or governing water use;

  - Response: In CWD's comment letter dated October 24, 2019, CWD expressed concerns about potential per- and polyfluoroalkyl substances (PFAS) contamination in the groundwater. MassDEP sent a letter to CWD on January 15, 2020 and addressed CWD's concerns regarding potential PFAS (see Attachment B and Additional State Requirements below). MassDEP inquired whether CWD deems the applicant's and MassDEP's responses to their concerns (PFAS monitoring and effluent limitation) are adequate. CWD responded in a letter dated January 27, 2020, that "CWD believes that MassDEP has adequately addressed CWD's concerns regarding potential PFAS)" (see Attachment C).

Additional State Requirements:

- RGP Part 2.3.3 allows MassDEP to include additional state certification requirements to the RGP if the state determines that such additional requirements are necessary to meet state WQS. Based on MassDEP's narrative criteria for toxic pollutants at 314 CMR 4.05 (5)(e), MassDEP determines to include a monitoring requirements for the six PFAS compounds

listed in table 1 and an effluent limitation of non-detect at a detection limit of 2.0 ng/L (PFAS minimum reporting levels) for each of the six PFAS compounds.

- The applicant is responsible for designing and operating a treatment system, and develop an operation and maintenance (O&M) manual for the treatment system that will achieve the effluent limitations established. A description of the treatment system and the O&M manual shall be provided to MassDEP prior to discharge commencing.

- In addition to the sampling locations required in Parts 4.1, 4.3 and 4.4 of the RGP, the applicant should establish a mid-point sampling location within the GAC treatment system to evaluate the performance of the treatment process for PFAS removal and to determine when the breakthrough point (increased PFAS concentrations) occurs. The mid-point monitoring allows the applicant to take appropriate and timely action and maintenance for the GAC columns to ensure the effluent limitations of the PFAS are achieved. The applicant shall use EPA Method 537 or 537.1 and follow Parts 4.1, 4.3 and 4.4 of the RGP for monitoring requirements for PFAS. The applicant shall also follow Part 2.5.2.e.iii of the RGP upon discovery of any violation of these effluent limitations.

Table 1: Monitoring and Effluent Limitations Requirements

Parameters	CAS Number	Effluent Limitation
Perfluorodecanoic acid (PFDA)	335-76-2	non-detect or 2.0 ng/L
Perfluoroheptanoic acid (PFHpA)	375-85-9	non-detect or 2.0 ng/L
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	non-detect or 2.0 ng/L
Perfluorononanoic acid (PFNA)	375-95-1	non-detect or 2.0 ng/L
Perfluorooctanesulfonate (PFOS)	1763-23-1	non-detect or 2.0 ng/L
Perfluorooctanoic acid (PFOA)	335-67-1	non-detect or 2.0 ng/L

- Infiltration of untreated dewatering effluent is prohibited to prevent the re-introduction of potential pollutants into the groundwater. The entire volume of the effluent should be treated through the on-site treatment system to meet the effluent limitations.

- The applicant shall send copies of the discharge monitoring reports (DMRs) and PFAS monitoring results to CWD at:

Attn: Jamie O'Connell
Cambridge Water Department
Office of Watershed Management
250 Fresh Pond Parkway
Cambridge, MA 02138

and to MassDEP at:

Attn: Xiaodan Ruan
MassDEP
1 Winter St., 5th Floor
Boston, MA 02108

- The applicant shall notify CWD 24 hours in advance of the start of dewatering activities and notify CWD again once the dewatering operation ends. The applicant shall also notify CWD if there are any upsets to the treatment system.

Conclusion

The NOI and the responses provided by the applicant have sufficiently defined the nature and general elements of the project for the purposes of MassDEP review and demonstrated that the proposed discharge will maintain or enhance the water quality of the receiving water. Based on review of the documents provided and comments received, MassDEP has determined that the discharge meets the requirements for authorization listed in 314 CMR 4.04(5)(b) and 314 CMR 4.04(5)(a)(2)-(4) and is authorizing the discharge, subject to the terms and conditions of EPA's authorization to discharge under the RGP. This Determination provides the Antidegradation Authorization for the temporary dewatering and treatment activity during construction. Any post-construction dewatering discharges would require a separate RGP authorization.

Lealdon Langley, Director
Division of Watershed Planning & Permitting

1/31/2020
[Date]

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

RESPONSE TO PUBLIC COMMENTS REGARDING MASSDEP'S TENTATIVE DETERMINATION TO ISSUE AN ANTIDEGRADATION AUTHORIZATION TO DISCHARGE TO AN OUTSTANDING RESOURCE WATER

NAME OF SITE:	Broadstone Watch City
SITE OWNER:	CRP/AR [Watch City] Venture, LLC
SITE OPERATOR (if different than owner):	Callahan Construction Managers
MASSDEP TRANSMITTAL NUMBER:	X284087
NAME OF RECEIVING WATER(S) AND TOWN:	Wetland that flows to Hobbs Brook Pond followed by Hobbs Brook, Stony Brook and then to Stony Brook Reservoir, Weston/Waltham, MA
PERMIT AUTHORITY FOR DISCHARGE:	NPDES Remediation General Permit (RGP), effective April 8, 2017

In accordance with the provisions of the Massachusetts Clean Waters Act, as amended, (M.G.L. Ch. 21, §§ 26-53) and 314 CMR 2.00, 3.00 and 4.00, this document presents the Massachusetts Department of Environmental Protection (MassDEP) Response to Comments received on the Tentative Determination to issue an Antidegradation Authorization to Discharge to an Outstanding Resource Water ("Antidegradation Authorization") for the above referenced proposed location. MassDEP solicited public comments on the Tentative Antidegradation Authorization from September 25, 2019 to October 25, 2019 for the discharge of treated construction dewatering from the above referenced site to a wetland that flows to Hobbs Brook

Pond. This Response to Comments explains and supports MassDEP's determination that forms the basis of the final Antidegradation Authorization.

The City of Cambridge Water Department (CWD) and the Charles River Watershed Association (CRWA) submitted comments on the Tentative Determination dated October 24 and 25, 2019, respectively. Based on the comments received, MassDEP requested additional information from the applicant's consultants via email on November 1, 2019. On behalf of CRP/AR [Watch City] Venture, LLC, Haley & Aldrich submitted a letter dated November 7, 2019 containing responses to MassDEP's questions. Following a review of the public comments received, the information in the applicant's Notice of Intent (NOI), and the applicant's response to MassDEP's questions, MassDEP has made a final decision to issue the Antidegradation Authorization. MassDEP's Antidegradation Authorization does not provide final Authorization for the discharge. With the issuance of the Antidegradation Authorization, the Environmental Protection Agency (EPA) may proceed with authorizing the discharge under the 2017 RGP.

Summary of Changes from the Tentative to the Final Antidegradation Authorization:

1. Under the section "Project and Site Description," based on new information provided by the applicant, the description of the construction dewatering duration and discharge rate has been modified to "Construction and construction dewatering activities are anticipated to be required for a period of 8 to 12 months, but may extend as long as 18 months, and the estimated effluent discharge rates will be up to 400 gallons per minute (gpm) with an average of 200 gpm."

2. Item 1 in the Final Determination has been modified to include additional information about the feasibility of alternative discharge options.

3. Additional information has been added to Item 4 and Item 5 in the Final Determination to explain why this discharge will meet 314 CMR 4.04(3)(b)1.

4. Additional state requirements have been added to the Final Determination:
   - Monitoring requirements and effluent limitation for the six per-and polyfluoroalkyl substances (PFAS) compounds (PFDA, PFHpA, PFHxS, PFNA, PFOS, and PFOA).
   - Infiltration of untreated dewatering effluent is prohibited, and the entire volume of the effluent should be treated through the on-site treatment system to meet the effluent limitations.
   - The applicant shall send copies of the discharge monitoring reports (DMRs) and PFAS monitoring results to CWD and MassDEP.

- The applicant shall notify the Cambridge Water Department (CWD) 24 hours in advance of the start of dewatering activities and notify CWD again once the dewatering operation ends.

5. A statement has been added to the Conclusion section: "This Final Determination provides an antidegradation authorization for the temporary dewatering activity during the construction. Any post-construction dewatering discharges would require a separate RGP authorization."

Comments are reproduced below as received; they have not been edited.

A. Comments submitted by the City of Cambridge Water Department (CWD):

Comment A.1:

"The Outstanding Resource Waters where the discharge will occur are a wetland and tributary to the Stony Brook Reservoir, a primary drinking water supply for the City of Cambridge. PFAS (per- and polyfluoroalkyl substances) are pollutants of emerging concern but were not assessed as part of the groundwater monitoring conducted at this site. In 2019, MassDEP published draft revisions to the Massachusetts Contingency Plan (MCP) that address PFAS. CWD requests that issuance of the Antidegradation Authorization be contingent on the applicant testing the groundwater at the site for the PFAS chemicals listed in the draft MCP revisions. If detected, CWD requests that the applicant implements a treatment system and monitoring program to ensure that the groundwater effluent and receiving waters meet the draft Ground Water1 (GW-1) PFAS standards. A link to the draft standard on the Massachusetts Department of Environmental Protection's (MassDEP) website is below: https://www.mass.gov/files/documents/2019/05/03/2019-04-24%20Proposed%20PFAS-Related%20MCP%20Revisions.pdf"

Response to Comment A.1:

See Attachment B, MassDEP's letter to CWD dated January 15, 2020.

Comment A.2:

"Given the sensitive location of the discharge, CWD requests that MassDEP require the applicant to send copies of the monthly monitoring results of the treatment system influent and effluent and the receiving waters to CWD at the following address:

Attn: Jamie O'Connell

Cambridge Water Department
Office of Watershed Management
250 Fresh Pond Parkway
Cambridge, MA 02138

Receipt of the sampling results will allow CWD to monitor water quality during construction dewatering and ensure that the discharged water meets the criteria defined in the Remediation General Permit (RGP) as well as the draft PFAS GW-1 standards."

Response to Comment A.2:

The RGP Part 4.6 requires submittals of DMRs for discharges lasting 12 months or more. Estimates of the length of time submitted in the application materials vary from 8 to 18 months. Notwithstanding the requirement to submit DMRs for discharges lasting 12 months or more, as requested by CWD and given that the discharge is going to the ORW and its tributaries, MassDEP exercises its rights under Part 2.3.3 of the RGP and requires the applicant to send copies of the monthly monitoring results and PFAS monitoring results to CWD at the above address and to MassDEP at **1 Winter St., 5th Floor, Boston, MA 02108, Attn: Xiaodan Ruan,** based on Part 2.3.3 of the RGP (see Response to Comment A.1). As stated in the Tentative Determination, EPA will determine appropriate effluent limits and include these limits in their authorization to discharge under the RGP.

Comment A.3:

"CWD also requests that MassDEP require the applicant to notify CWD 24 hours in advance of the start of dewatering activities and notify CWD again once the dewatering operation ends. These notifications will ensure that CWD can adequately monitor construction activities on the site and avoid adverse impacts to the water supply."

Response to Comment A.3

MassDEP will require the applicant to notify CWD 24 hours in advance of the start of dewatering activities and notify CWD again once the dewatering operation ends. The applicant shall also notify CWD if there are any upsets to the treatment system.

B. Comments submitted by the Charles River Water Association (CRWA):

Comment B.1:

"MassDEP cannot issue an antidegradation authorization without determining that the discharge is for the express purpose and intent of maintaining or enhancing the resource for its designated use.

Under the antidegradation provisions of MassDEP's Surface Water Quality Standards, "the quality of [Outstanding Resource Waters] shall be protected and maintained." 314 CMR 4.04(3) (emphasis added). Accordingly, the regulations prohibit a new or increased discharge to an Outstanding Resource Water unless "the discharge is determined by the Department to be for the express purpose and intent of maintaining or enhancing the resource for its designated use and an authorization is granted as provided in 314 CMR 4.04(5)."[1] 314 CMR 4.04(3)(b)1. (emphasis added).

The applicant ignored the first part of the required determination and only attempted to demonstrate that it meets the requirements of section 4.04(5). However, the criteria under section 4.04(5) are only relevant if the discharge has first been determined "to be for the express purpose and intent of maintaining or enhancing the resource for its designated use." 314 CMR 4.04(3)(b)1.[2] The Antidegradation Implementation Procedures provide examples of discharges that could qualify as being for the purpose of maintaining or enhancing a resource for its designated use: "discharges necessary to maintain a public water supply, such as a public supply treatment plant effluent; chemical application to a waterbody necessary to control weeds or algae to maintain designated uses; and discharges necessary to provide access to or maintain these areas (e.g. runoff from roads, parking lots or park buildings, or from reservoir maintenance activities).

The applicant has not explained how the discharge is for the express purpose and intent of maintaining or enhancing the Stony Brook Reservoir and its tributaries for their designated use

[1] The regulations also provide certain exceptions for the discharge of dredged or fill material under section 4.04(3)(b)2., which are not relevant here.

[2] See also MassDEP, Implementation Procedures for the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards, 314 CMR 4.00 ("Antidegradation Implementation Procedures") (Oct. 21, 2009) ("New or increased discharges to ORWs [ ] may be allowed only where both the discharge is 'determined by the Department to be for the express purpose and intent of maintaining or enhancing the resource for its designated use' and an authorization is granted pursuant to 314 CMR 4.04(5).") (emphasis added); ("Following the Department's determination, made in agreement with the appropriate entity, that a new or increased discharge to an ORW is for the express purpose of enhancing or maintaining the water for its designated use, the authorization process of 314 CMR 4.04(5) proceeds..."). These Antidegradation Implementation Procedures apply to point source discharges subject to 314 CMR 4.00. See 314 CMR 4.04(6).

as a Public Water Supply, and MassDEP has made no such determination here. In fact, the discharge of contaminated site dewatering effluent would seem to directly conflict with maintaining or enhancing these waters for their designated use. Without making a determination that the express purpose and intent of this discharge is maintaining or enhancing these waters for their designated use, MassDEP cannot issue an antidegradation authorization."

Response to Comment B.1:

MassDEP agrees that the requirement of 314 CMR 4.04(3)(b)1 was not addressed explicitly in the Tentative Determination. It is MassDEP's goal and intention to protect and ensure that the proposed discharge maintains or enhances the water quality of the ORW. The goal here is to maintain or enhance the water quality of the Stony Brook Reservoir and its tributaries as a Public Water Supply. MassDEP has reviewed the sampling results of the groundwater at the site and the receiving water of Hobbs Brook Pond (Table 1 and Table 2 in the NOI). The results of the groundwater sampling show that of the parameters listed in the RGP, pentachlorophenol, iron, lead, and pH exceed the preliminary calculation of the RGP effluent limitations.

Given the history of commercial and industrial development in the area, as well as the necessity of dewatering discharges from new construction, CRWA's strict reading of the language 314 CMR 4.04(3)(b)1 "for the express purpose and intent of maintaining or enhancing the resource for its designated use" that only allow discharges specifically designed to "maintain or enhance," presumably solely by the water supplier, is infeasible. This interpretation would prohibit the improvement of the surface water quality by discharging treated wastewater from developments into surface water, specifically in this case, the removal of PFAS compounds and other contaminants that would not otherwise be attenuated or removed prior to flowing by natural gradient to the Stony Brook Reservoir. Further, based on the dewatering rate and duration, trucking the treated wastewater to a different site instead of replenishing it to the watershed may result in the degradation of the water quality of the Stony Brook Reservoir and its tributaries due to a large amount of groundwater loss and reduced dilution. Thus, there are benefits associated with discharging the treated groundwater to the surface water instead of disposing of it offsite.

MassDEP also notes that metals, including arsenic, copper, iron, lead, and nickel, are higher in the groundwater than in Hobbs Brook Pond. As described on page 2 of the Tentative Determination and in the Response to Comment A.1, the wastewater treatment system will include necessary treatment components to treat the pumped groundwater to remove pollutants to meet the RGP effluent limits. The RGP effluent limits, which will be determined by EPA, will ensure that the discharge meets the MA SWQS (314 CMR 4.00). Based on the above information, MassDEP has determined that the discharge of the treated dewatering effluent will maintain and possibly enhance the water quality of the ORW and its tributaries.

Comment B.2:

"This discharge is ineligible for coverage under the RGP because MassDEP has not made, and likely cannot make, the necessary determination for an antidegradation authorization.

Under the Remediation General Permit (RGP), discharges to Outstanding Resource Waters in Massachusetts are ineligible for coverage "unless an authorization is granted by [MassDEP] by 314 CMR 4.04(3)(b)." National Pollutant Discharge Elimination System (NPDES) General Permit for Remediation Activity Discharges, Permit No. MAG910000, Part 1.3 Limitations on Coverage (2017). As discussed above, MassDEP has not made, and likely cannot make, the necessary determination for antidegradation authorization under 314 CMR 4.04(3)(b) that the dewatering discharge would be for the express purpose and intent of maintaining or enhancing the Stony Brook Reservoir and its tributaries for their designated use as a Public Water Supply. The discharge is therefore ineligible for coverage under the RGP."

Response to Comment B.2:

Upon review of new information provided by the proponent in the response letter regarding infiltration (see page 9 of Attachment A), the review of the analytical data of the groundwater and receiving water samples (see Table II in Attachment A), and the components of the wastewater treatment system (see page 3 of the final determination and Response to Comment B.1), MassDEP has determined that the applicant has adequately demonstrated the intent to provide a high level of treatment. Therefore, the water quality of the receiving water will be maintained and possibly enhanced. MassDEP's conclusion in the Tentative Determination of the Antidegradation Authorization has not changed in that the discharge meets the requirements for authorization listed in 314 CMR 4.04(5)(b) and 314 CMR 4.04(5)(a)2-4, and therefore MassDEP is authorizing the discharge, subject to the terms and conditions of EPA's authorization to discharge under the RGP. With the issuance of this Authorization, EPA may proceed with authorization of the discharge under the 2017 RGP.

Comment B.3:

"Even if MassDEP could properly issue an antidegradation authorization and the discharge was eligible for coverage under the RGP, the applicant has not met its high burden under section 4.04(5)(b) of the regulations.

Under 314 CMR 4.04(5)(b), before MassDEP may issue an authorization to discharge to Outstanding Resource Waters, an applicant must demonstrate that:

> no less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably available or feasible; to the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices; and the discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class.

The applicant's assertions that there are no less damaging alternatives and that water quality will be protected because the discharge will be subject to an NPDES permit (the RGP) are broad and unsubstantiated. CRWA strongly objects to this finding, based on the limited details provided about the project. It does not appear that the applicant considered any alternatives for construction of the project that might mitigate dewatering flows, such as limiting basement depth or accelerating foundation construction to shorten the duration of the discharge. Without that information, it is impossible to conclude that there are no less damaging alternatives or that the adverse impacts on water quality have been minimized to the maximum extent feasible. More information is also needed about why the entire volume of dewatering discharge could not go to the Waltham Municipal Separate Storm Sewer System.

Also, because the RGP does not contain specific antidegradation requirements, it appears that the limits imposed on the discharge by the RGP would be based only on achieving Massachusetts Surface Water Quality Criteria. For some pollutants like iron, lead, and ammonia, this will result in a significant increase in the downstream concentration of these pollutants, which is particularly problematic for a Public Water Supply. There would also be an increase in receiving water concentration for other pollutants, including nickel, arsenic, and copper. At the present time, CRWA is not aware of any information indicating that the quality of these waters will be protected and maintained if the proposed project moves forward. This outcome does not comport with the high level of protection afforded to Outstanding Resource Waters in Massachusetts's antidegradation provisions."

Response to Comment B.3:

MassDEP clarifies that the entire volume of the discharge to be discharged to surface water will go to the Waltham Municipal Separate Storm Sewer System (MS4). MassDEP believes that CRWA was referring to the City of Waltham municipal sewer system in this comment. See the responses to Items 1-5 on pages 3-6 of the Final Determination. Haley & Aldrich provided additional details and information to describe how the project would demonstrate compliance with the MA SWQS requirements for authorization listed in 314 CMR 4.04(5)(a)2 through 4.04(5)(a)4. Initially MassDEP requested that Haley & Aldrich evaluate whether infiltration at the site is possible. Haley & Aldrich reported that approximately 20-25 gpm of the dewatering effluent could be infiltrated onsite. MassDEP has since determined that treatment and discharge

of all of the construction dewatering to the wetland that flows to Hobbs Brook is more protective of the receiving water than infiltration of the untreated effluent. Therefore, infiltration of untreated dewatering effluent is prohibited (see Additional State Requirements in the Final Determination). It is concluded that there are no other less damaging alternatives that are reasonably available or feasible and that the adverse impacts on water quality have been minimized to the maximum extent feasible. It is also preferable for the drinking water reservoir to receive recharge of treated wastewater than to truck the water away. This is an appropriate water conservation and drought avoidance measure and also eliminates the fuel consumption and vehicle emissions that would result from transporting such a high volume of treated wastewater to another location.

MassDEP acknowledges that several metals and ammonia are above the concentrations in Hobbs Brook Pond, and iron and lead are above the preliminary calculation of the RGP limits. The liquid phase activated carbon and ion exchange treatments will effectively remove the pollutants so that the discharge will not result in an increase of concentrations of the pollutants in the receiving water.

Comment B.4:

"MassDEP should deny the applicant's request for an antidegradation authorization to discharge to an Outstanding Resource Water. The applicant has not met its high burden of showing that such a discharge should be allowed, and MassDEP has not complied with its own regulatory requirements in reaching its tentative determination. A final decision to authorize this discharge would not only be unlawful, it would contravene MassDEP's imperative duty to protect Outstanding Resource Waters and Public Water Supplies."

Response to Comment B.4:

See Response to Comment B.2.

In addition, according to the RGP Part 1, Section 1.5, "To maintain coverage under this general permit, the discharge must meet applicable water quality standards and all effluent limitations and requirements included in Part 2 and Part 6, and, if applicable, Part 7 of this general permit. The operator must also meet the requirements included in Part 4 and 5 of this general permit." Noncompliance with the permit can result in termination of coverage under the RGP. Should coverage be terminated, if the discharge continued, it would be considered discharging without a permit, which is both a state and a federal offense.

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

7 November 2019
File No. 132689-003

Massachusetts Department of Environmental Protection
One Winter Street
Boston, Massachusetts

Attention: Xiaodan Ruan
Environmental Engineer

Subject: Response to MassDEP Questions
Re: NPDES Remediation General Permit Application
341 Second Avenue
Waltham, Massachusetts

Ladies and Gentlemen:

We appreciate MassDEP's consideration of the NPDES Remediation General Permit application submitted on 21 August 2019 for temporary construction dewatering effluent discharge in support of the above-referenced project. In response to public comments received from the City of Cambridge and the Charles River Watershed Association (CRWA), and to MassDEP questions sent to us via email on Friday 01 November 2019, this letter provides additional information regarding the project and proposed temporary construction dewatering. We begin with a discussion of the project, site conditions, subsurface and assessment information, answer the questions in the 01 November 2019 email, while addressing the points raised in the CRWA letter, and conclude with a discussion of the PFAS test results requested by the City of Cambridge letter.

Project Background Information

The site is approximately 1.79 acres and is currently occupied by a single-level high-bay warehouse building (constructed between 1959 and 1966) which is surrounded primarily by impervious pavement, with small landscaped areas, as shown on Figure 1 to the right. The existing building is currently being abated and demolished. The existing stormwater management system at the site is in disrepair and does not provide stormwater pre-treatment.

The proposed redevelopment of the site consists of the construction of a 54,087 sf

footprint multi-family apartment building with six stories above grade and two levels of below-grade parking. The below-grade space will be waterproofed with a concrete mat foundation. No underdrain will be installed, and no permanent discharge of groundwater is proposed.

The planned building will occupy approximately 70% of the site, and the building utilities will occupy a significant amount of the remaining site area, as shown in Figure 2 below. The planned site improvements include significant upgrades to stormwater management at the site, including pre-treatment and infiltration.

The project has received all local permits after a long and expensive 4 year process. The site is fully engineered and designed and is fully capitalized with equity and debt based on our current business plan and budget. The City of Waltham played a large role in mandating the project's design, including specifically the need for the lowest level of parking, as a condition to their approval.

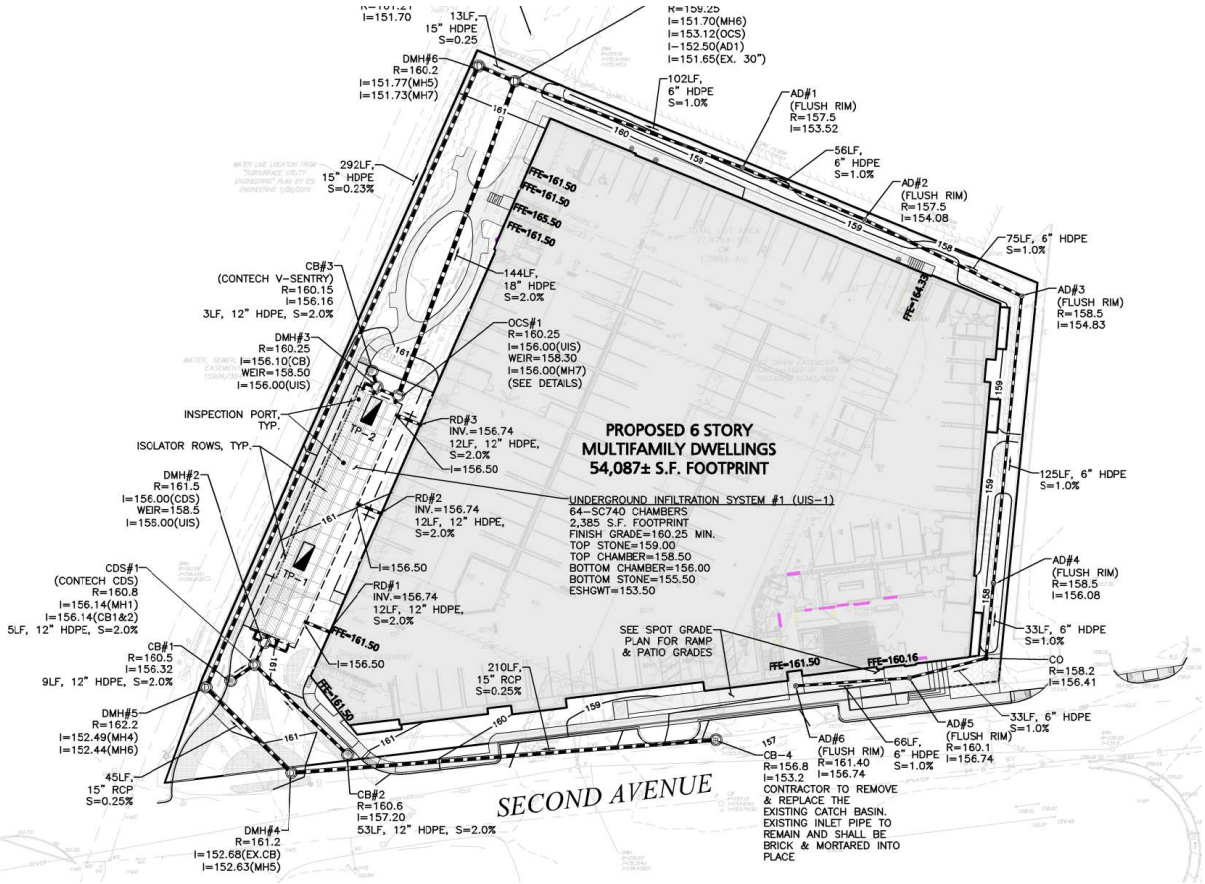


Figure 2: Drawing C-103.1 Grading & Drainage Plan (by Allen & Major Associates, Inc.)

Additionally, site logistics during construction are tightly planned to locate necessary construction trailers, the dewatering treatment system, and construction staging/ laydown area in the limited available site area surrounding the building excavation, as shown on Figure 3 below:

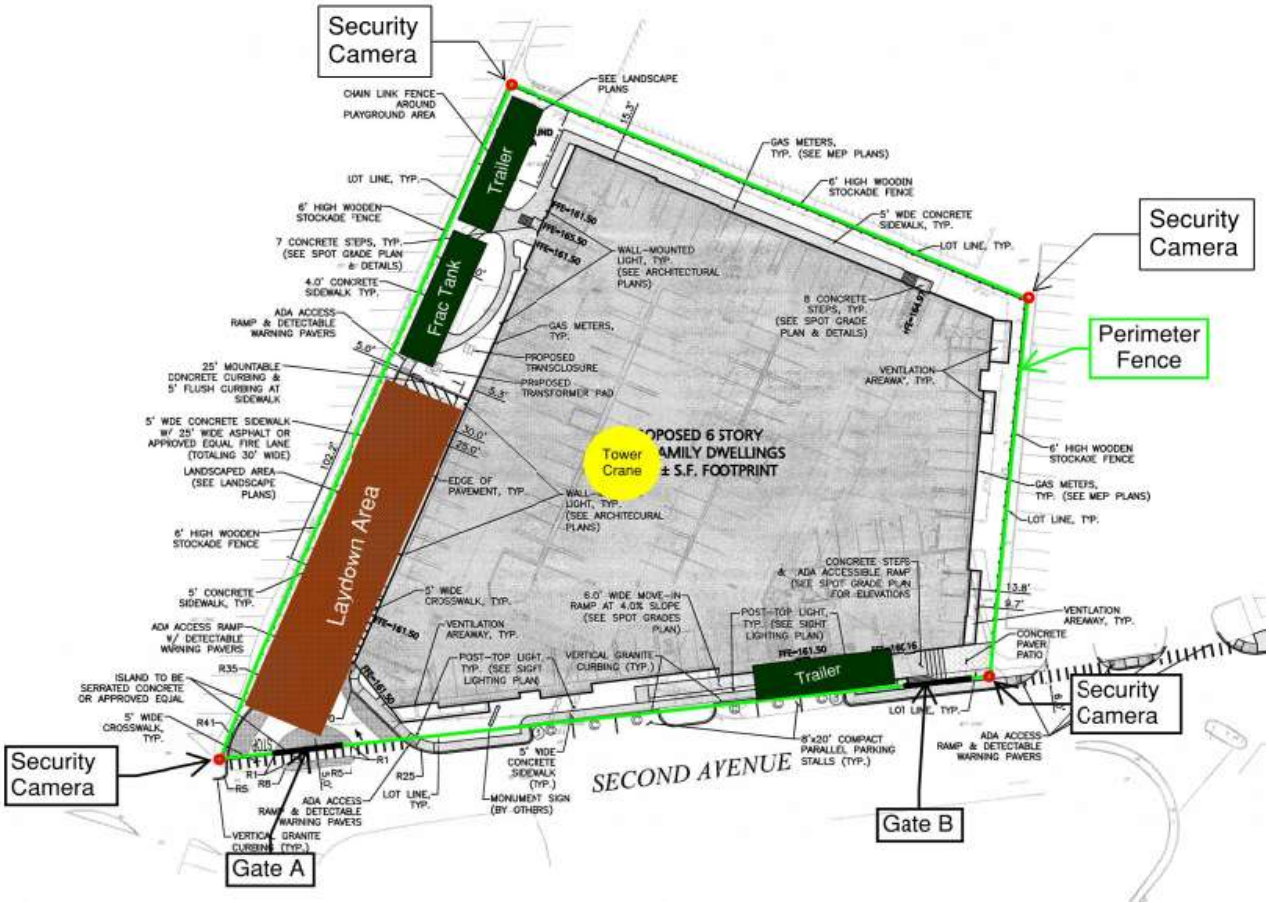


Figure 3: Proposed Site Logistics Plan (by Callahan Construction, Inc.)

Site Subsurface Conditions

Subsurface conditions at the site consist of the following, from ground surface, also depicted in Figure 4 below:

- fill (reworked natural soils) and organic soil (5 to 14 ft-thick)
- glaciofluvial sands (2 to 15 ft-thick)
- dense glacial till (4 to 18.5 ft-thick)
- bedrock encountered at depths of 10 to 32.5 ft below ground surface (bgs)

Numerous cobbles and boulders were encountered in both the glaciofluvial and glacial till deposits. The glaciofluvial sands are highly permeable, the glacial till soils also contain permeable sand seams, and the bedrock is expected to yield some additional groundwater flow.

Groundwater has been measured in observation wells at the site between 2015 and 2018 at 3.7 to 5.7 ft bgs.

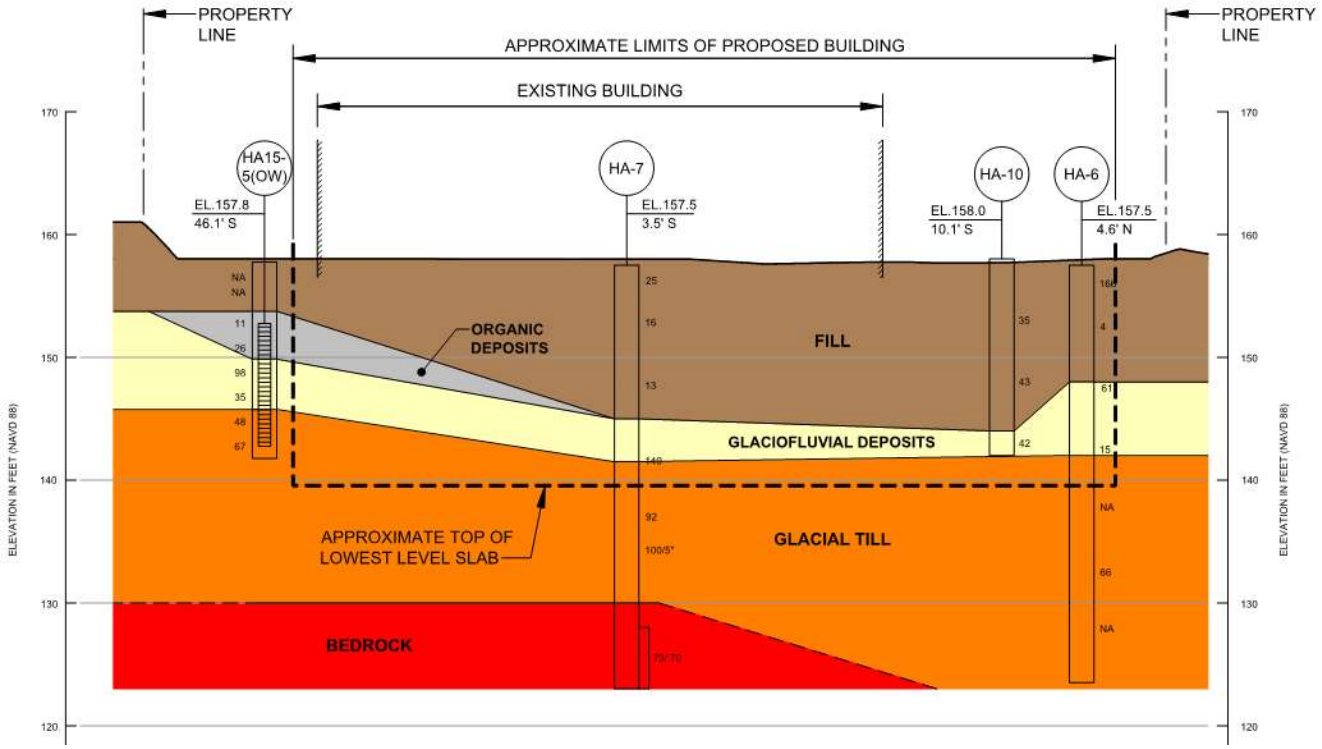


Figure 4: Subsurface profile west to east across site (by Haley & Aldrich, Inc.)

Environmental Assessment

In June 2015, Haley & Aldrich conducted an initial ASTM Phase I Environmental Site Assessment (ESA) to support Alliance Residential Company New England's acquisition of the property. The assessment included a limited subsurface exploration program including soil and groundwater testing to evaluate the potential for releases from past site operations. The ASTM Phase I ESA concluded there was no evidence of Recognized Environmental Conditions (RECs) at the site.

In March 2019, Haley & Aldrich conducted additional soil and groundwater testing at the site in preparation for site construction. We collected 63 soil samples to support offsite management of excavated soil and tested groundwater at the site for parameters required by the NPDES RGP application. In October 2019, Haley & Aldrich tested an additional groundwater sample for pentachlorophenol (PCP), which had been detected at a trace level previously, to evaluate the extent of PCP in groundwater, and for PFAS, as requested by the City of Cambridge. A summary of groundwater analytical results is attached as Table II.

Groundwater quality results indicated:

- Groundwater testing indicates concentrations below applicable Massachusetts Contingency Plan (MCP) RCGW-2 Reportable Concentrations and below the 2019 proposed MCP GW-1 standards for PFAS. No MCP regulatory compliance is required relative to groundwater.

- Groundwater testing indicates only two parameters exceed the NPDES discharge criteria calculated for the site; naturally occurring iron, and a trace level of pentachlorophenol, detected at a concentration of 6.5 ug/L, compared to an MCP Reportable Concentration of 200 ug/L, and an MCL and NPDES RGP Effluent Limitation of 1.0 ug/L. The detection of pentachlorophenol was localized to a groundwater sample in HA15-5(OW). Recent sampling at HA15-4(OW), which is located 98 ft northeast of HA15-5(OW), did not detect any pentachlorophenol in groundwater. As a consequence, the geographic distribution is limited.
- **As discussed further herein, planned onsite treatment of dewatering effluent includes activated carbon and ion exchange resin treatment which will remove the pentachlorophenol and iron from the effluent prior to discharge. The planned treatment will have the added benefit of removing the trace detected level of PFAS, which is already below the proposed MCP GW-1 standard.**

Soil quality results indicated:

- Only 3 soil samples out of 63 exhibited concentrations above MCP RCS-1 Reportable Concentrations, and all these detections are exempt from reporting under the MCP, as described further below. No MCP regulatory compliance is required relative to soil.
- One soil sample exhibited benzo(a)pyrene at 2.2 mg/kg which is above the MCP RCS-1 concentration of 2 mg/kg. Ba(P) was not detected above RCS-1 in the other 62 samples analyzed at the site. The soil sample was submitted for microscopy analysis and the report indicates the presence of asphalt and tar (tar is the binder in asphalt) in the sample. This condition is exempt from reporting to MassDEP in accordance with 310 CMR 40.0317(12), which does not require reporting if the hazardous material is emanating from the asphalt binder in bituminous pavement.
- Two soil samples exhibited total petroleum hydrocarbons (TPH) at 1,030 mg/kg and 1,400 mg/kg, which are above the MCP RCS-1 concentration of 1,000 mg/kg. The concentrations of EPH and VPH aliphatic and aromatic fractions in these samples are below RCS-1. In accordance with 310 CMR 40.0360(2) this condition is also exempt from reporting under the MCP: *"Notification shall not be required for sites solely on the basis of a measurement of TPH equal to or greater than an applicable Reportable Concentration if data exists demonstrating that concentrations of the Aliphatic and Aromatic Hydrocarbon Fractions comprising the TPH are less than the applicable Reportable Concentrations established in 310 CMR 40.1600."*

Proposed Support of Excavation

The excavation for the proposed building will extend to approximately 20 feet below existing site grade (16 to 14 ft below groundwater table) and will include the excavation of the fill soil, organics where present, and the underlying glaciofluvial sand layer. The bottom of the excavation will be within the glacial till soil above the bedrock surface as shown in Figure 4 above.

Options for support of excavation (SOE) are limited by the frequent presence of cobbles and boulders in the glacially-deposited soils at this site:

- Steel sheeting is not a feasible option since the cobbles and boulders would obstruct the sheeting from being vibrated or driven into place.

- The cobbles and boulders pose a similar obstacle to installation of a soil mix wall.
- Earth support consisting of a secant pile wall or slurry wall is not a feasible option since it would not only incur an exorbitant premium cost it would also increase the duration of construction, and by extension, the duration of construction dewatering.

Earth support is planned to consist of cantilevered soldier piles and lagging.

Evaluation of Construction Dewatering Pumping Rate

Soil permeability at the site has been evaluated based on slug tests (rising head and falling head permeability tests) conducted in four wells in December 2018, with results summarized below:

Well ID	Ground Surface Elevation NAVD 88	Depth pvc to Water (feet)	Groundwater Elevation	Top of Screen bgs (feet)	Bottom of Screen bgs (feet)	Top of Screen Elevation (feet above MSL).	Bottom Of Screen Elevation (feet above MSL).	Rising Head Test (cm/sec)	Falling Head Test (cm/sec)	ave (cm/sec)
HA15-2	157.40	7.2	150.2	5	15	152	142	2E-03	1E-03	2E-03
HA15-4	157.1	4.2	152.9	5	15	152	142	6E-04	3E-04	4E-04
HA15-5	157.80	5.2	152.6	5	15	153	143	1E-03	6E-04	9E-04
HA15-3	157.3	4.7	152.6	5	15	152	142	1E-02	1E-02	1E-02

Table 1: Summary of Slug Test Results

Additionally, a groundwater pump test was conducted in March 2019 to support design of the dewatering system for the project. The test consisted of pumping water from a 3-in. diameter pumping well at a known rate and measuring the impacts to the groundwater table at nearby observation wells. Drawdown levels, well construction information, and pumping rates were used to estimate the hydraulic properties of the aquifer and evaluate the radial influence of a pumping well.

For each well, the drawdown and recovery data were plotted to match a solution using the Theis 1935 solution and the Cooper-Jacob 1946 solution. Results of the solutions for unconfined aquifers provided a range of transmissivity, storage coefficient, and hydraulic conductivity values. The geometric mean of the hydraulic conductivity measured by the pumping test was $3x10^{-2}$ cm/sec. The average transmissivity and storativity were estimated at approximately 18 cm^2/sec and $4x10^{-5}$, respectively. The pumping well was pumped at a rate of 20 gpm to achieve about 13 ft. of drawdown, which is close to the required drawdown needed for the temporary construction dewatering.

In order to dewater to a depth of 2 ft below the bottom of planned subgrade elevation to enable construction of the concrete mat foundation:

- Continuous pumping is necessary from a combination of deep wells that are proposed to be socketed into the bedrock, and well points that will draw the water down to a prescribed elevation. The Contractor's dewatering designer (Lockwood Remediation Technologies, LLC) has designed a system of ten (10) deep dewatering wells to an approximate depth of 30 to 40 ft bgs as shown in Figure 5 below.
- **The groundwater contribution into the excavation is estimated to start at approximately 100 gallons per minute (gpm) within the top 10 ft. of excavation and progressively increase to an expected average of 200 gpm, as the excavation progresses to the subgrade elevation.**

- Due to the variability of subsurface conditions, a safety factor has been applied to this anticipated 100-200 gpm pumping rate to account for periods of higher pumping if permeable sand seams are encountered and to accommodate water from precipitation events; for these reasons the NPDES NOI provided notice of a maximum flow rate during peak periods approaching 400 gpm.

Dewatering must be conducted to draw down hydrostatic pressure until such time that sufficient building weight is constructed to counteract the hydrostatic pressure and prevent the newly constructed building from floating upward. For this project, the structural engineer (Odeh Engineers, Inc.) has confirmed that dewatering will be discontinued after the ground floor concrete slab has been constructed. **Callahan Construction estimates that the duration of dewatering until this milestone is reached is approximately 8 to 12 months. We note that this is significantly less than the conservative duration of 18 months noted in the NPDES RGP NOI**.

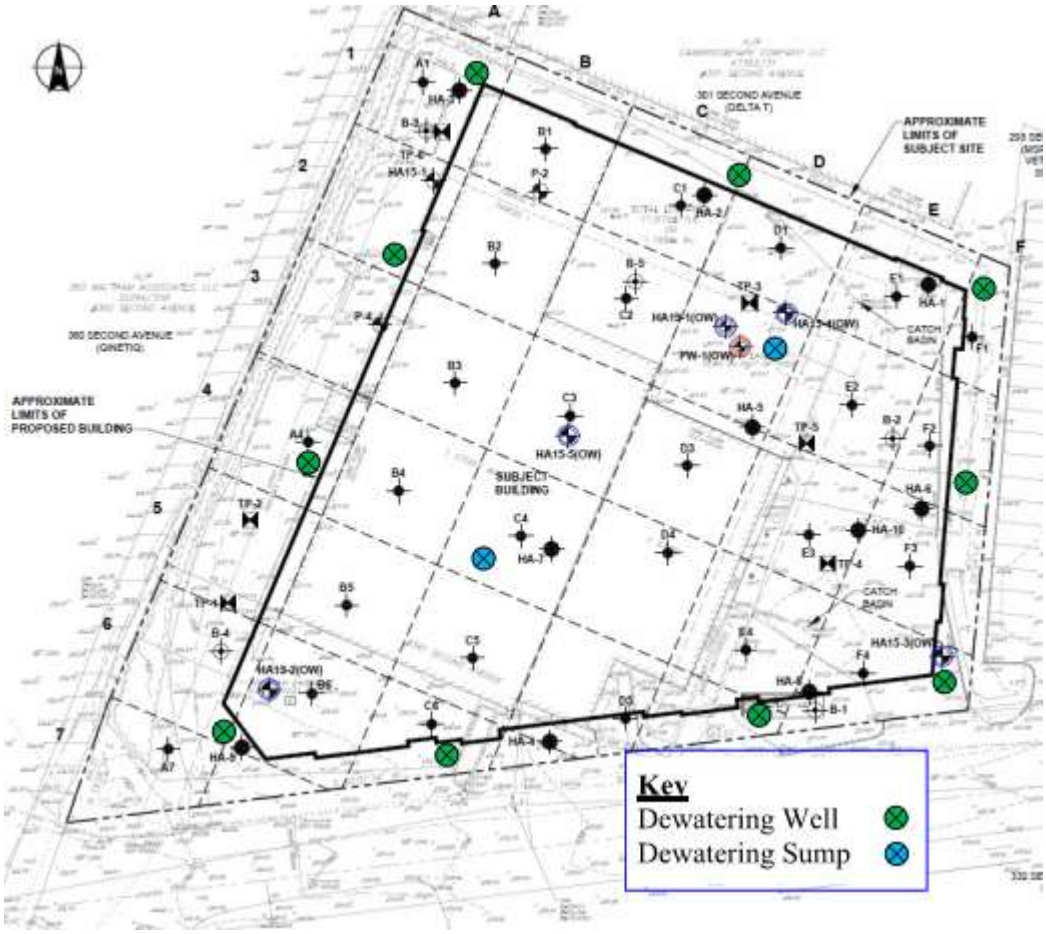


Figure 5: Proposed Dewatering System Layout (by Lockwood Remediation Technologies, LLC)

Responses to MassDEP Questions:

1. *Is on-site groundwater recharge feasible at a lower pumping rate or for portion of the discharge?*

Regarding feasibility of onsite recharge, please see our answer to question #2 below.

Regarding the pumping rate, the construction dewatering pumping estimates are based on the required drawdown necessary for achieving stable subgrade soils to pour concrete for foundations and building slabs. The hydraulic conductivity of the saturated zone was used to estimate the total flow into the proposed excavation. We prepared calculations showing the range of flows expected into the excavation. The calculations assume that the excavation acts like a very large well, the soils are uniform throughout the saturated zone, and the well is approximately 200 ft by 120 ft. On these assumptions, the drawdown required within this entire footprint is 17 ft (2 ft below subgrade). The calculations are attached as Attachment 1.

In reality, the excavation does not require the entire footprint to have 17 ft. of drawdown, and the soils are variable. Using a range of measured hydraulic conductivity values, the flow necessary to maintain drawdown to below the excavation is 100 to 250 gpm. **On average, the actual reasonable estimated flow is about 200 gpm. We note that this is materially less than the 250-450 gpm noted in the NPDES RGP NOI.** However, there is heterogeneity in the soils (cobbles and gravel layers) that could yield more water, so there is a safety factor applied to the 200 gpm. This safety factor also allows for the management of rainwater and snow melt. If there is a significant rain event while the Contractor is preparing subgrade, the Contractor and the dewatering system may need to manage up to 400 gpm for a short period of time. As a prudent measure and considering our commitment to antidegradation of the water resource, the construction dewatering treatment system is being designed to manage up to 400 gpm, even if the pumping rate will be much less during most of its operation.

2. *Can a portion of the discharge be infiltrated, and could you provide supporting information on the soil condition to support any claim of the volume that can (or cannot) infiltrate?*

We have discussed with MassDEP that onsite recharge is generally infeasible at this site. However, our hydrogeologist and engineering teams have been able to develop a plan that will allow for limited on-site recharge, discussed below, after a discussion of the broader issues associated with managing all the discharge through recharge.

As can be seen on Figures 2, 3 and 5 above, considering the location and size of the excavation and the necessary dewatering wells located around the perimeter of the excavation, the only potential site area for recharge is along the west side of the site within the area proposed for future stormwater infiltration that will be the construction laydown area.

If sufficient land area were available, the process of determining the capacity of the soils to infiltrate would be conducted by evaluating the soil conditions and the static groundwater elevations. At a flow rate of 200 gpm, the total daily flow is 288,000 gallons per day. In order to minimize mounding of groundwater above the groundwater table, the site should maintain a loading rate of less than 3 gpd/square ft. This would result in the need for an infiltration area of approximately 96,000 square feet in area, or larger than the entire site area. As a consequence, infiltration of the daily flow is not feasible.

We also evaluated another option for groundwater recharge, injection of treated water into the bedrock formation. However, based on published values and our experience at nearby sites in the Waltham area, the bedrock hydraulic conductivity is relatively low; it would be difficult to inject much more than 0.5 to 1 gpm per well, and to minimize well interference, the wells would need to be spaced at least 20 ft apart. This may only allow for the injection of a total of about 10 gpm onsite, which is a very small portion of the total flow necessary to dewater the site. As a consequence, injection into bedrock wells is infeasible in light of the high cost and complicated logistics compared to the very small volume of additional benefit.

After reassessing all the options, the hydrogeologist and engineering teams have determined that limited infiltration is feasible. As a consequence, we have **made plans to install the permanent stormwater infiltration gallery (shown on Figure 2) prior to the building excavation, in order to allow for the infiltration system to be used to recharge a portion of the dewatering effluent during construction.** This sequencing had not previously been planned since the location of the infiltration gallery is at the main entrance to the construction site and is a necessary construction staging area; special precautions will be necessary above the newly constructed infiltration gallery to protect it from damage by the loads of heavy construction cranes and other equipment during construction.

Based on the calculations provided as Attachment 2 to this letter, we estimate that approximately 20 to 25 gpm of dewatering effluent can be recharged using this infiltration gallery.

In addition, the new construction sequencing plan (construction of site stormwater management prior to building construction) has the added benefit of further reducing offsite discharge of dewatering effluent. Dewatering effluent pumped during this utility construction will be recharged onsite within the footprint of the proposed future building, reducing both the duration and total volume of discharge offsite.

3. *At what discharge flow rate or volume would the sewer system allow the connection? Will the sewer system be able to accommodate the volume at a lower rate or a portion of the discharge?*

There is no rate or volume of groundwater discharge that the City would allow to their municipal sewer system. The City of Waltham is under a MassDEP Amended Consent Order (ACO) dated February 22, 2010.

Per order #8 of the ACO "…*the City shall not… allow an increase in flow to any sewer… if the existing discharge would result in the sanitary waste design flow component for the … downstream sewer owned and/or operated by the City of Waltham to be exceeded*". Additionally, the ACO Order #8 specifically notes *"a prohibition on stormwater or groundwater connections."*

4. *Can some of the discharge be held on-site (e.g., in a tank) or be trucked off-site to reduce the volume discharged to the wetland?*

A typical dewatering frac tank holds up to 21,000 gallons of water and is typically about 45 ft long by 8 ft wide. At a pumping rate of 200 gpm, the site will produce at least 288,000 gallons per day, enough to fill

14 frac tanks per day. Considering that dewatering is necessary to be conducted continuously for 8 to 12 months, it is not feasible to store the pumped dewatering effluent onsite.

On a recent project, Haley & Aldrich, Inc. and Callahan Construction obtained a 2019 quote from Globalcycle, Inc., a fully permitted industrial/ commercial wastewater treatment and recycling plant located in Taunton, Massachusetts. Globalcycle removes water from frac tanks at the site in 9,000-gal tanker trucks. Based on the anticipated pumping rate at the subject site, 32 tanker trucks (one trip every 45 minutes) would be required around the clock daily, or more than 7,680 round trips over the duration of the project, which would have a detrimental effect on the environment and on the neighborhood. In addition, the cost for offsite trucking, treatment and discharge of dewatering effluent is $0.33 to $0.37 per gallon, which would be approximately $100,000 per day, or $24 million to $36 million over the duration of construction dewatering. It is not feasible to truck the dewatering effluent offsite.

5. *Would it be possible to combine the above multiple alternatives to avoid surface water discharge or significantly reduce the volume that will be discharged to the wetland? Please provide detailed descriptions.*

As discussed above, we estimate that the typical flow rate will be 100 to 250 gpm, or much less than the peak flow rate of 400 gpm. We propose to further reduce this flow rate by recharging dewatering effluent during the early utility installation phase of the project, and recharging approximately 20-25 gpm of dewatering effluent (10-20% of the average expected flow) onsite during mass excavation utilizing the permanent stormwater management system. Additionally, the contractor has estimated that dewatering effluent discharge can be discontinued after approximately 8 to 12 months, much earlier than the 18 months estimated in the NPDES RGP NOI.

6. *Could you provide hydrology of groundwater flow in this area and whether the hydraulic gradient of the groundwater at the site is flowing to the Stony Brook Reservoir and/or its tributaries?*

The site is located within the Stony Brook watershed. Based on groundwater elevations measured within on-site observation wells, the predominant direction of groundwater flow is toward the south and southwest. Groundwater flow is coincident with general site topography, and to some extent is regionally controlled by the bedrock elevations in the area. Bear Hill located south of the site is a rock-controlled hill, and to the east there are rock outcrops along Route 128. These regional features result in the groundwater flowing along the bedrock valley within the permeable glacial deposits. Surface water and groundwater flow from the site is toward wetlands and ponds located south of the site that connect into Hobbs Brook that discharges into Stony Brook near Church Street and North Avenue (Rte 117) intersection.

Dewatering effluent discharge at the site will also flow toward the tributaries of the Stony Brook Reservoir, as shown in Figure 6 below.

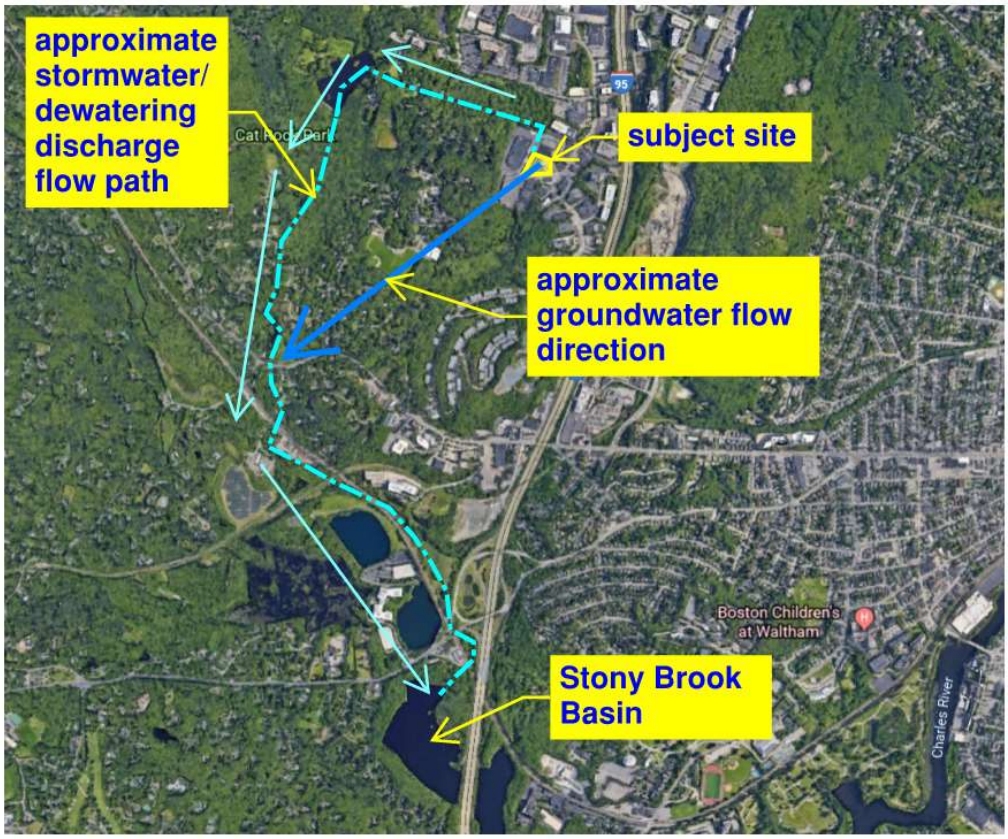


Figure 6: Groundwater and dewatering discharge flow paths

7. *The NOI indicated the site is contaminated with VOCs and SVOCs or believed present. Please provide information on the geographic extent of the VOCs and SVOCs contamination in the groundwater. Please address whether the treatment system will be able to remove all the VOC and SVOC contaminates and whether the treatment will enhance or maintain the water quality in the ORW.*

We are providing the following bullet points for context, to address the first part of question 7, and to respond to certain allegations in the CRWA letter. After the bullet points is a discussion of how the treatment system and the project enhance and maintain water quality in the ORW.

- Recognizing that the NOI reflected that VOCs were present or believed to be present in at the site, this box was checked as a conservative measure and included consideration of soil testing conducted at the site. No VOCs were identified in groundwater, and we do not believe VOCs are present in groundwater. A very low concentration of benzene was detected at 0.001 mg/kg (three orders of magnitude lower than the MCP RCS-1 concentration of 2 mg/kg) in 1 out of 63 soil samples, and a very low concentration of cis-1,2-dichloroethylene was detected at 0.0026 mg/kg (an order of magnitude below the MCP RCS-1 concentration of 0.01 mg/kg) in 1 out of 63 soil samples. Additionally, a very low concentration of acetone was detected in soil samples;

acetone is a common laboratory contaminant and its presence in the soil results is attributed to residual effects of the laboratory analysis, and not to a release at the site.

- The only SVOC identified in groundwater was pentachlorophenol, at a concentration of 6.5 ug/L, compared to an MCP Reportable Concentration of 200 ug/L, and an MCL and NPDES RGP Effluent Limitation of 1.0 ug/L. While Hobbs Pond was ND for pentachlorophenol, the planned activated carbon and ion exchange resin treatment will remove the pentachlorophenol from the effluent prior to discharge.
- The detection of pentachlorophenol was localized to a groundwater sample in HA15-5(OW). Recent sampling at HA15-4(OW), which is located 98 ft northeast of HA15-5(OW), did not detect any pentachlorophenol in groundwater. As a consequence, the geographic distribution is limited.
- Several metals (iron, lead, nickel, arsenic and copper) and ammonia are above the concentrations currently existing in Hobbs Pond. Of these, only iron, a common naturally occurring metal, is above the drinking water Maximum Contaminant Level (MCL), Secondary MCL, or Office of Research & Standards Guideline (ORSG) concentration. Just as with pentachlorophenol, the activated carbon and ion exchange resin treatment will remove the metals and ammonia prior to discharge. Consequently, there will be no added concentration load for the public water supply from this effluent discharge.
- Because we did not identify a release or any specific source for any detected contaminants, "source minimization" cannot be employed here. Notably, iron and arsenic appear to be naturally occurring.

Regarding maintenance or enhancement of water quality, the treatment system will enhance or maintain the water quality in the wetland and Hobbs Pond in two very important ways. First, it will treat the collected groundwater so that any effluent discharge will not have any contaminants above existing water quality standards or permit standards. Second and equally important, the effluent will be cleaner than the currently existing water in the wetland, which will create a dilutive effect and enhance the existing overall water quality in the outstanding water resources. Quite simply, the treatment and discharge have the express purpose and intent to maintain or enhance the Stony Brook Reservoir and its tributaries for their designated use as a Public Water Supply. Indeed, this treatment system and companion effluent discharge are expressly designed to maintain or improve water quality in the outstanding water resources, and by design, no burdens will be placed on downstream users.[1] An adoption of the narrow reading of 314 CMR 4.00 suggested by the CRWA would result in unintended and negative consequences to water resources in the Commonwealth.

Although you asked about the treatment system, which we have answered above, it is also meaningful to look at the overall project. The completed project expressly enhances the outstanding water resources, including the Stony Brook Reservoir and its tributaries, by removing pathways for uncontrolled contaminants to enter the outstanding water resources. This is by express design. Currently, stormwater is not controlled, and the uncontrolled runoff from asphalt, roofing, and general flow over the property makes its way to the water resources. The new stormwater system will manage

[1] At the direction of MassDEP, our NOI did not focus on the express purpose and intent language in 314 CMR 4.00. We realize that your questions did not focus on the language either. Nevertheless, we note that the CRWA suggests in its comment letter that that express purpose and intent language cannot be met here. We disagree. As set forth in the text above, the discharge here is expressly and intentionally designed to maintain or enhance water quality in the outstanding water resources.

and treat stormwater, which will be of significant benefit to the wetland and Pond. The combination of maintenance and enhancement from the discharges of clean effluent and the control of stormwater resulting from the redevelopment the Site serve to expressly and intentionally protect, preserve, and enhance the outstanding water resources.

PFAS Testing Requested by City of Cambridge

In response to the City of Cambridge public comments, on 30 November 2019 Haley & Aldrich collected a groundwater sample from well HA15-4(OW) at the site, and a surface water sample from Hobbs Pond, and submitted these samples for analysis for PFAS. Results are summarized on the attached Table II and indicate:

- Total PFAS in groundwater at the site, detected at 17.0 ng/L is below the 2019 proposed MCP GW-1 standard of 20 ng/L.
- Total PFAS in groundwater at the site is less than the concentration detected in Hobbs Pond, 19.4 ng/L.

Although the PFAS in groundwater at the site is already below the proposed MCP GW-1 standard which is protective of drinking water quality, the planned dewatering system activated carbon and ion exchange treatment will have the added benefit of removing PFAS from the dewatering discharge. Consequently, the proposed dewatering treatment will enhance the outstanding water resources.

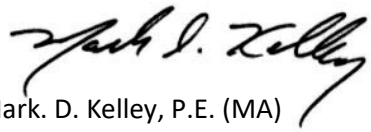
Closure

We sincerely appreciate MassDEP's consideration of our application, and the time your team has taken to speak with us while we were preparing the NPDES RGP application and over the past several weeks following receipt of public comments. We reiterate our commitment to antidegradation of the water resource and emphasize our intent to conduct and maintain robust onsite dewatering treatment in order to fully comply with the NPDES permit requirements for regular monitoring, testing, and reporting of influent and effluent results.

We are more than happy to answer any additional questions you may have.

Sincerely yours,
HALEY & ALDRICH, INC.

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



Mark. D. Kelley, P.E. (MA)
Senior Hydrogeologist

Michael J. Weaver, P.E. (MA)
Senior Associate

Table II- Summary of Groundwater and Surface Water Analytical Results
Attachment 1 – Construction Dewatering Estimate
Attachment 2 – Construction Dewatering Recharge Calculations

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TABLE II
SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
341 SECOND AVENUE
WALTHAM, MA
FILE NO. 132689-002

						SITE GROUNDWATER			RECEIVING WATER BODY		QUALITY CONTROL	
Location Name	MCP Reportable Concentration	MCP 2019 Proposed	Maximum Contaminant	Secondary Maximum Contaminant	NPDES Site Specfic RGP Effluent	HA15-5	HA15-4	HA15-4	Hobb's Pond	Hobb's Pond		
Sample Name	RCGW-2	GW-1	Level	Level	Limits	HA15-5	HA15-4 (OW)	HA15-4(OW)	2019-0805-SW	HOBBS POND	FIELD BLANK	EQUIPMENT BLANK
Sample Date	2014					03/25/2019	10/30/2019	10/30/2019	08/05/2019	10/30/2019	10/30/2019	10/30/2019
Lab Sample ID						L1911827-01	L1951386-01	L1951384-01	L1934877-01	L1951389-01	L1951389-02	L1951389-03
Volatile Organic Compounds (ug/L)												
1,1,1-Trichloroethane	4000	NA	200	NA	200	ND (2)	-	-	-	-	-	-
1,1,2-Trichloroethane	900	NA	5	NA	5	ND (1.5)	-	-	-	-	-	-
1,1-Dichloroethane	2000	NA	NA	NA	70	ND (1.5)	-	-	-	-	-	-
1,1-Dichloroethene	80	NA	7	NA	3.2	ND (1)	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene Dibromide)	2	NA	0.05	NA	0.05	ND (0.01)	-	-	-	-	-	-
1,2-Dichlorobenzene	2000	NA	600	NA	600	ND (5)	-	-	-	-	-	-
1,2-Dichloroethane	5	NA	5	NA	5	ND (1.5)	-	-	-	-	-	-
1,3-Dichlorobenzene	6000	NA	NA	NA	320	ND (5)	-	-	-	-	-	-
1,4-Dichlorobenzene	60	NA	75	NA	5	ND (5)	-	-	-	-	-	-
Acetone	50000	NA	NA	NA	7970	ND (10)	-	-	-	-	-	-
Benzene	1000	NA	5	NA	5	ND (1)	-	-	-	-	-	-
Carbon tetrachloride	2	NA	5	NA	4.4	ND (1)	-	-	-	-	-	-
cis-1,2-Dichloroethene	20	NA	70	NA	70	ND (1)	-	-	-	-	-	-
Ethylbenzene	5000	NA	700	NA	100	ND (1)	-	-	-	-	-	-
Methyl Tert Butyl Ether	5000	NA	NA	NA	70	ND (10)	-	-	-	-	-	-
Methylene chloride	2000	NA	5	NA	4.6	ND (1)	-	-	-	-	-	-
Tert-Amyl Methyl Ether (TAME)	NA	NA	NA	NA	90	ND (20)	-	-	-	-	-	-
Tert-Butyl Alcohol (tert-Butanol)	NA	NA	NA	NA	120	ND (100)	-	-	-	-	-	-
Tetrachloroethene	50	NA	5	NA	5	ND (1)	-	-	-	-	-	-
Toluene	40000	NA	1000	NA	100	ND (1)	-	-	-	-	-	-
Trichloroethene	5	NA	5	NA	5	ND (1)	-	-	-	-	-	-
Vinyl chloride	2	NA	2	NA	2	ND (1)	-	-	-	-	-	-
Xylene (total)	3000	NA	10000	NA	100	ND (1)	-	-	-	-	-	-
SUM of BTEX Compounds	NA	NA	NA	NA	100	ND	-	-	-	-	-	-
SUM of VOCs	NA	NA	NA	NA	100	ND	-	-	-	-	-	-
Volatile Organic Compounds SIM (ug/L)												
1,4-Dioxane	6000	NA	NA	NA	200	ND (50)	-	-	-	-	-	-
Semi-Volatile Organic Compounds (ug/L)												
bis(2-Ethylhexyl)phthalate	50000	NA	6	NA	101	ND (2.2)	-	-	-	-	-	-
Butyl benzylphthalate	10000	NA	NA	NA	NA	ND (5)	-	-	-	-	-	-
Diethyl phthalate	9000	NA	NA	NA	NA	ND (5)	-	-	-	-	-	-
Dimethyl phthalate	50000	NA	NA	NA	NA	ND (5)	-	-	-	-	-	-
Di-n-butylphthalate	5000	NA	NA	NA	NA	ND (5)	-	-	-	-	-	-
Di-n-octyl phthalate	100000	NA	NA	NA	NA	ND (5)	-	-	-	-	-	-
Total Phthalates	NA	NA	NA	NA	190	ND	-	-	-	-	-	-
Semi-Volatile Organic Compounds (SIM) (ug/L)												
Acenaphthene	6000	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Acenaphthylene	40	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Anthracene	30	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Fluorene	40	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Naphthalene	700	NA	NA	NA	20	ND (0.1)	-	-	-	-	-	-
Phenanthrene	10000	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Sum PAH (low molecular weight)	NA	NA	NA	NA	100	ND	-	-	-	-	-	-

TABLE II
SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
341 SECOND AVENUE
WALTHAM, MA
FILE NO. 132689-002

						SITE GROUNDWATER			RECEIVING WATER BODY		QUALITY CONTROL	
Location Name	MCP Reportable Concentration RCGW-2 2014	MCP 2019 Proposed GW-1	Maximum Contaminant Level	Secondary Maximum Contaminant Level	NPDES Site Specfic RGP Effluent Limits	HA15-5	HA15-4	HA15-4	Hobb's Pond	Hobb's Pond		
Sample Name						HA15-5	HA15-4 (OW)	HA15-4(OW)	2019-0805-SW	HOBBS POND	FIELD BLANK	EQUIPMENT BLANK
Sample Date						03/25/2019	10/30/2019	10/30/2019	08/05/2019	10/30/2019	10/30/2019	10/30/2019
Lab Sample ID						L1911827-01	L1951386-01	L1951384-01	L1934877-01	L1951389-01	L1951389-02	L1951389-03
Benzo(a)anthracene	1000	NA	NA	NA	1	ND (0.1)	-	-	-	-	-	-
Benzo(a)pyrene	500	NA	0.2	NA	1	ND (0.1)	-	-	-	-	-	-
Benzo(b)fluoranthene	400	NA	NA	NA	1	ND (0.1)	-	-	-	-	-	-
Benzo(g,h,i)perylene	20	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Benzo(k)fluoranthene	100	NA	NA	NA	1	ND (0.1)	-	-	-	-	-	-
Chrysene	70	NA	NA	NA	1	ND (0.1)	-	-	-	-	-	-
Dibenz(a,h)anthracene	40	NA	NA	NA	1	ND (0.1)	-	-	-	-	-	-
Fluoranthene	200	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	100	NA	NA	NA	1	ND (0.1)	-	-	-	-	-	-
Pyrene	20	NA	NA	NA	100	ND (0.1)	-	-	-	-	-	-
Sum PAH (high molecular weight)	NA	NA	NA	NA	1	ND	-	-	-	-	-	-
Pentachlorophenol	200	NA	1	NA	1	**6.5**	ND (1)	-	-	ND (1)	-	-
SUM of Semi-Volatile Organic Compounds (SIM)	9000	NA	NA	NA	90	6.5	ND	-	-	ND	-	-
Total Petroleum Hydrocarbons (ug/L)												
Petroleum hydrocarbons	5000	NA	NA	NA	0.005	ND (4400)	-	-	-	-	-	-
Inorganic Compounds, Total (ug/L)												
Antimony, Total	8000	NA	6	NA	206	ND (4)	-	-	ND (4)	-	-	-
Arsenic, Total	900	NA	10	NA	104	1.57	-	-	ND (1)	-	-	-
Cadmium, Total	4	NA	5	NA	10.2	ND (0.2)	-	-	ND (0.2)	-	-	-
Chromium, Total	300	NA	100	NA	NA	ND (1)	-	-	ND (1)	-	-	-
Chromium III (Trivalent)	600	NA	NA	NA	323	ND (10)	-	-	ND (10)	-	-	-
Chromium VI (Hexavalent), Dissolved	300	NA	NA	NA	323	ND (10)	-	-	ND (10)	-	-	-
Copper, Total	100000	NA	1300	1000	242	3.21	-	-	1.03	-	-	-
Cyanide, Total	30	NA	200	NA	0.178	ND (5)	-	-	-	-	-	-
Iron, Total	NA	NA	NA	300	1000	**11000**	-	-	402	-	-	-
Lead, Total	10	NA	15	NA	1.32	1.54	-	-	ND (1)	-	-	-
Mercury, Total	20	NA	2	NA	0.739	ND (0.2)	-	-	ND (0.2)	-	-	-
Nickel, Total	200	NA	NA	NA	1450	2.75	-	-	ND (2)	-	-	-
Selenium, Total	100	NA	50	NA	0.178	ND (5)	-	-	ND (5)	-	-	-
Silver, Total	7	NA	NA	100	35.1	ND (0.4)	-	-	ND (0.4)	-	-	-
Zinc, Total	900	NA	NA	5000	420	ND (10)	-	-	11.99	-	-	-

TABLE II
SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
341 SECOND AVENUE
WALTHAM, MA
FILE NO. 132689-002

						SITE GROUNDWATER			RECEIVING WATER BODY		QUALITY CONTROL	
Location Name	MCP Reportable Concentration RCGW-2 2014	MCP 2019 Proposed GW-1	Maximum Contaminant Level	Secondary Maximum Contaminant Level	NPDES Site Specfic RGP Effluent Limits	HA15-5	HA15-4	HA15-4	Hobb's Pond	Hobb's Pond		
Sample Name						HA15-5	HA15-4 (OW)	HA15-4(OW)	2019-0805-SW	HOBBS POND	FIELD BLANK	EQUIPMENT BLANK
Sample Date						03/25/2019	10/30/2019	10/30/2019	08/05/2019	10/30/2019	10/30/2019	10/30/2019
Lab Sample ID						L1911827-01	L1951386-01	L1951384-01	L1934877-01	L1951389-01	L1951389-02	L1951389-03
Pesticides and PCBs (ug/L)												
Aroclor-1016 (PCB-1016)	5	NA	NA	NA	0.000064	ND (0.25)	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	5	NA	NA	NA	0.000064	ND (0.25)	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	5	NA	NA	NA	0.000064	ND (0.25)	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	5	NA	NA	NA	0.000064	ND (0.25)	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	5	NA	NA	NA	0.000064	ND (0.25)	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	5	NA	NA	NA	0.000064	ND (0.25)	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	5	NA	NA	NA	0.000064	ND (0.2)	-	-	-	-	-	-
SUM of PCBs	5	NA	NA	NA	0.000064	ND	-	-	-	-	-	-
Perfluorinated Alkyl Acids (ng/L)												
PFHpA	NA	20	NA	NA	NA	-	-	2.61	-	2.74	ND(1.83)	ND(1.86)
PFHxS	NA	20	NA	NA	NA	-	-	ND(1.84)	-	ND(1.83)	ND(1.83)	ND(1.86)
PFOA	NA	20	NA	NA	NA	-	-	7.44	-	9.11	ND(1.83)	ND(1.86)
PFNA	NA	20	NA	NA	NA	-	-	ND(1.84)	-	ND(1.83)	ND(1.83)	ND(1.86)
PFOS	NA	20	NA	NA	NA	-	-	6.95	-	7.54	ND(1.83)	ND(1.86)
PFDA	NA	20	NA	NA	NA	-	-	ND(1.84)	-	ND(1.83)	ND(1.83)	ND(1.86)
SUM	NA	20	NA	NA	NA	-	-	17.0	-	19.4	ND	ND
Other (pH units)												
pH (lab), Total	NA	NA	NA	8.5	NA	-	-	-	7.1	-	-	-
Ammonia (ug/L)	NA	NA	NA	NA	NA	1420	-	-	144	-	-	-
Hardness, Total	NA	NA	NA	NA	NA	50100	-	-	76200	-	-	-
Chloride (ug/L)	NA	NA	NA	250000	NA	35200	-	-	-	-	-	-
Chlorine, residual (ug/L)	NA	NA	NA	NA	11	ND (20)	-	-	-	-	-	-
Total phenols (ug/L)	NA	NA	NA	NA	1080	ND (30)	-	-	-	-	-	-
Total Suspended Solids (TSS) (ug/L)	NA	NA	NA	NA	30000	ND (5000)	-	-	-	-	-	-

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

- Volatile and Semi-Volatile Organic analytes detected in at least one SAMPLE are reported herein. For a complete list of analytes, see the laboratory data sheets.
- **BOLD** values indicate an exceedance of the NPDES Site-Specific RGP criteria.
- Temperature and pH were measured in the field on 25 March 2019.

CONSTRUCTION DEWATERING ESTIMATE
RADIAL SOURCE TO A SINK FOR UNCONFINED AQUIFERS (DRISCOLL, 1986)
341 SECOND AVENUE
WALTHAM, MASSACHUSETTS
132689-004

$$Q = \frac{k(H^2 - h^2)}{1055 \log R / r_e} \qquad h = \sqrt{H^2 - \frac{1055 Q \log R / r_e}{k}}$$

Q = flow, gpm
k = hydraulic conductivity, gpd/sq.ft.
H = saturated thickness before pumping, ft.
h = saturated thickness after pumping, ft.
R = radius of influence, ft. (based on Sichardt equation).
r_e = effective well radius.
r = radius within the cone of depression, ft.

kave= 3E-02 cm/sec

Seepage calculations, k = 4E-02 cm/sec. to 1E-02 cm/sec.

Area	Description	Q (gpm)	k (gpd/ft.^{2})	H (ft.)	h (ft.)	R (ft.)	r_e (ft.)	s (ft.)	Excavation Length (ft.)	Excavation Width (ft.)
1. K_{max}		260.0	8.47E+02	19	2	1107.4	87.40	17	200	120
2. Kave		205.7	6.36E+02	19	2	970.7	87.40	17	200	120
2. K_{min}		85.9	2.12E+02	19	2	597.4	87.40	17	200	120

NOTES:
R = radius estimated by Sichardt equation, plus re, as radius of influence will be from sides of excavation, rather than center.

HALEY ALDRICH	CALCULATIONS	File No.:	132689-004
		Sheet:	1 of 4
Client:	Alliance Residential Company NE	Date:	6-Nov-2019
Project:	341 Second Avenue, Wallthan, Massachusetts	Computed by:	MDK
Subject:	Construction Dewatering Recharge Calculations	Checked by:	JRK

PROBLEM STATEMENT & OBJECTIVE

Estimate the groundwater mound underneath a recharge system. Flow = 25 GPM

Approach

A recharge system has been proposed, and is modeled with the USGS Hantush spreadsheet model. The hydrogeologic conditions have been assessed with borings near the proposed recharge system.

The modeled mound should be less than the available unsaturated thickness for recharge.

ASSUMPTIONS

Recharge is available only into a fill unit and the underlying granular glacial deposits located above the dense glacial till. The fill and underlying sand has a thickness of approximately 15 ft (from boring logs).

Groundwater elevation:	153	ft
System bottom elevation:	156	ft
Fill bottom elevation:	153	ft
Avialble unsaturated thickness for recharge:	3	ft
Recharge duration:	24	hours
K of fill:	3.00E-03	cm/s
	8.5	ft/d
Specific yield of fill:	0.25	
System size:	120 x 20	ft
Area:	2400	sqft

CALCULATIONS

Infiltrate in 24 hours		4813	cu ft	
		36001.24	gallons	
flow rate		25	GPM	
Loading Rate	(Vol/Area)	2.1	ft	
	t=1 days	2.1	ft/d	
Time for Drawdown		0.2	days	Volume/k(area)

Summary of Mounding Calculations:

Estimate mounding at 72 hours, using USGS Hantush mouinding equation. The available soil for infiltration is from El. 16 to El. 5, which is the Granular Fill material (11 ft. thick layer of fill).

Results:

Predicted recharge head:	3.1	ft	
Predicted groundwater elevation under recharge at t = 3 day:	156.1	ft	The groundwater mound could reach a maximum of Elevation 156 before reaching the base of system. El 156.1>156 (Lower Flow)

HALEY ALDRICH	CALCULATIONS	File No.:	132689-004
		Sheet:	2 of 4
Client:	Alliance Residential Company NE	Date:	6-Nov-2019
Project:	341 Second Avenue, Wallthan, Massachusetts	Computed by:	MDK
Subject:	Construction Dewatering Recharge Calculations	Checked by:	JRK

PROBLEM STATEMENT & OBJECTIVE

Estimate the groundwater mound underneath a recharge system. Flow = 20 GPM

Approach

A recharge system has been proposed, and is modeled with the USGS Hantush spreadsheet model. The hydrogeologic conditions have been assessed with borings near the proposed recharge system.

The modeled mound should be less than the available unsaturated thickness for recharge.

ASSUMPTIONS

Recharge is available only into a fill unit and the underlying granular glacial deposits located above the dense glacial till. The fill and underlying sand has a thickness of approximately 15 ft (from boring logs).

Groundwater elevation:	153	ft
System bottom elevation:	156	ft
Fill bottom elevation:	153	ft
Avialble unsaturated thickness for recharge:	3	ft
Recharge duration:	24	hours
K of fill:	3.00E-03	cm/s
	8.5	ft/d
Specific yield of fill:	0.25	
System size:	120 x 20	ft
Area:	2400	sqft

CALCULATIONS

Infiltrate in 24 hours		3850	cu ft	
		28798	gallons	
flow rate		20	GPM	
Loading Rate	(Vol/Area)	1.6	ft	
	t=1 days	1.6	ft/d	
Time for Drawdown		0.2	days	Volume/k(area)

Summary of Mounding Calculations:

Estimate mounding at 72 hours, using USGS Hantush mouinding equation. The available soil for infiltration is from El. 16 to El. 5, which is the Granular Fill material (11 ft. thick layer of fill).

Results:

Predicted recharge head:	2.5	ft	
Predicted groundwater elevation under recharge at t = 3 day:	155.5	ft	The groundwater mound could reach a maximum of Elevation 156 before reaching the base of system. El 155.5< 156 (OK)

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
2.0200	*R*	**Recharge (infiltration) rate (feet/day)**
0.250	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
8.50	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
60.000	x	**1/2 length of basin (x direction, in feet)**
10.000	y	**1/2 width of basin (y direction, in feet)**
1.000	t	**duration of infiltration period (days)**
15.000	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

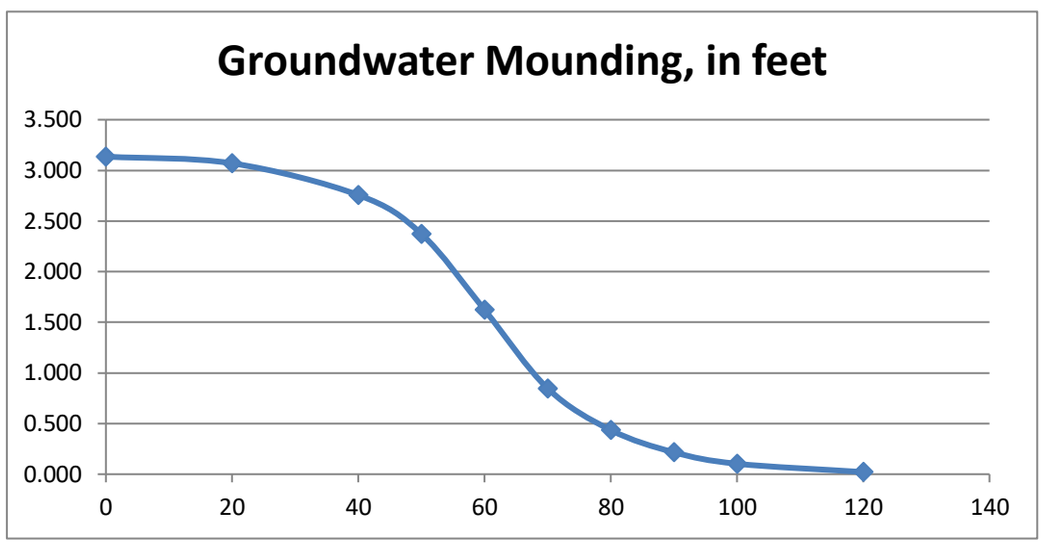
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

18.135	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
3.135	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
3.135	0
3.069	20
2.756	40
2.372	50
1.622	60
0.847	70
0.435	80
0.216	90
0.103	100
0.021	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
1.6100	*R*	**Recharge (infiltration) rate (feet/day)**
0.250	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
8.50	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
60.000	**x**	**1/2 length of basin (x direction, in feet)**
10.000	**y**	**1/2 width of basin (y direction, in feet)**
1.000	**t**	**duration of infiltration period (days)**
15.000	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

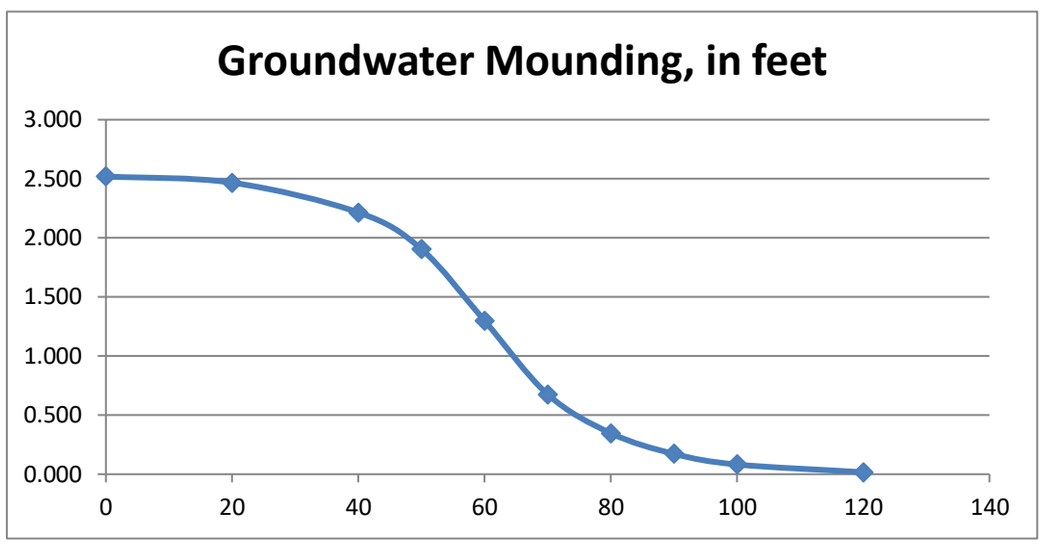
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

17.520	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
2.520	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
2.520	0
2.467	20
2.215	40
1.904	50
1.298	60
0.675	70
0.347	80
0.172	90
0.082	100
0.017	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

APPENDIX B

Copy of WM15 Transmittal Form

Enter your transmittal number → X284087 (Transmittal Number)

Your unique Transmittal Number can be accessed online:
http://www.mass.gov/eea/agencies/massdep/service/approvals/transmittal-form-for-payment.html

Massachusetts Department of Environmental Protection

Transmittal Form for Permit Application and Payment

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: MassDEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application. **Copy 2** must accompany your fee payment. **Copy 3** should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

MassDEP
P.O. Box 4062
Boston, MA
02211

*** Note:**
For BWSC Permits, enter the LSP.

A. Permit Information

1. Permit Code: 4 to 7 character code from permit instructions	2. Name of Permit Category
WM15	NPDES RGP

3. Type of Project or Activity: Construction dewatering associated with property redevelopment

B. Applicant Information – Firm or Individual

1. Name of Firm - Or, if party needing this approval is an individual enter name below: CRP/AR [Watch City] Venture, LLC

2. **Last Name** of Individual	3. **First Name** of Individual	4. MI
NA	NA	NA

5. Street Address: 184 High Street, Suite 401

6. City/Town	7. State	8. Zip Code	9. Telephone #	10. Ext. #
Boston	MA	02110	617-356-1000	NA

11. Contact Person	12. e-mail address
Michael Boujoulian	mboujoulian@allresco.com

C. Facility, Site or Individual Requiring Approval

1. Name of Facility, Site Or Individual: Proposed Broadstone Watch City

2. Street Address: 341 Second Avenue

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Waltham	MA	02324	508-279-0012	NA

8. DEP Facility Number (if Known)	9. Federal I.D. Number (if Known)	10. BWSC Tracking # (if Known)
NA	NA	NA

D. Application Prepared by (if different from Section B)*

1. Name of Firm Or Individual: Haley & Aldrich, Inc.

2. Address: 465 Medford Street, Suite 2200

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Boston	MA	02129	617-886-7400	NA

8. Contact Person	9. LSP Number (BWSC Permits only)
Katherine L. Dilawari, P.E., LSP	3659

E. Permit - Project Coordination

1. Is this project subject to MEPA review? ☐ yes ☒ no
If yes, enter the project's EOEA file number - assigned when an Environmental Notification Form is submitted to the MEPA unit: NA (EOEA File Number)

F. Amount Due

DEP Use Only

Permit No:

Rec'd Date:

Reviewer:

Special Provisions:

1. ☐ **Fee** Exempt (city, town or municipal housing authority)(state agency if fee is $100 or less).
There are no fee exemptions for BWSC permits, regardless of applicant status.
2. ☐ Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. ☐ Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. ☐ Homeowner (according to 310 CMR 4.02).

Check Number	Dollar Amount	Date
251243	$500.00	7/31/2019

APPENDIX C

Dilution Factor and Effluent Limit Calculations

341 Second Avenue Stream Stats Report

Region ID: MA
Workspace ID: MA20190614150320868000
Clicked Point (Latitude, Longitude): 42.38927, -71.26518
Time: 2019-06-14 11:03:41 -0400

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.0366	square miles
BSLDEM250	Mean basin slope computed from 1:250K DEM	4.423	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	-100000	square mile per mile
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0366	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	4.423	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	-100000	square mile per mile	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

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

Statistic	Value	Unit

Low-Flow Statistics Citations

Application Version: 4.3.1

HALEY & ALDRICH, INC.		**CALCULATIONS**	FILE NO.	132689-002	
			SHEET	1 of 1	
CLIENT	Alliance Residential Company New England		DATE	30-Jul-19	
PROJECT	341 Second Avenue, Waltham, MA		COMPUTED BY	EJC	
SUBJECT	Dilution Factor Calculations				

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

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

ASSUMPTIONS:
1. 7Q10 is 0 cfs (from StreamStats 4.0)
2. A conversion of 7.48 is used to convert cubic feet to gallons
3. A discharge flowrate of 400 gpm is assumed

CALCULATIONS:

7Q10 Low Flow Value (Q_S)

$$Q_S = \frac{0\ ft^3}{sec} \times \frac{7.48\ gallons}{ft^3} \times \frac{86{,}400\ sec}{day} \times \frac{1\ MG}{1{,}000{,}000\ gallons}$$

Q_S = 0 MGD

Discharge Flowrate (Q_D)

$$Q_D = \frac{400\ gallons}{min} \times \frac{1{,}440\ min}{day} \times \frac{1\ MG}{1{,}000{,}000\ gallons}$$

Q_D = 0.576 MGD

Dilution Factor (DF)

$$DF = \frac{Q_S + Q_D}{QD} = \frac{0\ MGD + 0.576\ MGD}{0.576\ MGD} = 1$$

CONCLUSION: The dilution factor for this project is calculated to be 1 based on the provided 7Q10 low flow value and discharge flowrate.

Christmas, Elizabeth

From: Wood, Jennifer (DEP) <jennifer.wood@state.ma.us>
Sent: Tuesday, July 02, 2019 5:08 PM
To: Christmas, Elizabeth
Cc: Vakalopoulos, Catherine (DEP)
Subject: RE: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation, 341 Second Avenue Waltham

CAUTION: External Email

Hi Elizabeth,

I can confirm that the 7Q10 value of 0 for the proposed discharge from 341 Second Avenue, Waltham to the nearby wetland is correct. You are also correct that the dilution factor for the proposed discharge is therefore 1. However, the wetland in question discharges into Hobbs Brook which discharges into Stony Brook and ultimately to Stony Brook Reservoir. As a result, Stony Brook is identified as MA72-26, a Class A/Outstanding Resource Water (ORW).

As you are aware, the RGP requires MassDEP authorization for discharge to an ORW. Authorization must be completed before EPA can look at the NOI and it is a time consuming process. Also, this office cannot guarantee positive results. Have you considered alternative disposal methods? Here is a link to the MassDEP Underground Injection Control (UIC) registration forms: https://www.mass.gov/service-details/underground-injection-control-uic-application-forms Alternatively, is there a nearby sewer system that would be amenable to this discharge or the possibility of trucking to such a system?

If you are interested in continuing with the RGP NOI, in order to meet the requirements of the Massachusetts Surface Water Quality Standards and the RGP, a "Determination to Issue Antidegredation Authorization to Discharge to an Outstanding Resource Water" must be drafted (with additional information beyond the NOI) and made available for public comment before it can be finalized.

Also, if this is not a *current* MCP site, you must apply to MassDEP alongside submittal of the NOI by following the instructions at: https://www.mass.gov/how-to/wm-15-npdes-general-permit-notice-of-intent. There is a $500 fee unless the applicant is fee-exempt (e.g. a municipality).

To assist you with filling out the NOI for coverage under the RGP, There are no approved TMDLs on this segment.

Please let me or Cathy (617-348-4026) know if you plan to go ahead with the RGP process so that we can provide more details.

Good luck!
Jennifer Wood
617-654-6536

From: Vakalopoulos, Catherine (DEP)
Sent: Tuesday, July 02, 2019 4:08 PM
To: Christmas, Elizabeth
Cc: Wood, Jennifer (DEP)
Subject: FW: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation, 341 Second Avenue Waltham

Hi Elizabeth,

Sorry for not being able to respond to you sooner. I have cc'd Jennifer and she will be able to help you.
Cathy

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

From: Christmas, Elizabeth [mailto:EChristmas@haleyaldrich.com]
Sent: Tuesday, June 25, 2019 4:29 PM
To: Vakalopoulos, Catherine (DEP)
Cc: Dilawari, Kate
Subject: NPDES RGP Application - 7Q10 and Dilution Factor Confirmation, 341 Second Avenue Waltham

Hi Cathy,

I am working on an RGP application, and I am trying to establish the 7 Day 10 Year (7Q10) low flow value for our project (located at 341 Second Avenue in Waltham). Based on our understanding, the discharge flows into a wetland that is part of the City of Waltham's stormwater management system, and then it eventually routes into a pond at Cat Rock Park (understood route shown on the attached Phase I Map). As we do not have an upstream location, I selected the wetland where the stormwater is routed as the point for delineating the watershed.

Based on the attached StreamStats report, my understanding is that our 7Q10 value is **0**, making our dilution factor **1**.

Can you please confirm if these values are appropriate for use for our project? Let me know if you have questions or require additional information.

Thank you,

Elizabeth Christmas, P.E. (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

Enter number values in green boxes below

Enter values in the units specified

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

Enter a dilution factor, if other than zero

1

Enter values in the units specified

50.1	C_d = Enter influent hardness in **mg/L** $CaCO_3$
76.2	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

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

7.1	pH in **Standard Units**
24	Temperature in **°C**
0.144	Ammonia in **mg/L**
76.2	Hardness in **mg/L** $CaCO_3$
0	Salinity in **ppt**
0	Antimony in **µg/L**
0	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
1.03	Copper in **µg/L**
402	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**
11.99	Zinc in **µg/L**

Enter **influent** concentrations in the units specified

0	TRC in **µg/L**
1.42	Ammonia in **mg/L**
0	Antimony in **µg/L**
1.57	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
3.21	Copper in **µg/L**
11000	Iron in **µg/L**
1.54	Lead in **µg/L**
0	Mercury in **µg/L**
2.75	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**
0	Cyanide in **µg/L**
0	Phenol in **µg/L**
0	Carbon Tetrachloride in **µg/L**
0	Tetrachloroethylene in **µg/L**
0	Total Phthalates in **µg/L**
0	Diethylhexylphthalate in **µg/L**
0	Benzo(a)anthracene in **µg/L**
0	Benzo(a)pyrene in **µg/L**
0	Benzo(b)fluoranthene in **µg/L**
0	Benzo(k)fluoranthene in **µg/L**
0	Chrysene in **µg/L**
0	Dibenzo(a,h)anthracene in **µg/L**
0	Indeno(1,2,3-cd)pyrene in **µg/L**
0	Methyl-tert butyl ether in **µg/L**

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

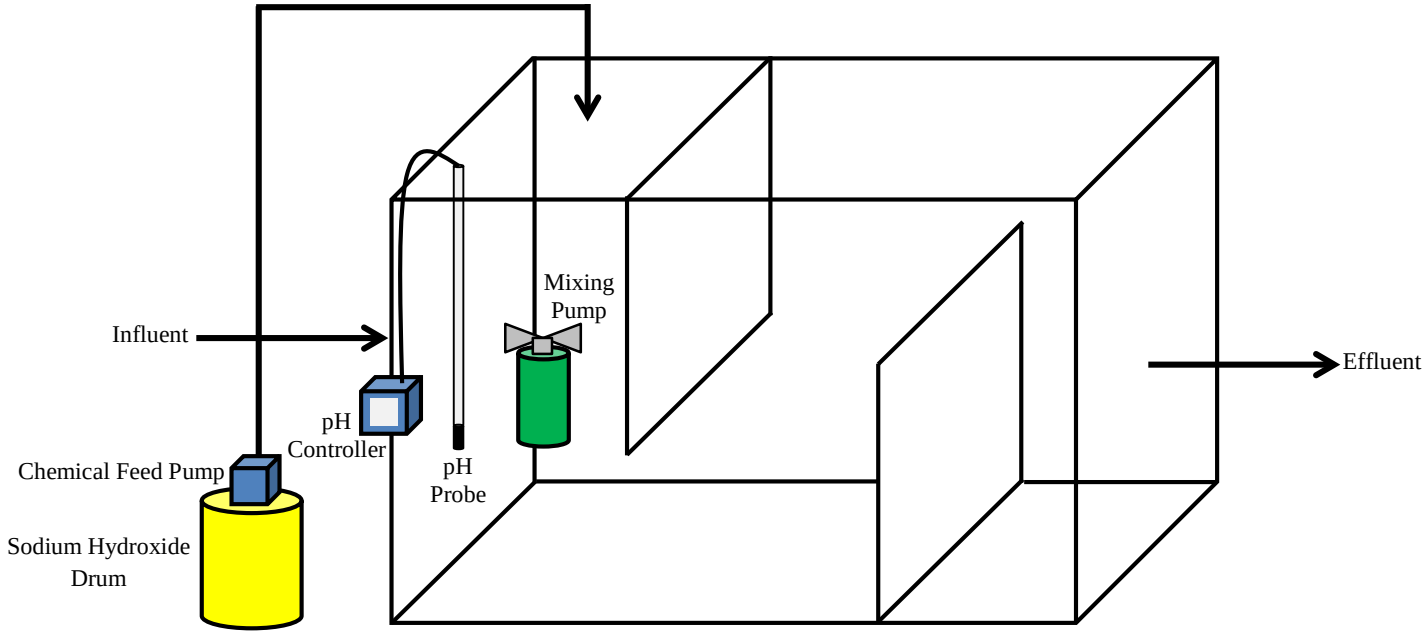
if >10 samples, may enter 95th percentile

Enter 0 if non-detect or testing not required

Dilution Factor	1.0					
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	**11**	µg/L	50	µg/L
Total Suspended Solids	**30**	mg/L	---			
Antimony	**206**	µg/L	640	µg/L		
Arsenic	**104**	µg/L	10	µg/L		
Cadmium	**10.2**	µg/L	0.1622	µg/L		
Chromium III	**323**	µg/L	48.9	µg/L		
Chromium VI	**323**	µg/L	11.4	µg/L		
Copper	**242**	µg/L	5.2	µg/L		
Iron	5000	µg/L	**1000**	µg/L		
Lead	160	µg/L	**1.32**	µg/L		
Mercury	**0.739**	µg/L	0.91	µg/L		
Nickel	**1450**	µg/L	29.1	µg/L		
Selenium	**235.8**	µg/L	5.0	µg/L		
Silver	**35.1**	µg/L	1.2	µg/L		
Zinc	**420**	µg/L	66.7	µg/L		
Cyanide	**178**	mg/L	5.2	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	300	µg/L		
C. Halogenated VOCs						
Carbon Tetrachloride	**4.4**	µg/L	1.6	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	3.3	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	2.2	µg/L		
Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---			
Benzo(a)anthracene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Benzo(a)pyrene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Benzo(b)fluoranthene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Benzo(k)fluoranthene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Chrysene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Indeno(1,2,3-cd)pyrene	**1.0**	µg/L	0.0038	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	20	µg/L		
tert-Butyl Alcohol	**120**	µg/L	---			
tert-Amyl Methyl Ether	**90**	µg/L	---			

APPENDIX D

Contractor's Dewatering Submittal



Notes:

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

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

Configuration of pH Adjustment System

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

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

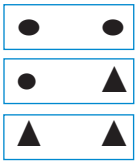
Choose from Hach's Broad Range of Digital and Analog Sensors

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	▲

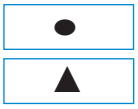
● = Digital ▲ = Analog

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



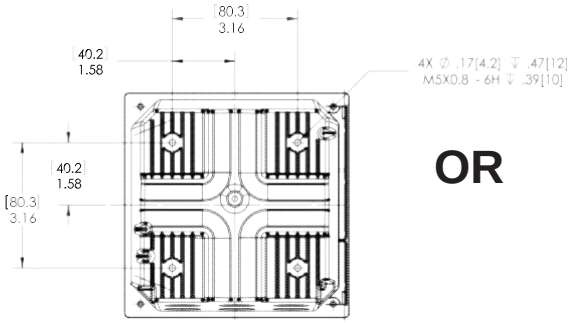
Specifications*

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.*

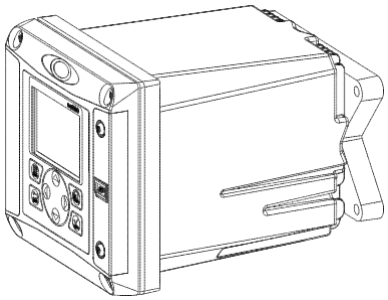
Dimensions

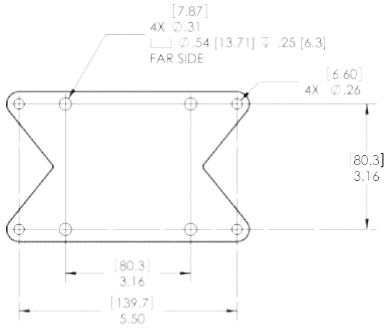
Surface Mounting Dimensions



Mounting Dimensions
(Rear View)

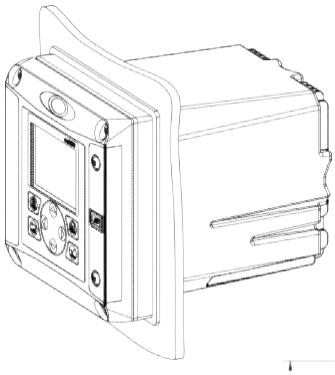
OR

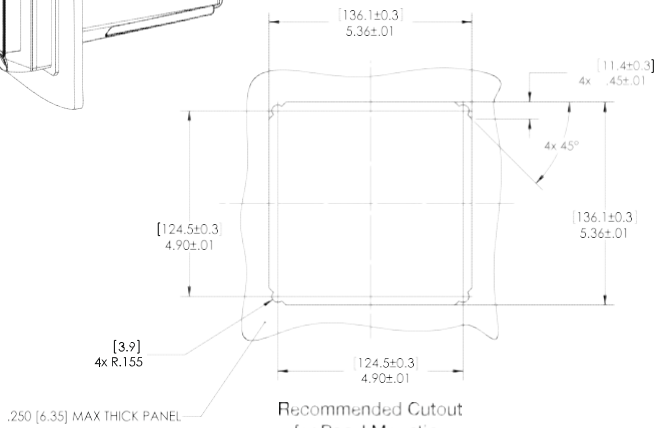




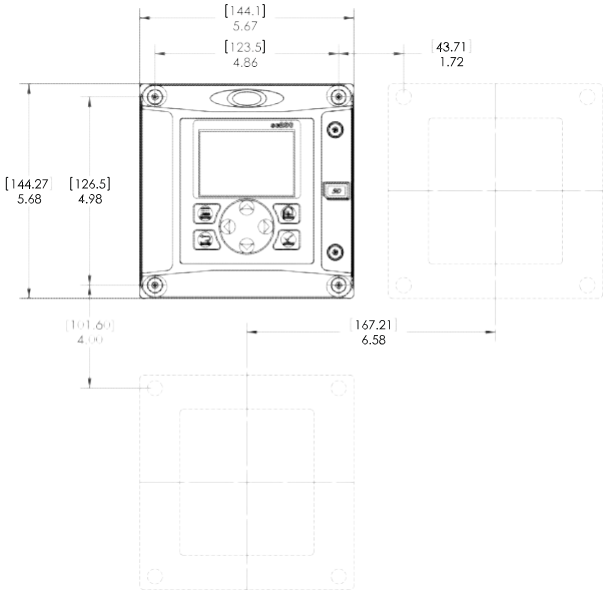
Bracket (supplied) for Surface Mounting
(Not compatible with Weather and Sun Shield
p/n 9220600 when surface mounting.)

Panel Mounting Dimensions



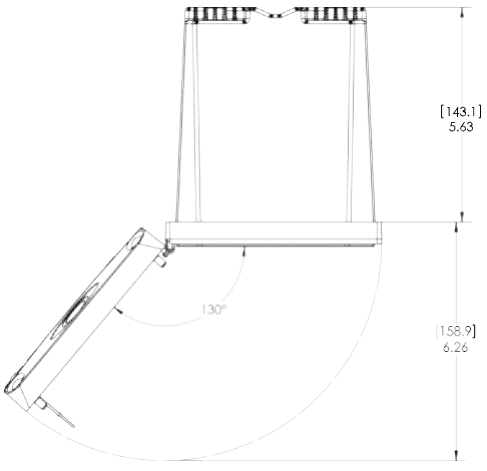


Recommended Cutout
for Panel Mounting

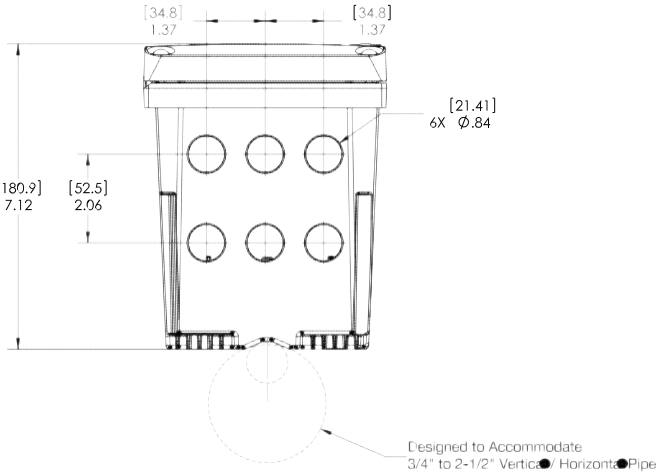


Minimum Spacing Dimensions
for Group Mounting

Top and Bottom Views

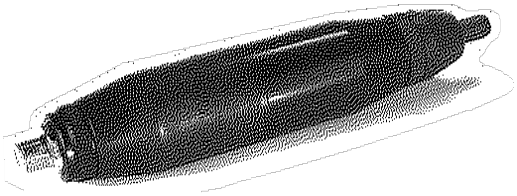


Door Opening Details

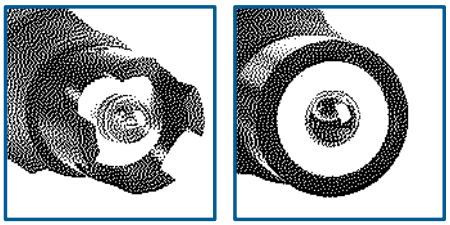


Designed to Accommodate
3/4" to 2-1/2" Vertical / Horizontal Pipe

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.

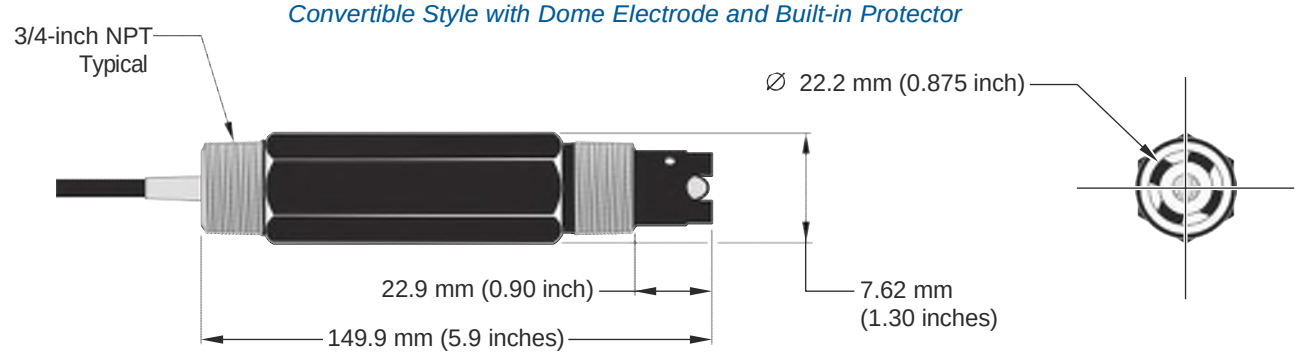
Insertion Style Sensor

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.

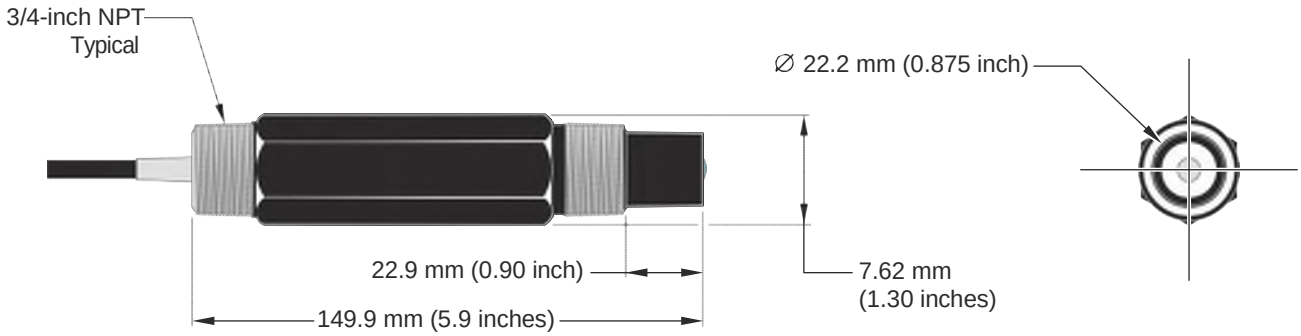
Sanitary Style Sensor

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	1.14' D X 3.8' OD		
		Pioina	1.14' FNPT									
Strokes/Minute		SPM	125							250		

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

Engineering Data

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

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

Engineering Data

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

Custom Engineered Designs - Pre-Engineered Systems

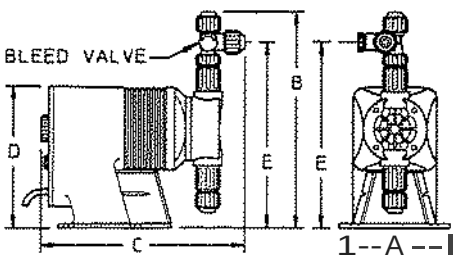
Pre-Engineered Systems

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

Dimensions

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

NOTE: Inches X 2.54 cm



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

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

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

A95OVER Specifications

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

Metric Equivalent Specifications

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

A95OVER Technical Information

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

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

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

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

SAFETY DATA SHEET

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

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

1.1. Product identification

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

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

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

1.3. Details of the supplier of the safety data sheet

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

1.4. Emergency telephone number

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

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Substances/mixtures corrosive to metal	Category 1

Health hazards

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

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

2.2. Label elements

Signal Word **Danger**

Hazard Statements

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

Precautionary Statements

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

2.3. Other hazards

No information available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

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

Reach Registration Number	01-2119457892-27

Full text of Hazard Statements: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

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

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

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

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

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

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

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

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

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

Notes to Physician Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

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

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

5.2. Special hazards arising from the substance or mixture

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

Hazardous Combustion Products
Sodium oxides, Hydrogen.

5.3. Advice for firefighters

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

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

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

6.2. Environmental precautions

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

6.3. Methods and material for containment and cleaning up

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

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

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

7.2. Conditions for safe storage, including any incompatibilities

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

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

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

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

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

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

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

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

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

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

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

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

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

Derived No Effect Level (DNEL) See table for values

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

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

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

Personal protective equipment

Eye Protection Goggles (European standard - EN 166)

Hand Protection Protective gloves

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

Skin and body protection Long sleeved clothing

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

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

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

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

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

Environmental exposure controls Prevent product from entering drains.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance White
Physical State Solid

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

9.2. Other information

Molecular Formula	H Na O
Molecular Weight	40

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

Yes
Contact with metals may evolve flammable hydrogen gas

10.2. Chemical stability

Stable under normal conditions

10.3. Possibility of hazardous reactions

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

10.4. Conditions to avoid

Incompatible products. Excess heat.

10.5. Incompatible materials

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

10.6. Hazardous decomposition products

Sodium oxides. Hydrogen.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information No acute toxicity information is available for this product

(a) acute toxicity;

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

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

(b) skin corrosion/irritation; Category 1 A

(c) serious eye damage/irritation; Category 1

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

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

Mutagenic effects have occurred in experimental animals

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

There are no known carcinogenic chemicals in this product

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

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

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

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

(j) aspiration hazard; Not applicable
Solid

Other Adverse Effects See actual entry in RTECS for complete information

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

SECTION 12: ECOLOGICAL INFORMATION

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

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

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

12.3. Bioaccumulative potential Does not bioaccumulate; Bioaccumulation is unlikely

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

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

12.6. Other adverse effects

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

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

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

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

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

ADR

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

IATA

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

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

SECTION 15: REGULATORY INFORMATION

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

International Inventories X = listed

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

National Regulations

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

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

15.2. Chemical safety assessment

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

SECTION 16: OTHER INFORMATION

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

Legend

CAS - Chemical Abstracts Service

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

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

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

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

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

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

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

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

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

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

Disclaimer

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

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

End of Safety Data Sheet

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.

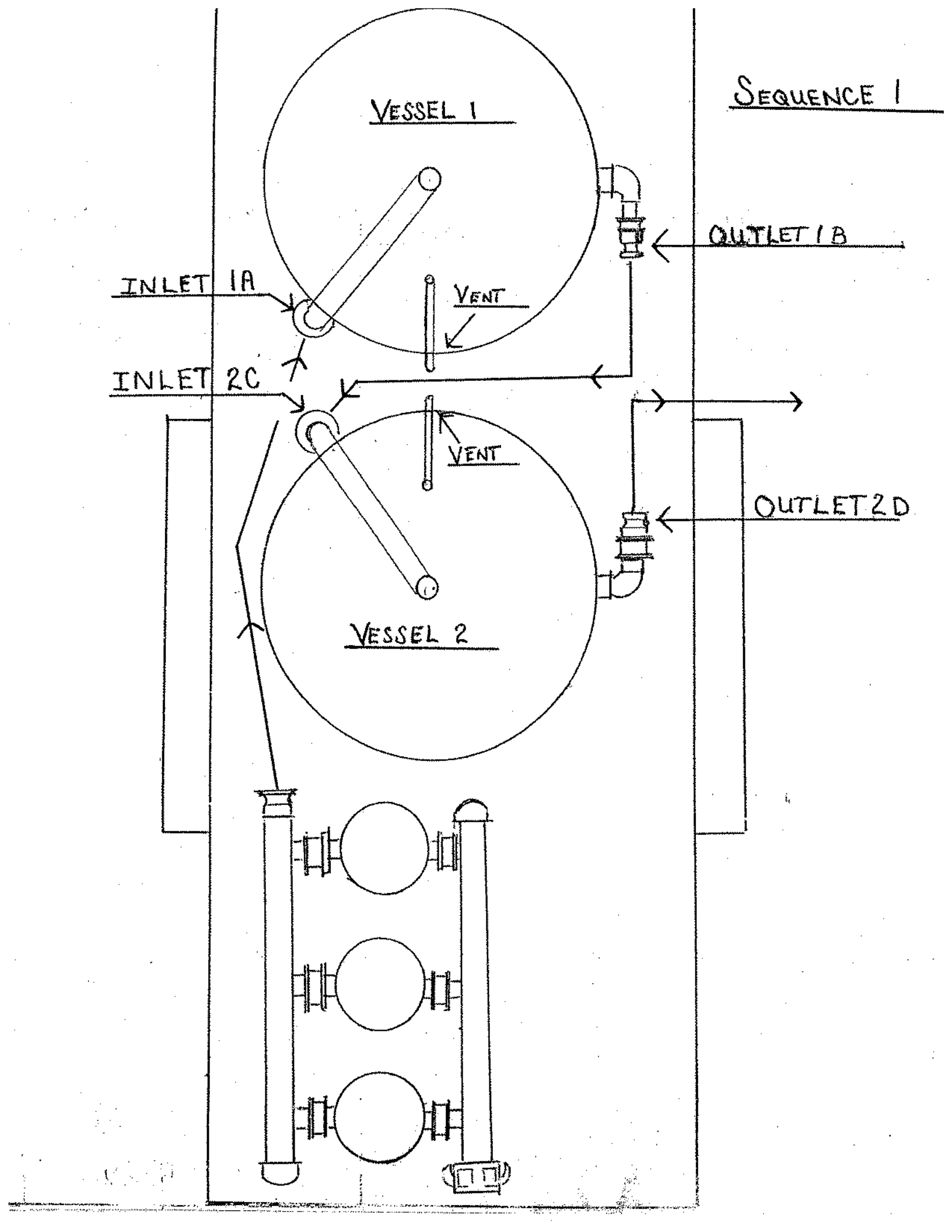
The system is mounted on a 12,230lb GVWR / 9600lb LC equipment hauler manufactured by Superior Trailers of Georgia. The main frame is 7" channel with two (2) 6000lb brake axles. There are four (4) 12000lb drop leg jackets with one mounted in each corner of the trailer. The combined dry weight of the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

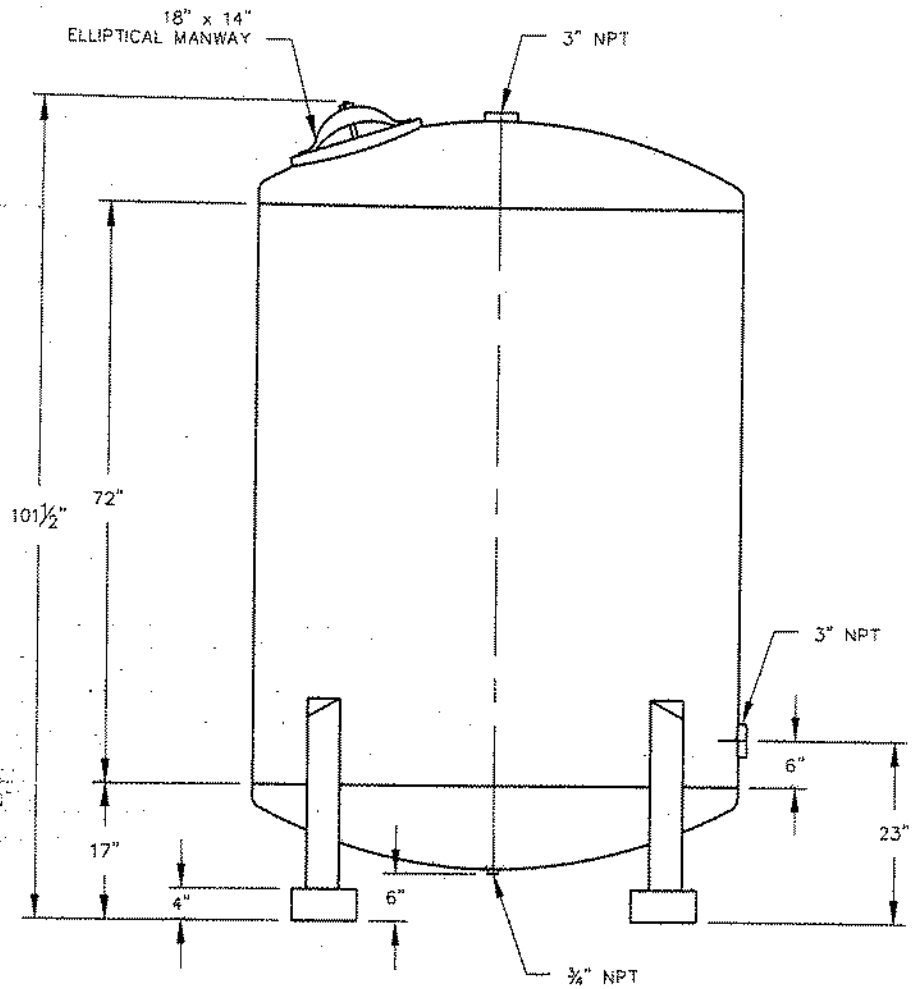
1) Superior Trailers 12,232lb GVWR trailer equipped with two (2) 6000lb AXIS Products brake axles.

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

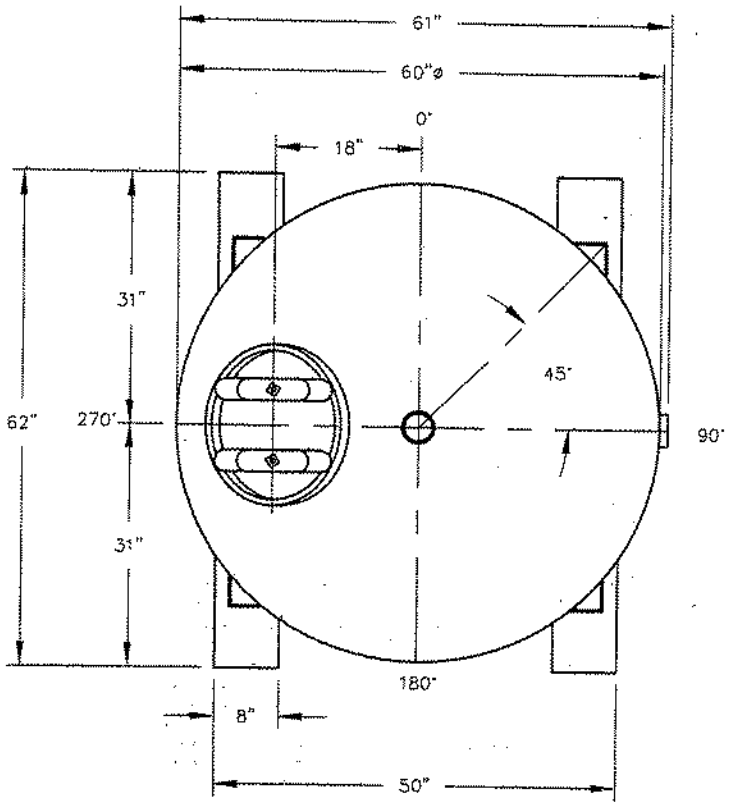
6) Legend Mfg. 2" Butterfly valves model T-335AB with EPDM seat, Aluminum/Bronze construction.

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 low (the water in 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 or the inlet nozzle. This step removes the air that is in the adsorber and it is now ready to be placed into service.

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 Section 4.0 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 after 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$^{foot\text{-}lbs}$. 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 removal of 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$^{\text{foot-lbs}}$. 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.

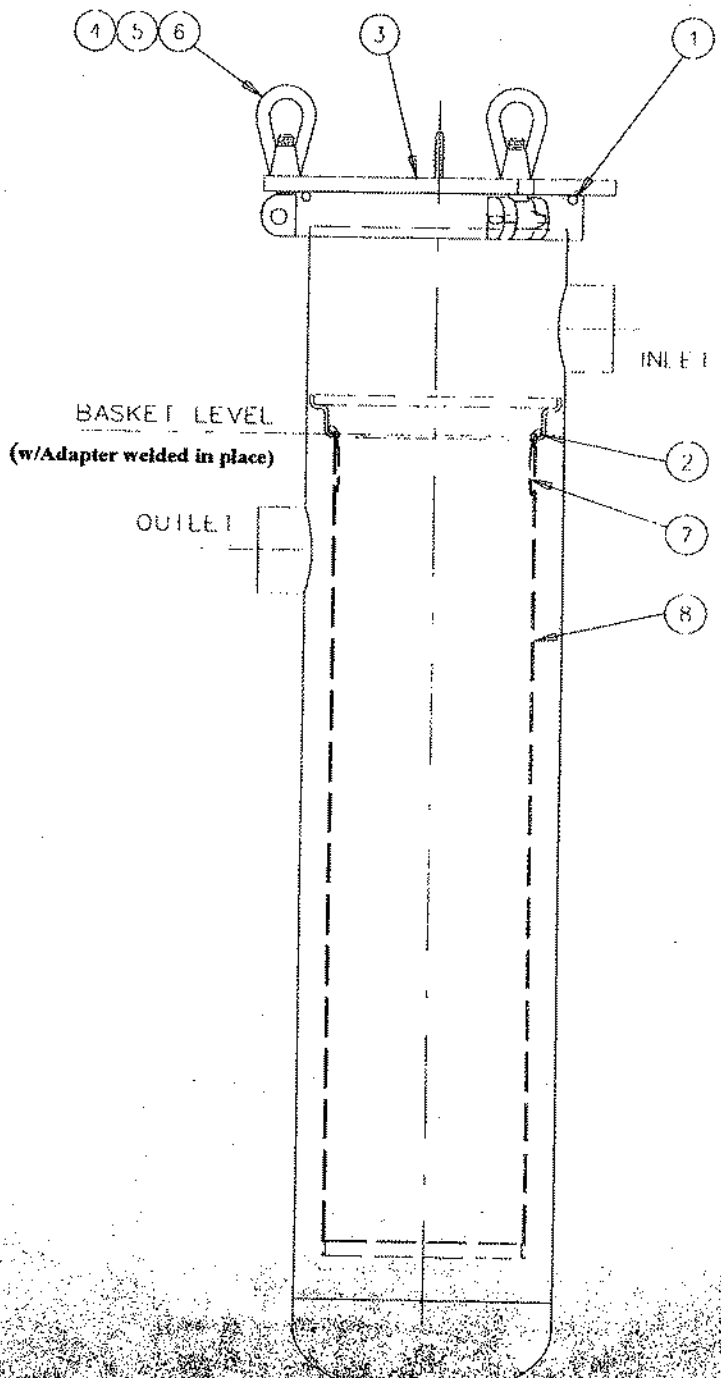
III. Spare Parts List

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

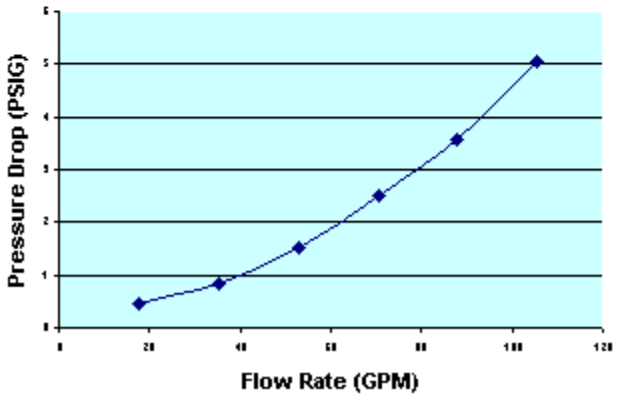
HPAF SERIES FILTERS
MODEL HPAF-2000

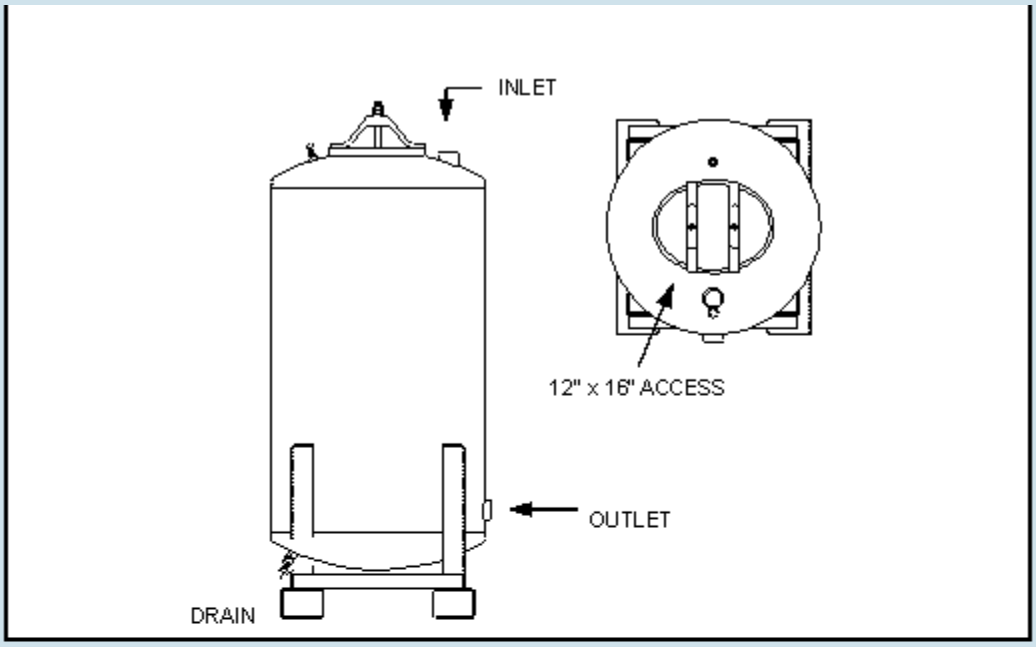
The HPAF-2000 filter is a media filter vessel designed to treat liquid streams. While the typical design application is a activated carbon adsorbtion unit, the filter can easily accommodate many medias. Some applications include:

- 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

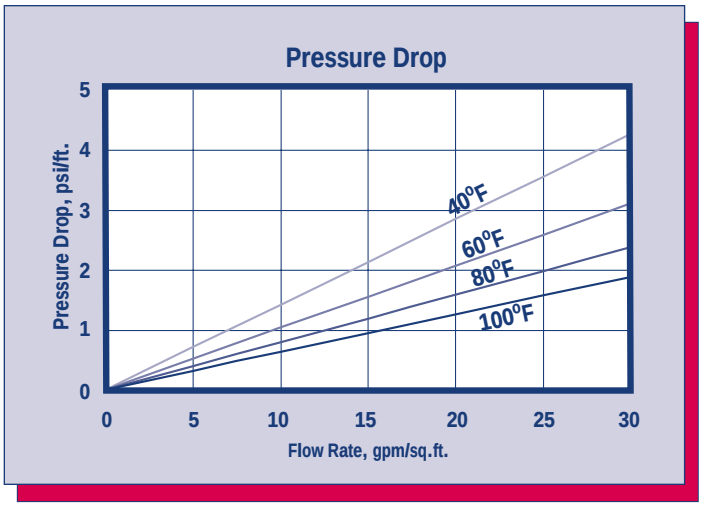
RESINTECH CGS is a high purity, light colored, high capacity, gel type sulfonated polystyrene cation resin supplied in the sodium form as moist, tough uniform spherical beads. *ResinTech CGS* specifically is intended for use in all water softening applications,including beverages, potable water and water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

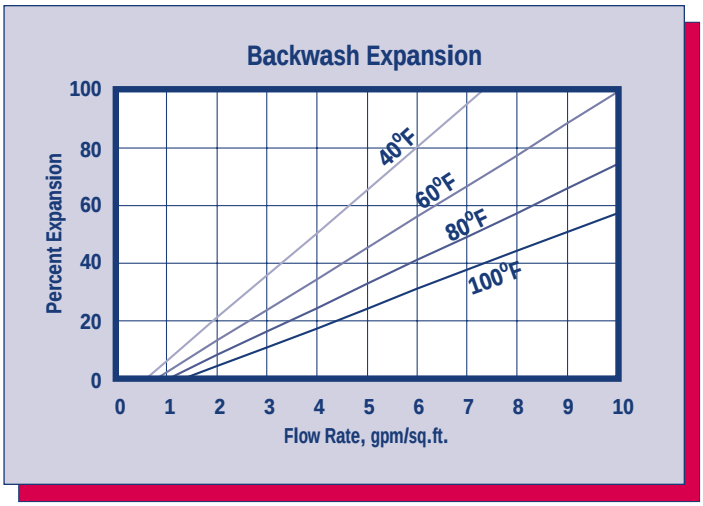
FEATURES & BENEFITS

- **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

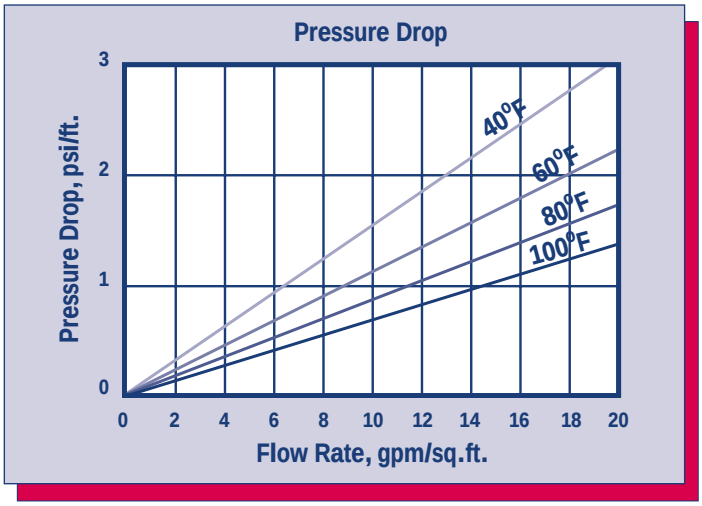
ResinTech SBG1 is a high capacity, shock resistant, gelular, Type 1, strongly basic anion exchange resin supplied in the chloride or hydroxide form as moist, tough, uniform, spherical beads. *ResinTech SBG1* is intended for use in all types of deionization systems and chemical processing applications.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

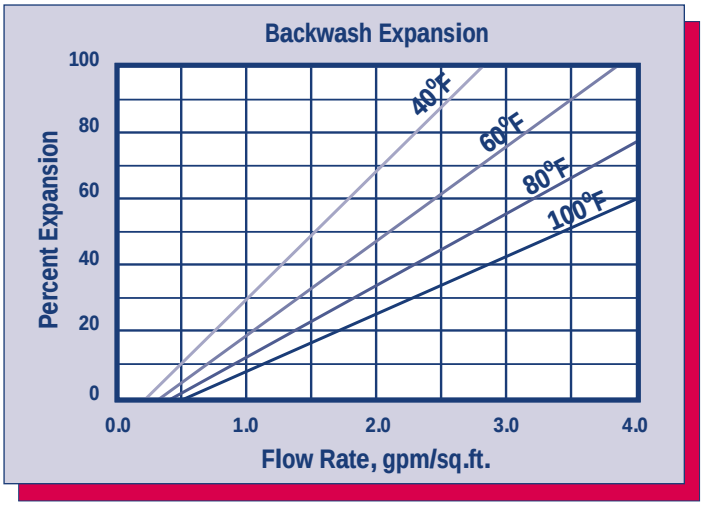
FEATURES & BENEFITS

- **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 $NaOH/ft^3$	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.

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

APPENDIX E

National Register of Historic Places Documentation

Massachusetts Cultural Resource Information System

MACRIS

MACRIS Search Results

Search Criteria: Town(s): Waltham; Street Name: Second Ave; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year

APPENDIX F

Endangered Species Act Documentation

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

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

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

Location

Middlesex County, Massachusetts

Local office

New England Ecological Services Field Office

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

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

http://www.fws.gov/newengland

Endangered species

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

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

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

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

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

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

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

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis Threatened

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9045

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

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

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

Additional information can be found using the following links:

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

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

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

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

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

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

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

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

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

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

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

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

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

What are the levels of concern for migratory birds?

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

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

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

Details about birds that are potentially affected by offshore projects

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

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

What if I have eagles on my list?

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

Proper Interpretation and Use of Your Migratory Bird Report

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

Facilities

National Wildlife Refuge lands

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

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

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

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

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

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND
PEM1E

FRESHWATER FORESTED/SHRUB WETLAND
PFO1E

FRESHWATER POND
PUBHh

RIVERINE
R2UBH
R5UBH

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

Data limitations

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

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

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

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters.

Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

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

APPENDIX G

Laboratory Data Reports

ANALYTICAL REPORT

Lab Number:	L1911827
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Mike Weaver
Phone:	(617) 886-7373
Project Name:	341 SECOND AVE.
Project Number:	132689.002, SID 5
Report Date:	08/09/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

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

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1911827-01	HA15-5	WATER	WALTHAM, MA	03/25/19 14:30	03/25/19
L1911827-02	TRIP BLANK	WATER	WALTHAM, MA	03/25/19 14:30	03/25/19

Project Name:	341 SECOND AVE.	**Lab Number:**	L1911827
Project Number:	132689.002, SID 5	**Report Date:**	08/09/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	341 SECOND AVE.	**Lab Number:**	L1911827
Project Number:	132689.002, SID 5	**Report Date:**	08/09/19

Case Narrative (continued)

Report Revision

August 09, 2019: This report includes the results of the Hardness analysis performed on L1911827-01 (HA15-5).

Report Submission

April 10, 2019: This final report includes the results of all requested analyses.

March 29, 2019: This is a preliminary report.

The Ethanol analysis was subcontracted. A copy of the laboratory report is included as an addendum. Please note: This data is only available in PDF format and is not available on Data Merger.

Sample Receipt

L1911827-02: A sample identified as "TRIP BLANK" was received but not listed on the Chain of Custody and was not analyzed.

Total Metals

The WG1220167-2 LCS recovery, associated with L1911827-01 (HA15-5), 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: Cristin Walker

Title: Technical Director/Representative Date: 08/09/19

ORGANICS

VOLATILES

Project Name: 341 SECOND AVE.
Lab Number: L1911827
Project Number: 132689.002, SID 5
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA
Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1
Analytical Date: 03/28/19 19:10
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethane	ND		ug/l	1.5	--	1
Carbon tetrachloride	ND		ug/l	1.0	--	1
1,1,2-Trichloroethane	ND		ug/l	1.5	--	1
Tetrachloroethene	ND		ug/l	1.0	--	1
1,2-Dichloroethane	ND		ug/l	1.5	--	1
1,1,1-Trichloroethane	ND		ug/l	2.0	--	1
Benzene	ND		ug/l	1.0	--	1
Toluene	ND		ug/l	1.0	--	1
Ethylbenzene	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	1.0	--	1
Trichloroethene	ND		ug/l	1.0	--	1
1,2-Dichlorobenzene	ND		ug/l	5.0	--	1
1,3-Dichlorobenzene	ND		ug/l	5.0	--	1
1,4-Dichlorobenzene	ND		ug/l	5.0	--	1
p/m-Xylene	ND		ug/l	2.0	--	1
o-xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
Acetone	ND		ug/l	10	--	1
Methyl tert butyl ether	ND		ug/l	10	--	1
Tert-Butyl Alcohol	ND		ug/l	100	--	1
Tertiary-Amyl Methyl Ether	ND		ug/l	20	--	1

Project Name: 341 SECOND AVE. **Lab Number:** L1911827

Project Number: 132689.002, SID 5 **Report Date:** 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01 Date Collected: 03/25/19 14:30

Client ID: HA15-5 Date Received: 03/25/19

Sample Location: WALTHAM, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	104		60-140
Fluorobenzene	95		60-140
4-Bromofluorobenzene	95		60-140

Project Name: 341 SECOND AVE.
Lab Number: L1911827
Project Number: 132689.002, SID 5
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA

Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1-SIM
Analytical Date: 03/28/19 19:10
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-SIM - Westborough Lab						
1,4-Dioxane	ND		ug/l	50	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	109		60-140
4-Bromofluorobenzene	88		60-140

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA

Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 03/27/19 19:57
Analyst: AWS

Extraction Method: EPA 504.1
Extraction Date: 03/27/19 17:45

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: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 03/27/19 18:48
Analyst: AWS

Extraction Method: EPA 504.1
Extraction Date: 03/27/19 17:45

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01 Batch: WG1220304-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A

Project Name: 341 SECOND AVE. **Lab Number:** L1911827

Project Number: 132689.002, SID 5 **Report Date:** 08/09/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 03/28/19 16:58
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1221086-4					
Methylene chloride	ND		ug/l	1.0	--
1,1-Dichloroethane	ND		ug/l	1.5	--
Carbon tetrachloride	ND		ug/l	1.0	--
1,1,2-Trichloroethane	ND		ug/l	1.5	--
Tetrachloroethene	ND		ug/l	1.0	--
1,2-Dichloroethane	ND		ug/l	1.5	--
1,1,1-Trichloroethane	ND		ug/l	2.0	--
Benzene	ND		ug/l	1.0	--
Toluene	ND		ug/l	1.0	--
Ethylbenzene	ND		ug/l	1.0	--
Vinyl chloride	ND		ug/l	1.0	--
1,1-Dichloroethene	ND		ug/l	1.0	--
cis-1,2-Dichloroethene	ND		ug/l	1.0	--
Trichloroethene	ND		ug/l	1.0	--
1,2-Dichlorobenzene	ND		ug/l	5.0	--
1,3-Dichlorobenzene	ND		ug/l	5.0	--
1,4-Dichlorobenzene	ND		ug/l	5.0	--
p/m-Xylene	ND		ug/l	2.0	--
o-xylene	ND		ug/l	1.0	--
Xylenes, Total	ND		ug/l	1.0	--
Acetone	ND		ug/l	10	--
Methyl tert butyl ether	ND		ug/l	10	--
Tert-Butyl Alcohol	ND		ug/l	100	--
Tertiary-Amyl Methyl Ether	ND		ug/l	20	--

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5
Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 03/28/19 16:58
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1221086-4					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	104		60-140
Fluorobenzene	96		60-140
4-Bromofluorobenzene	94		60-140

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5
Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1-SIM
Analytical Date: 03/28/19 16:58
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1221090-4					
1,4-Dioxane	ND		ug/l	50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	111		60-140
4-Bromofluorobenzene	88		60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: 341 SECOND AVE.

Project Number: 132689.002, SID 5

Lab Number: L1911827

Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab	Associated sample(s): 01		Batch: WG1220304-2						
1,2-Dibromoethane	103		-		80-120	-			A

Lab Control Sample Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1221086-3								
Methylene chloride	100		-		60-140	-		28
1,1-Dichloroethane	100		-		50-150	-		49
Carbon tetrachloride	105		-		70-130	-		41
1,1,2-Trichloroethane	95		-		70-130	-		45
Tetrachloroethene	95		-		70-130	-		39
1,2-Dichloroethane	115		-		70-130	-		49
1,1,1-Trichloroethane	110		-		70-130	-		36
Benzene	105		-		65-135	-		61
Toluene	105		-		70-130	-		41
Ethylbenzene	110		-		60-140	-		63
Vinyl chloride	100		-		5-195	-		66
1,1-Dichloroethene	105		-		50-150	-		32
cis-1,2-Dichloroethene	100		-		60-140	-		30
Trichloroethene	105		-		65-135	-		48
1,2-Dichlorobenzene	100		-		65-135	-		57
1,3-Dichlorobenzene	100		-		70-130	-		43
1,4-Dichlorobenzene	100		-		65-135	-		57
p/m-Xylene	100		-		60-140	-		30
o-xylene	100		-		60-140	-		30
Acetone	84		-		40-160	-		30
Methyl tert butyl ether	100		-		60-140	-		30
Tert-Butyl Alcohol	93		-		60-140	-		30
Tertiary-Amyl Methyl Ether	110		-		60-140	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1221086-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Pentafluorobenzene	105				60-140
Fluorobenzene	95				60-140
4-Bromofluorobenzene	101				60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: 341 SECOND AVE.

Project Number: 132689.002, SID 5

Lab Number: L1911827

Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1221090-3								
1,4-Dioxane	91		-		60-140	-		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Fluorobenzene	111				60-140
4-Bromofluorobenzene	89				60-140

Matrix Spike Analysis

Batch Quality Control

Project Name: 341 SECOND AVE.

Project Number: 132689.002, SID 5

Lab Number: L1911827

Report Date: 08/09/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1220304-3 QC Sample: L1911270-01 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.25	0.277	111		-	-		80-120	-		20	A
1,2-Dibromo-3-chloropropane	ND	0.25	0.268	107		-	-		80-120	-		20	A

SEMIVOLATILES

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5
Lab Number: L1911827
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA

Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1
Analytical Date: 03/29/19 08:15
Analyst: SZ

Extraction Method: EPA 625.1
Extraction Date: 03/27/19 11:44

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.2	--	1
Butyl benzyl phthalate	ND		ug/l	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

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	73		42-122
2-Fluorobiphenyl	87		46-121
4-Terphenyl-d14	104		47-138

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA

Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1-SIM
Analytical Date: 03/29/19 14:45
Analyst: DV

Extraction Method: EPA 625.1
Extraction Date: 03/27/19 11:42

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	ND		ug/l	0.10	--	1
Fluoranthene	ND		ug/l	0.10	--	1
Naphthalene	ND		ug/l	0.10	--	1
Benzo(a)anthracene	ND		ug/l	0.10	--	1
Benzo(a)pyrene	ND		ug/l	0.10	--	1
Benzo(b)fluoranthene	ND		ug/l	0.10	--	1
Benzo(k)fluoranthene	ND		ug/l	0.10	--	1
Chrysene	ND		ug/l	0.10	--	1
Acenaphthylene	ND		ug/l	0.10	--	1
Anthracene	ND		ug/l	0.10	--	1
Benzo(ghi)perylene	ND		ug/l	0.10	--	1
Fluorene	ND		ug/l	0.10	--	1
Phenanthrene	ND		ug/l	0.10	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--	1
Pyrene	ND		ug/l	0.10	--	1
Pentachlorophenol	6.5		ug/l	1.0	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	43		25-87
Phenol-d6	30		16-65
Nitrobenzene-d5	77		42-122
2-Fluorobiphenyl	63		46-121
2,4,6-Tribromophenol	92		45-128
4-Terphenyl-d14	74		47-138

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5
Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1-SIM
Analytical Date: 03/29/19 16:04
Analyst: DV

Extraction Method: EPA 625.1
Extraction Date: 03/27/19 07:38

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1220125-1					
Acenaphthene	ND		ug/l	0.10	--
Fluoranthene	ND		ug/l	0.10	--
Naphthalene	ND		ug/l	0.10	--
Benzo(a)anthracene	ND		ug/l	0.10	--
Benzo(a)pyrene	ND		ug/l	0.10	--
Benzo(b)fluoranthene	ND		ug/l	0.10	--
Benzo(k)fluoranthene	ND		ug/l	0.10	--
Chrysene	ND		ug/l	0.10	--
Acenaphthylene	ND		ug/l	0.10	--
Anthracene	ND		ug/l	0.10	--
Benzo(ghi)perylene	ND		ug/l	0.10	--
Fluorene	ND		ug/l	0.10	--
Phenanthrene	ND		ug/l	0.10	--
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--
Pyrene	ND		ug/l	0.10	--
Pentachlorophenol	ND		ug/l	1.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	27		25-87
Phenol-d6	20		16-65
Nitrobenzene-d5	57		42-122
2-Fluorobiphenyl	47		46-121
2,4,6-Tribromophenol	50		45-128
4-Terphenyl-d14	49		47-138

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1
Analytical Date: 03/28/19 15:22
Analyst: EK

Extraction Method: EPA 625.1
Extraction Date: 03/27/19 07:38

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1220134-1					
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.2	--
Butyl benzyl phthalate	ND		ug/l	5.0	--
Di-n-butylphthalate	ND		ug/l	5.0	--
Di-n-octylphthalate	ND		ug/l	5.0	--
Diethyl phthalate	ND		ug/l	5.0	--
Dimethyl phthalate	ND		ug/l	5.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	54		42-122
2-Fluorobiphenyl	65		46-121
4-Terphenyl-d14	88		47-138

Lab Control Sample Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1220125-2								
Acenaphthene	92		-		60-132	-		30
Fluoranthene	85		-		43-121	-		30
Naphthalene	79		-		36-120	-		30
Benzo(a)anthracene	98		-		42-133	-		30
Benzo(a)pyrene	100		-		32-148	-		30
Benzo(b)fluoranthene	99		-		42-140	-		30
Benzo(k)fluoranthene	98		-		25-146	-		30
Chrysene	96		-		44-140	-		30
Acenaphthylene	90		-		54-126	-		30
Anthracene	88		-		43-120	-		30
Benzo(ghi)perylene	67		-		1-195	-		30
Fluorene	99		-		70-120	-		30
Phenanthrene	96		-		65-120	-		30
Dibenzo(a,h)anthracene	85		-		1-200	-		30
Indeno(1,2,3-cd)pyrene	86		-		1-151	-		30
Pyrene	85		-		70-120	-		30
Pentachlorophenol	79		-		38-152	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1220125-2								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	55				25-87
Phenol-d6	37				16-65
Nitrobenzene-d5	91				42-122
2-Fluorobiphenyl	72				46-121
2,4,6-Tribromophenol	88				45-128
4-Terphenyl-d14	66				47-138

Lab Control Sample Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1220134-2								
Bis(2-ethylhexyl)phthalate	85		-		29-137	-		30
Butyl benzyl phthalate	89		-		1-140	-		30
Di-n-butylphthalate	87		-		8-120	-		30
Di-n-octylphthalate	94		-		19-132	-		30
Diethyl phthalate	92		-		1-120	-		30
Dimethyl phthalate	98		-		1-120	-		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Nitrobenzene-d5	88				42-122
2-Fluorobiphenyl	95				46-121
4-Terphenyl-d14	86				47-138

PCBS

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5
Lab Number: L1911827
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA

Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 127,608.3
Analytical Date: 03/28/19 17:17
Analyst: WR

Extraction Method: EPA 608.3
Extraction Date: 03/27/19 19:24
Cleanup Method: EPA 3665A
Cleanup Date: 03/28/19
Cleanup Method: EPA 3660B
Cleanup Date: 03/28/19

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/l	0.250	--	1	A
Aroclor 1221	ND		ug/l	0.250	--	1	A
Aroclor 1232	ND		ug/l	0.250	--	1	A
Aroclor 1242	ND		ug/l	0.250	--	1	A
Aroclor 1248	ND		ug/l	0.250	--	1	A
Aroclor 1254	ND		ug/l	0.250	--	1	A
Aroclor 1260	ND		ug/l	0.200	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	114		37-123	B
Decachlorobiphenyl	110		38-114	B
2,4,5,6-Tetrachloro-m-xylene	90		37-123	A
Decachlorobiphenyl	85		38-114	A

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 127,608.3
Analytical Date: 03/28/19 04:08
Analyst: AWS

Extraction Method: EPA 608.3
Extraction Date: 03/26/19 23:54
Cleanup Method: EPA 3665A
Cleanup Date: 03/27/19
Cleanup Method: EPA 3660B
Cleanup Date: 03/27/19

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1219905-1						
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	92		37-123	B
Decachlorobiphenyl	**120**	Q	38-114	B
2,4,5,6-Tetrachloro-m-xylene	92		37-123	A
Decachlorobiphenyl	97		38-114	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: 341 SECOND AVE.

Project Number: 132689.002, SID 5

Lab Number: L1911827

Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 Batch: WG1219905-2									
Aroclor 1016	104		-		50-140	-		36	A
Aroclor 1260	97		-		8-140	-		38	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	97				37-123	B
Decachlorobiphenyl	**124**	Q			38-114	B
2,4,5,6-Tetrachloro-m-xylene	95				37-123	A
Decachlorobiphenyl	100				38-114	A

METALS

Project Name: 341 SECOND AVE.
Lab Number: L1911827
Project Number: 132689.002, SID 5
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA
Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Arsenic, Total	0.00157		mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Copper, Total	0.00321		mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Iron, Total	11.0		mg/l	0.050	--	1	03/27/19 13:16	03/28/19 19:58	EPA 3005A	19,200.7	AB
Lead, Total	0.00154		mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	03/26/19 11:23	03/26/19 18:53	EPA 245.1	3,245.1	EA
Nickel, Total	0.00275		mg/l	0.00200	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	03/27/19 13:16	03/27/19 18:52	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	50.1		mg/l	0.660	NA	1	03/27/19 13:16	03/28/19 18:39	EPA 3005A	19,200.7	AB
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		03/27/19 18:52	NA	107,-	

Project Name: 341 SECOND AVE. **Lab Number:** L1911827

Project Number: 132689.002, SID 5 **Report Date:** 08/09/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1219624-1										
Mercury, Total	ND		mg/l	0.00020	--	1	03/26/19 11:23	03/26/19 18:08	3,245.1	EA

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: WG1220166-1										
Iron, Total	ND		mg/l	0.050	--	1	03/27/19 13:16	03/28/19 16:52	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: WG1220166-1										
Hardness	ND		mg/l	0.660	NA	1	03/27/19 13:16	03/28/19 16:52	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: WG1220167-1										
Antimony, Total	ND		mg/l	0.00400	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5
Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Lead, Total	ND	mg/l	0.00100	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Nickel, Total	ND	mg/l	0.00200	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Selenium, Total	ND	mg/l	0.00500	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Silver, Total	ND	mg/l	0.00040	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM
Zinc, Total	ND	mg/l	0.01000	--	1	03/27/19 13:16	03/27/19 17:40	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: 341 SECOND AVE.

Project Number: 132689.002, SID 5

Lab Number: L1911827

Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1219624-2								
Mercury, Total	98		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1220166-2								
Iron, Total	101		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1220166-2								
Hardness	100		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1220167-2								
Antimony, Total	104		-		85-115	-		
Arsenic, Total	103		-		85-115	-		
Cadmium, Total	111		-		85-115	-		
Chromium, Total	101		-		85-115	-		
Copper, Total	97		-		85-115	-		
Lead, Total	108		-		85-115	-		
Nickel, Total	100		-		85-115	-		
Selenium, Total	**116**	Q	-		85-115	-		
Silver, Total	106		-		85-115	-		
Zinc, Total	114		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1219624-3 QC Sample: L1911815-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00492	98		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1219624-5 QC Sample: L1911815-02 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00495	99		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220166-3 QC Sample: L1911441-01 Client ID: MS Sample												
Iron, Total	7.79	1	8.86	107		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220166-3 QC Sample: L1911441-01 Client ID: MS Sample												
Hardness	76.8	66.2	139	94		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220166-7 QC Sample: L1911736-01 Client ID: MS Sample												
Iron, Total	3.48	1	4.15	**67**	Q	-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220166-7 QC Sample: L1911736-01 Client ID: MS Sample												
Hardness	571	66.2	602	**47**	Q	-	-		75-125	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220167-3 QC Sample: L1911736-01 Client ID: MS Sample										
Antimony, Total	ND	0.5	0.6878	**138**	Q	-	-	70-130	-	20
Arsenic, Total	0.01331	0.12	0.1382	104		-	-	70-130	-	20
Cadmium, Total	ND	0.051	0.05543	109		-	-	70-130	-	20
Chromium, Total	0.00278	0.2	0.2010	99		-	-	70-130	-	20
Copper, Total	0.02450	0.25	0.2653	96		-	-	70-130	-	20
Lead, Total	0.06834	0.51	0.6170	108		-	-	70-130	-	20
Nickel, Total	0.00413	0.5	0.4900	97		-	-	70-130	-	20
Selenium, Total	ND	0.12	0.05565	**46**	Q	-	-	70-130	-	20
Silver, Total	ND	0.05	0.05190	104		-	-	70-130	-	20
Zinc, Total	0.03808	0.5	0.5747	107		-	-	70-130	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: 341 SECOND AVE.

Project Number: 132689.002, SID 5

Lab Number: L1911827

Report Date: 08/09/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1219624-4 QC Sample: L1911815-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1219624-6 QC Sample: L1911815-02 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220166-4 QC Sample: L1911441-01 Client ID: DUP Sample						
Iron, Total	7.79	7.95	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220166-8 QC Sample: L1911736-01 Client ID: DUP Sample						
Iron, Total	3.48	3.34	mg/l	4		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220166-8 QC Sample: L1911736-01 Client ID: DUP Sample						
Hardness	571	557	mg/l	2		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1220167-4 QC Sample: L1911736-01 Client ID: DUP Sample					
Antimony, Total	ND	ND	mg/l	NC	20
Arsenic, Total	0.01331	0.01323	mg/l	1	20
Cadmium, Total	ND	ND	mg/l	NC	20
Chromium, Total	0.00278	0.00259	mg/l	7	20
Copper, Total	0.02450	0.02326	mg/l	5	20
Lead, Total	0.06834	0.06589	mg/l	4	20
Nickel, Total	0.00413	0.00404	mg/l	2	20
Selenium, Total	ND	ND	mg/l	NC	20
Silver, Total	ND	ND	mg/l	NC	20
Zinc, Total	0.03808	0.03731	mg/l	2	20

INORGANICS
&
MISCELLANEOUS

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

SAMPLE RESULTS

Lab ID: L1911827-01
Client ID: HA15-5
Sample Location: WALTHAM, MA

Date Collected: 03/25/19 14:30
Date Received: 03/25/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	03/26/19 12:15	121,2540D	DR
Cyanide, Total	ND		mg/l	0.005	--	1	03/26/19 10:30	03/26/19 15:23	121,4500CN-CE	LH
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	03/25/19 23:00	121,4500CL-D	AS
Nitrogen, Ammonia	1.42		mg/l	0.075	--	1	03/27/19 12:08	03/27/19 20:22	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.40	--	1.1	03/26/19 16:30	03/26/19 22:00	74,1664A	ML
Phenolics, Total	ND		mg/l	0.030	--	1	03/26/19 09:00	03/26/19 11:36	4,420.1	GD
Chromium, Hexavalent	ND		mg/l	0.010	--	1	03/25/19 23:00	03/26/19 00:24	1,7196A	JW
Anions by Ion Chromatography - Westborough Lab										
Chloride	35.2		mg/l	0.500	--	1	-	03/26/19 22:35	44,300.0	AU

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5
Lab Number: L1911827
Report Date: 08/09/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1219397-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	03/25/19 23:00	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1219413-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	03/25/19 23:00	03/25/19 23:59	1,7196A	JW
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1219529-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	03/26/19 12:15	121,2540D	DR
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1219570-1										
Cyanide, Total	ND		mg/l	0.005	--	1	03/26/19 10:30	03/26/19 14:52	121,4500CN-CE	LH
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1219594-1										
Phenolics, Total	ND		mg/l	0.030	--	1	03/26/19 09:00	03/26/19 11:33	4,420.1	GD
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1219792-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	03/26/19 16:30	03/26/19 22:00	74,1664A	ML
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1220031-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	03/27/19 12:08	03/27/19 20:15	121,4500NH3-BH	AT
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1220280-1										
Chloride	ND		mg/l	0.500	--	1	-	03/26/19 16:46	44,300.0	AU

Lab Control Sample Analysis

Batch Quality Control

Project Name: 341 SECOND AVE.

Project Number: 132689.002, SID 5

Lab Number: L1911827

Report Date: 08/09/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1219397-2								
Chlorine, Total Residual	96		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1219413-2								
Chromium, Hexavalent	98		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1219570-2								
Cyanide, Total	101		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1219594-2								
Phenolics, Total	104		-		70-130	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1219792-2								
TPH	92		-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1220031-2								
Nitrogen, Ammonia	104		-		80-120	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1220280-2								
Chloride	97		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219397-4 QC Sample: L1911827-01 Client ID: HA15-5												
Chlorine, Total Residual	ND	0.25	0.26	104		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219413-4 QC Sample: L1911827-01 Client ID: HA15-5												
Chromium, Hexavalent	ND	0.1	0.099	99		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219570-4 QC Sample: L1911827-01 Client ID: HA15-5												
Cyanide, Total	ND	0.2	0.184	92		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219594-4 QC Sample: L1911827-01 Client ID: HA15-5												
Phenolics, Total	ND	0.4	0.43	108		-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219792-4 QC Sample: L1911306-09 Client ID: MS Sample												
TPH	ND	20	16.2	81		-	-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1220031-4 QC Sample: L1911913-03 Client ID: MS Sample												
Nitrogen, Ammonia	0.987	4	4.78	95		-	-		80-120	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1220280-3 QC Sample: L1911734-02 Client ID: MS Sample												
Chloride	2.26	4	6.36	102		-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219397-3 QC Sample: L1911804-01 Client ID: DUP Sample						
Chlorine, Total Residual	6.5	6.2	mg/l	5		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219413-3 QC Sample: L1911827-01 Client ID: HA15-5						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219529-2 QC Sample: L1911740-01 Client ID: DUP Sample						
Solids, Total Suspended	63	62	mg/l	2		29
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219570-3 QC Sample: L1911719-01 Client ID: DUP Sample						
Cyanide, Total	ND	ND	mg/l	NC		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219594-3 QC Sample: L1911827-01 Client ID: HA15-5						
Phenolics, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1219792-3 QC Sample: L1911306-01 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1220031-3 QC Sample: L1911913-03 Client ID: DUP Sample						
Nitrogen, Ammonia	0.987	0.928	mg/l	6		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1220280-4 QC Sample: L1911734-02 Client ID: DUP Sample						
Chloride	2.26	2.26	mg/l	0		18

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
B	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1911827-01A	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1911827-01A1	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		624.1-RGP(7)
L1911827-01A2	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		624.1-RGP(7)
L1911827-01B	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1911827-01B1	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		624.1-RGP(7)
L1911827-01B2	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		624.1-RGP(7)
L1911827-01C	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		504(14)
L1911827-01D	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		504(14)
L1911827-01E	Vial HCl preserved	B	NA		3.5	Y	Absent		SUB-ETHANOL(14)
L1911827-01F	Vial HCl preserved	B	NA		3.5	Y	Absent		SUB-ETHANOL(14)
L1911827-01G	Vial HCl preserved	B	NA		3.5	Y	Absent		SUB-ETHANOL(14)
L1911827-01H	Plastic 250ml HNO3 preserved	B	<2	<2	3.5	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),HARDU(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1911827-01J	Plastic 500ml NaOH preserved	B	>12	>12	3.5	Y	Absent		TCN-4500(14)
L1911827-01K	Plastic 500ml H2SO4 preserved	B	<2	<2	3.5	Y	Absent		NH3-4500(28)
L1911827-01L	Plastic 950ml unpreserved	B	7	7	3.5	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1)
L1911827-01M	Plastic 950ml unpreserved	B	7	7	3.5	Y	Absent		TSS-2540(7)
L1911827-01N	Amber 950ml H2SO4 preserved	B	<2	<2	3.5	Y	Absent		TPHENOL-420(28)
L1911827-01P	Amber 1000ml Na2S2O3	B	7	7	3.5	Y	Absent		PCB-608.3(7)
L1911827-01Q	Amber 1000ml Na2S2O3	B	7	7	3.5	Y	Absent		PCB-608.3(7)
L1911827-01R	Amber 1000ml Na2S2O3	B	7	7	3.5	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1911827-01S	Amber 1000ml Na2S2O3	B	7	7	3.5	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)

*Values in parentheses indicate holding time in days

Project Name: 341 SECOND AVE.
Project Number: 132689.002, SID 5

Lab Number: L1911827
Report Date: 08/09/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1911827-01T	Amber 1000ml Na2S2O3	B	7	7	3.5	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1911827-01U	Amber 1000ml Na2S2O3	B	7	7	3.5	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1911827-01V	Amber 1000ml HCl preserved	B	NA		3.5	Y	Absent		TPH-1664(28)
L1911827-01W	Amber 1000ml HCl preserved	B	NA		3.5	Y	Absent		TPH-1664(28)
L1911827-02A	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		ARCHIVE()
L1911827-02B	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		ARCHIVE()
L1911827-02C	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		ARCHIVE()
L1911827-02D	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		ARCHIVE()
L1911827-02E	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		ARCHIVE()
L1911827-02F	Vial Na2S2O3 preserved	B	NA		3.5	Y	Absent		ARCHIVE()

*Values in parentheses indicate holding time in days

Project Name:	341 SECOND AVE.	**Lab Number:**	L1911827
Project Number:	132689.002, SID 5	**Report Date:**	08/09/19

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	341 SECOND AVE.	**Lab Number:**	L1911827
Project Number:	132689.002, SID 5	**Report Date:**	08/09/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol 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 reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	341 SECOND AVE.	**Lab Number:**	L1911827
Project Number:	132689.002, SID 5	**Report Date:**	08/09/19

REFERENCES

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

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

4 Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. Revised March 1983.

14 Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. EPA/600/4-88/039, Revised July 1991.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.

74 Method 1664,Revision A: N-Hexane Extractable Material (HEM; Oil & Grease) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry, EPA-821-R-98-002, February 1999.

107 Alpha Analytical - In-house calculation method.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

127 Method 608.3: Organochlorine Pesticides and PCBs by GC/HSD, EPA 821-R-16-009, December 2016.

128 Method 624.1: Purgeables by GC/MS, EPA 821-R-16-008, December 2016.

129 Method 625.1: Base/Neutrals and Acids by GC/MS, EPA 821-R-16-007, December 2016.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

ALPHA ANALYTICAL

CHAIN OF CUSTODY

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Date Rec'd in Lab: 3/25/19

ALPHA Job #: L1911825

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

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

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

H&A Information

H&A Client: Alliance
H&A Address: 465 Medford Ave, Suite 2200
Boston, MA 02129
H&A Phone: 617-886-7400
H&A Fax:
H&A Email: mweaver, bstanley, gbeaudin

Project Information

Project Name: 348 Second Ave
Project Location: Waltham, MA
Project #: 132689.002, SID 5
(Use Project name as Project #) ☐
Project Manager: M. Weaver
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)

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 (cont'd on pg 2.)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	TSS - 2540	TEC - 4500	TCN - 4500	504	8260 & 8260SIM w/ 1,4-Dioxane	TPHENOL - 420	HexCr-3500 & Hydrazine	8270 TCL + 1,4-Dioxane + Ethylene Glycol	Sample Filtration / Preservation / (Please Specify below)	Sample Specific Comments	Total # Bottles
11827-01	HA15-5	3/25/19	1430	GW	GKH	x	x	x	x	x	x	x	x			25

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

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
Bruce K Howard	3/25/19 1400	Miller	3/25/19 1610
M. Weaver	3/25/19 1610		3/25/19 1630
	3/25/19 1815		3/26/19

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 2 of 2

Date Rec'd in Lab: 3/25/19

ALPHA Job #: L911827

H&A Information

H&A Client: Alliance

H&A Address: 465 Medford Ave, Suite 2200

Boston, MA 02129

H&A Phone: 617-886-7400

H&A Fax: mweaver@haleyaldrich.com

H&A Email: ghoward

Project Information

Project Name: 341 Second Ave

Project Location: Waltham MA

Project #: 132689-002, SID 5

(Use Project name as Project #) ☐

Project Manager: M. Weaver

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)

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 (cont'd.)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	8270 TCL +TIC	CL-300	Tot. Metals: Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Tl, Zn, Hg	Ammonia	Total Hardness	Al-Nickel (Ekman)	TPH-1664	PCB-608	Sample Filtration / Preservation / Sample Specific Comments	Total # Bottles
11827-01	MW6-S	3/25/19	1430	GW	GKH	x	x	x	x	x	x	x	x		25

Sample Filtration: ☐ Done ☐ Lab to do

Preservation: ☐ Lab to do

(Please Specify below)

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
Anna K. Howard	3/25/19 1400		3/25/19 1630
	3/25/19 1515		3/25/19 1630
	3/25/19 1815		3/25/19 1815

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# 9915-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

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

ALPHA ANALYTICAL

Subcontract Chain of Custody

Test America (Nashville)
2960 Foster Creighton Drive
Nashville, TN 37204

Alpha Job Number
L1911827

Client Information

Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019

Phone: 603.319.5010
Email: mgulli@alphalab.com

Project Information

Project Location: MA
Project Manager: Melissa Gulli

Turnaround & Deliverables Information

Due Date:
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1911827

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	HA15-S	03-25-19 14:30	WATER	Ethanol by EPA 1671 Revision A	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		3-26-19 14:10		
Form No: AL_subcoc				

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

Laboratory Job ID: 490-171038-1
Client Project/Site: L1911827
Revision: 2

For:
Alpha Analytical Inc
145 Flanders Road
Westborough, Massachusetts 01581-1019

Attn: Melissa Gulli

Authorized for release by:
4/10/2019 1:56:17 PM

Ken Hayes, Project Manager II
(615)301-5035
ken.hayes@testamericainc.com

Client: Alpha Analytical Inc
Project/Site: L1911827

Laboratory Job ID: 490-171038-1

Table of Contents

Sample Summary

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-171038-1	HA15-5	Water	03/25/19 14:30	03/28/19 15:45

Case Narrative

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Job ID: 490-171038-1

Laboratory: Eurofins TestAmerica, Nashville

Narrative

Job Narrative
490-171038-1

REVISED REPORT 2: Revised to correct the sample collection to that listed on the updated COC received after initial Login. This report replaces the one generated on 04/10/19 @ 0955.

REVISED REPORT: Revised to correct the Project and sample ID to match updated COC received after initial Login. This report replaces the one generated on 04/09/19 @ 1755.

Comments
No additional comments.

Receipt
The sample was received on 3/28/2019 3:45 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.0º C.

GC Semi VOA
Method 1671A: Surrogate recovery was outside acceptance limits for the following matrix spike/matrix spike duplicate (MS/MSD) samples: (490-171288-D-5 MS) and (490-171288-D-5 MSD). The parent sample's surrogate recovery was within limits. The MS/MSD sample has been qualified and reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Qualifiers

GC VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Client Sample ID: HA15-5

Date Collected: 03/25/19 14:30
Date Received: 03/28/19 15:45

Lab Sample ID: 490-171038-1

Matrix: Water

Method: 1671A - Ethanol (GC/FID)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethanol	ND		2000	500	ug/L			04/08/19 16:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Isopropyl acetate (Surr)	*80*		*70 - 130*		*04/08/19 16:11*	*1*

QC Sample Results

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Method: 1671A - Ethanol (GC/FID)

Lab Sample ID: MB 490-586425/14
Matrix: Water
Analysis Batch: 586425

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethanol	ND		2000	500	ug/L			04/08/19 15:47	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Isopropyl acetate (Surr)	*86*		*70 - 130*		*04/08/19 15:47*	*1*

Lab Sample ID: LCS 490-586425/15
Matrix: Water
Analysis Batch: 586425

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Ethanol			50200	48400		ug/L		96	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Isopropyl acetate (Surr)	*94*		*70 - 130*

Lab Sample ID: LCSD 490-586425/16
Matrix: Water
Analysis Batch: 586425

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ethanol			50200	51210		ug/L		102	70 - 130	6	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Isopropyl acetate (Surr)	*85*		*70 - 130*

Lab Sample ID: 490-171288-D-5 MS
Matrix: Water
Analysis Batch: 586425

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Ethanol	ND		50200	54870		ug/L		109	70 - 130		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Isopropyl acetate (Surr)	*45*	*X*	*70 - 130*

Lab Sample ID: 490-171288-D-5 MSD
Matrix: Water
Analysis Batch: 586425

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ethanol	ND		50200	48960		ug/L		97	70 - 130	11	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
Isopropyl acetate (Surr)	*33*	*X*	*70 - 130*

QC Association Summary

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

GC VOA

Analysis Batch: 586425

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-171038-1	HA15-5	Total/NA	Water	1671A	
MB 490-586425/14	Method Blank	Total/NA	Water	1671A	
LCS 490-586425/15	Lab Control Sample	Total/NA	Water	1671A	
LCSD 490-586425/16	Lab Control Sample Dup	Total/NA	Water	1671A	
490-171288-D-5 MS	Matrix Spike	Total/NA	Water	1671A	
490-171288-D-5 MSD	Matrix Spike Duplicate	Total/NA	Water	1671A	

Lab Chronicle

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Client Sample ID: HA15-5
Date Collected: 03/25/19 14:30
Date Received: 03/28/19 15:45

Lab Sample ID: 490-171038-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1671A		1			586425	04/08/19 16:11	ZXS	TAL NSH

Laboratory References:

TAL NSH = Eurofins TestAmerica, Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Method	Method Description	Protocol	Laboratory
1671A	Ethanol (GC/FID)	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL NSH = Eurofins TestAmerica, Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Accreditation/Certification Summary

Client: Alpha Analytical Inc
Project/Site: L1911827

Job ID: 490-171038-1

Laboratory: Eurofins TestAmerica, Nashville

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2938	06-30-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1671A		Water	Ethanol

Maine	State Program	1	TN00032	11-03-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1671A		Water	Ethanol

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-171038 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 03-28-2019 @ 1545

Time Samples Removed From Cooler 1557 Time Samples Placed in Storage 1613 (2 Hour Window)

1. Tracking # _____ (last 4 digits, FedEx) Courier: Lab

IR Gun ID 31470368 pH Strip Lot HC697554 Chlorine Strip Lot 0811GK

2. Temperature of rep. sample or temp blank when opened: 4.0 Degrees Celsius

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES NO NA

If yes, how many and where: _____

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) AOH

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

Larger than this.

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence # _____

I certify that I unloaded the cooler and answered questions 7-14 (intial) AOH

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA AOH 3/28/19

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) AOH

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) AOH

I certify that I attached a label with the unique LIMS number to each container (intial) AOH

21. Were there Non-Conformance issues at login? YES NO Was a NCM generated? YES...NO...#_____

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 8/23/17

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Test America (Nashville)
2960 Foster Creighton Drive
Nashville, TN 37204

Alpha Job Number
L1911827

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 603.319.5010 Email: mgulli@alphalab.com	Project Location: MA Project Manager: Melissa Gulli **Turnaround & Deliverables Information** Due Date: Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1911827

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	HA15-5	03-25-19 14:30	WATER	Ethanol by EPA 1671 Revision A	

4.0

	Relinquished By:	Date/Time:	Received By:	Date/Time:
				3/28/19 1545
Form No: AL_subcoc				

ANALYTICAL REPORT

Lab Number:	L1934877
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Kate Dilawari
Phone:	(617) 886-7458
Project Name:	341 SECOND AVENUE
Project Number:	132689-002
Report Date:	08/07/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

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

Project Name: 341 SECOND AVENUE
Project Number: 132689-002

Lab Number: L1934877
Report Date: 08/07/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1934877-01	2019-0805-SW	WATER	WALTHAM, MA	08/05/19 10:00	08/05/19

Project Name:	341 SECOND AVENUE	**Lab Number:**	L1934877
Project Number:	132689-002	**Report Date:**	08/07/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

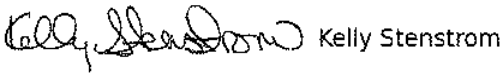
When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Kelly Stenstrom

Title: Technical Director/Representative Date: 08/07/19

METALS

Project Name: 341 SECOND AVENUE
Project Number: 132689-002
Lab Number: L1934877
Report Date: 08/07/19

SAMPLE RESULTS

Lab ID: L1934877-01
Client ID: 2019-0805-SW
Sample Location: WALTHAM, MA
Sample Depth:
Matrix: Water

Date Collected: 08/05/19 10:00
Date Received: 08/05/19
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	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Copper, Total	0.00103		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Iron, Total	0.402		mg/l	0.050	--	1	08/06/19 10:40	08/06/19 18:08	EPA 3005A	19,200.7	MC
Lead, Total	ND		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	08/06/19 16:05	08/06/19 19:53	EPA 245.1	3,245.1	GD
Nickel, Total	ND		mg/l	0.00200	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Zinc, Total	0.01199		mg/l	0.01000	--	1	08/06/19 10:40	08/06/19 15:32	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	76.2		mg/l	0.660	NA	1	08/06/19 10:40	08/06/19 18:08	EPA 3005A	19,200.7	MC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		08/06/19 15:32	NA	107,-	

Project Name: 341 SECOND AVENUE
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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: WG1267944-1										
Iron, Total	ND		mg/l	0.050	--	1	08/06/19 10:40	08/06/19 16:57	19,200.7	LC

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: WG1267944-1										
Hardness	ND		mg/l	0.660	NA	1	08/06/19 10:40	08/06/19 16:57	19,200.7	LC

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: WG1269088-1										
Antimony, Total	ND		mg/l	0.00400	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Lead, Total	ND		mg/l	0.00100	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	08/06/19 10:40	08/06/19 15:07	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Project Name: 341 SECOND AVENUE
Project Number: 132689-002
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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: WG1269250-1										
Mercury, Total	ND		mg/l	0.00020	--	1	08/06/19 16:05	08/06/19 19:14	3,245.1	GD

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: 341 SECOND AVENUE

Project Number: 132689-002

Lab Number: L1934877

Report Date: 08/07/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1267944-2								
Iron, Total	104		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1267944-2								
Hardness	98		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1269088-2								
Antimony, Total	96		-		85-115	-		
Arsenic, Total	108		-		85-115	-		
Cadmium, Total	112		-		85-115	-		
Chromium, Total	100		-		85-115	-		
Copper, Total	97		-		85-115	-		
Lead, Total	97		-		85-115	-		
Nickel, Total	102		-		85-115	-		
Selenium, Total	104		-		85-115	-		
Silver, Total	106		-		85-115	-		
Zinc, Total	109		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1269250-2								
Mercury, Total	100		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: 341 SECOND AVENUE
Project Number: 132689-002

Lab Number: L1934877
Report Date: 08/07/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1267944-3 WG1267944-4 QC Sample: L1934876-02 Client ID: MS Sample												
Iron, Total	14.6	1	16.1	**150**	Q	16.2	**160**	Q	75-125	1		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1267944-3 WG1267944-4 QC Sample: L1934876-02 Client ID: MS Sample												
Hardness	5.43	66.2	73.7	103		74.0	104		75-125	0		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1269088-3 WG1269088-4 QC Sample: L1934876-02 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.4958	99		0.4697	94		70-130	5		20
Arsenic, Total	0.00291	0.12	0.1237	101		0.1212	98		70-130	2		20
Cadmium, Total	ND	0.051	0.05852	115		0.05559	109		70-130	5		20
Chromium, Total	ND	0.2	0.2076	104		0.2085	104		70-130	0		20
Copper, Total	ND	0.25	0.2543	102		0.2538	102		70-130	0		20
Lead, Total	ND	0.51	0.6033	118		0.6026	118		70-130	0		20
Nickel, Total	ND	0.5	0.5320	106		0.5272	105		70-130	1		20
Selenium, Total	ND	0.12	0.1225	102		0.1245	104		70-130	2		20
Silver, Total	ND	0.05	0.05339	107		0.05206	104		70-130	3		20
Zinc, Total	0.01155	0.5	0.5796	114		0.5809	114		70-130	0		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1269250-3 QC Sample: L1933210-02 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00468	94		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1269250-5 QC Sample: L1933288-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00448	90		-	-		70-130	-		20

Lab Duplicate Analysis

Batch Quality Control

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Project Number: 132689-002

Lab Number: L1934877

Report Date: 08/07/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1269250-4 QC Sample: L1933210-02 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1269250-6 QC Sample: L1933288-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: 341 SECOND AVENUE
Project Number: 132689-002

Lab Number: L1934877
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SAMPLE RESULTS

Lab ID: L1934877-01
Client ID: 2019-0805-SW
Sample Location: WALTHAM, MA

Date Collected: 08/05/19 10:00
Date Received: 08/05/19
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	7.1		SU	-	NA	1	-	08/06/19 03:35	121,4500H+-B	DS
Nitrogen, Ammonia	0.144		mg/l	0.075	--	1	08/06/19 02:42	08/06/19 22:07	121,4500NH3-BH	AT
Chromium, Hexavalent	ND		mg/l	0.010	--	1	08/06/19 04:30	08/06/19 05:48	1,7196A	JW

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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: WG1268868-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	08/06/19 02:42	08/06/19 22:01	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1268946-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	08/06/19 04:30	08/06/19 05:39	1,7196A	JW

Lab Control Sample Analysis

Batch Quality Control

Project Name: 341 SECOND AVENUE

Project Number: 132689-002

Lab Number: L1934877

Report Date: 08/07/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1268868-2								
Nitrogen, Ammonia	98		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1268929-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1268946-2								
Chromium, Hexavalent	100		-		85-115	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: 341 SECOND AVENUE
Project Number: 132689-002

Lab Number: L1934877
Report Date: 08/07/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1268868-4 QC Sample: L1934319-01 Client ID: MS Sample												
Nitrogen, Ammonia	0.267	4	3.90	91		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1268946-4 QC Sample: L1934877-01 Client ID: 2019-0805-SW												
Chromium, Hexavalent	ND	0.1	0.092	92		-	-		85-115	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: 341 SECOND AVENUE
Project Number: 132689-002

Lab Number: L1934877
Report Date: 08/07/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1268868-3 QC Sample: L1934319-01 Client ID: DUP Sample						
Nitrogen, Ammonia	0.267	0.276	mg/l	3		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1268929-2 QC Sample: L1934785-01 Client ID: DUP Sample						
pH	6.4	6.4	SU	0		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1268946-3 QC Sample: L1934877-01 Client ID: 2019-0805-SW						
Chromium, Hexavalent	ND	ND	mg/l	NC		20

Project Name: 341 SECOND AVENUE
Project Number: 132689-002

Lab Number: L1934877
Report Date: 08/07/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1934877-01A	Plastic 250ml unpreserved	A	7	7	3.0	Y	Absent		HEXCR-7196(1),PH-4500(.01)
L1934877-01B	Plastic 250ml HNO3 preserved	A	<2	<2	3.0	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)
L1934877-01C	Plastic 500ml H2SO4 preserved	A	<2	<2	3.0	Y	Absent		NH3-4500(28)

*Values in parentheses indicate holding time in days

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GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	341 SECOND AVENUE	**Lab Number:**	L1934877
Project Number:	132689-002	**Report Date:**	08/07/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol 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 reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	341 SECOND AVENUE	**Lab Number:**	L1934877
Project Number:	132689-002	**Report Date:**	08/07/19

REFERENCES

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

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

107 Alpha Analytical - In-house calculation method.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

ALPHA ANALYTICAL

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

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

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

Page 1 of 1

Date Rec'd in Lab: 8/5/19

ALPHA Job #: L1934877

H&A Information

H&A Client: Alliance Residential Co. NE

H&A Address: 465 Medford Street

Boston, MA 02129

H&A Phone: 617-886-7400

H&A Fax: echristmas@haleyaldrich.com

H&A Email: kchatterton@haleyaldrich.com

Project Information

Project Name: 341 Second Avenue

Project Location: Waltham, MA

Project #: 132689-002

(Use Project name as Project #): ☐

Project Manager: Kate Dilaveri

ALPHAQuote #:

Turn-Around Time

Standard ☐ — Due Date:

Rush (only if pre approved) ☑ — # of Days: 2 Day

Deliverables

☑ Email ☐ Fax

☐ EQuIS (1 File) ☑ EQuIS (4 File)

☐ Other:

Billing Information

☑ Same as Client Info

PO #

Regulatory Requirements (Program/Criteria)

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:

☐ NJ ☐ NY

☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Note: Report Ag, As, Cd, Cr III and VI, Cu, Ni, Pb, Sb, Se, Zn, Fe, Hg

Please specify Metals or TAL.

ANALYSIS

1. pH
2. Hardness
3. Ammonia
4. Total metals: see note

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. pH	2. Hardness	3. Ammonia	4. Total metals: see note	Sample Specific Comments	Total # Bottles
34877-01	2019-0805-SW	8/5/2019	10:00	AQ	EJC	X	X	X	X		3

Container Type: P P P P

Preservative: A C D C

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; D = Other; E = Encore; D = BOD Bottle

Westboro: Certification No: MA935

Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	8/5/19 11:00		8/5/19 16:57
	8/5/19 16:57		8/5/19 1630
	8/5/19 1815		8/8/19 [illegible]

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)