HALEY & ALDRICH, INC.
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Boston, MA 02129
(617) 886.7400

25 September 2019
File No. 129485-010

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

Attention: Shauna Little, EPA/OEP RGP Applications Coordinator

Subject: Notice of Intent (NOI)
Temporary Construction Dewatering
Proposed Hamilton Canal District Parking Garage
Parcel 14
Lowell, Massachusetts

Dear Ms. Little:

On behalf of our client, City of Lowell, and in accordance with the National Pollutant Discharge Elimination System (NPDES) Remediation General Permit (RGP) in Massachusetts, MAG910000, this letter submits a Notice of Intent (NOI) and the applicable documentation as required by the US Environmental Protection Agency (EPA) for temporary construction site dewatering under the RGP. Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this submission to facilitate off-site discharge of temporary dewatering during construction activities at the Proposed Hamilton Canal District Parking Garage Project, located at Parcel 14, off Dutton Street in Lowell, Massachusetts.

Site Location and Historical Site Usage

The site is located in Lowell, Massachusetts and is bounded to the south by the Lower Pawtucket Canal and to the east by a canal referred to as the 'Wasteway.' The location of the site is shown on Figure 1, Project Locus. North of the site is a parking lot and west of the site is a vacant lot. The site is located in a mixed commercial and residential area in the highly urbanized downtown neighborhood of Lowell. The area has been developed with factories and industrial buildings since the 1800s.

Historically, the site was part of the Lowell Machine Shop campus from early 1800s to the 1930s. The site was then occupied by a textile manufacturing corporation until 2006 when the building on site was demolished. The site has been occupied by a municipal parking lot since then.

Proposed Activities

The proposed Hamilton Canal District Parking Garage is planned to be a seven-story parking structure with slab on grade foundations, utility installations, landscape improvements, and public green space and walkways.

The ground level floor slab designed at El. 82 to match grades at the canal level and current site grades range from about El. 91 at the northern portion of the site to El. 80 at the southern area of the site, adjacent to the canal. Excavation depths of approximately 5 to 8 ft below current site grades are anticipated. Temporary construction dewatering is necessary to construction below grade spaces and utilities of the proposed garage.

Dewatering System and Off-site Discharge

During the construction activities, it will be necessary to perform temporary dewatering to control surface water runoff from precipitation, groundwater seepage and construction-generated water to enable remedial excavations in-the-dry. Dewatering activities are anticipated to start in September 2019 and is anticipated to be required through May 2021. On average, we estimate effluent discharge rates of about 50 gallons per minute (gpm), with occasional peak flows of approximately 150 gpm during significant precipitation events. Temporary dewatering will be conducted from sumps located in excavations or from dewatering wells installed at the site.

Construction dewatering includes piping and discharging directly to the Wasteway Canal located on the east of the site. An effluent treatment system will be designed by the Contractor to meet the 2017 NPDES RGP Discharge Effluent Criteria. Prior to discharge, collected water will be routed through a sedimentation tank and a bag filter and other necessary treatment components, to remove suspended solids and chemical constituents, as shown on Figure 3.

Groundwater Quality Data

One groundwater sample was obtained from observation well HA17-110(OW) on 19 July 2018. The collected sample was submitted to Alpha Analytical Laboratory (Alpha) of Westborough, MA, for chemical analysis of 2017 NPDES Remediation General Permit parameters including volatile organic compounds, semivolatile organic compounds, polycyclic aromatic hydrocarbons, total metals, total petroleum hydrocarbons, polychlorinated biphenyls, total suspended solids, ammonia, phenolics, chloride, total cyanide, total phenolics, and total residual chlorine.

Haley & Aldrich collected an additional groundwater sample from the same observation well HA17-110(OW) on 06 August 2019. The collected sample was submitted to Alpha for chemical analysis of a subset of 2019 NPDES Remediation General Permit parameters including total metals, pH, ammonia, chloride, and total suspended solids.

Refer to Table I for a summary of groundwater analytical data. The recent groundwater analyses did not detect concentrations of chemical constituents above the 2017 NPDES RGP Project-Specific Effluent Limits or the applicable Massachusetts Contingency Plan RCGW-2 reportable concentrations. The construction dewatering effluent at the Site will be managed under an RGP. The location of the observation well HA17-110(OW) is shown on Figure 2.

Receiving Water Quality Information and Dilution Factor

On 19 July 2018 and 1 August 2018, Haley & Aldrich collected a receiving water sample from the Wasteway Canal area using a disposable polyethylene bailer. The surface water sample was collected and submitted to Alpha for chemical analysis of pH, ammonia, hardness, and total metals. Field parameters, including

temperature, were collected from surface water sample at the time of sampling. The results of water quality testing are summarized in Table I.

Haley & Aldrich collected an additional receiving water sample from the Wasteway Canal area on 06 August 2019. The surface water sample was collected and submitted to Alpha for chemical analysis of hardness, pH, and Ammonia.

The results from analysis were used to calculate the site Water Quality Based Effluent Limitations (WQBELs). U.S. Geological Survey (USGS) StreamStats program did not have data for the seven-day-ten-year flow (7Q10) of the receiving water. No dilution factor or 7Q10 value was used in the WQBEL Calculation spreadsheet.

Ethanol Discussion

Ethanol sampling was not conducted on the groundwater samples collected in July 2018 and August 2019 as site history does not suggest that ethanol was stored at the property, and a petroleum product containing ethanol is not known to have been released at the site. Ethanol has been increasingly used in fuels since 2006 (according to the 2016 NOI Fact Sheet), and according to site history, the site has been used a textile manufacturing and parking lot since the 1960's, with no known fuel-related storage or handling activities conducted onsite.

Effluent Criteria Determination

The EPA suggested WQBEL Calculation spreadsheet was used to calculate the effluent criteria for the site using groundwater and receiving water data. The resulting criteria was tabulated in the attached Table I. As requested by EPA, the Microsoft Excel spreadsheet for the WQBEL calculation will be submitted to the EPA via email, for their review upon submission of this NOI.

Historic Property Review

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), the site is part of the Lowell National Historic Park and Lowell Locks and Canal District the which are both listed as historic properties. Proposed discharges and discharge-related activities are not considered to have the potential to cause effects on the historic properties. The discharge is considered to meet Criterion B. Documentation is included in Appendix B.

Owner and Operator Information

Owner:
City of Lowell
375 Merrimack Street
Lowell, MA 01852
Contact: Eileen Donoghue
City Manager

Operator:
Shawmut Design and Construction
560 Harrison Avenue
Boston, MA 02118
Contact: Joseph Pollock
Project Manager

Appendices

The completed "Suggested Notice of Intent" form as provided in the RGP is enclosed in Appendix A. Haley & Aldrich plans to monitor the Contractor's dewatering activities on behalf of the City of Lowell in accordance with the requirements for this NOI submission.

Appendices B and C include the National Register of Historic Places and ESA Documentation, respectively. Copies of the groundwater testing laboratory data reports are provided in Appendix D. Since the Site Contractor's dewatering submittal is not yet available, Appendix E provides details of typical the dewatering system components used to remove suspended solids and undissolved chemical constituents. A Best Management Practices Plan (BMPP), which outlines the proposed discharge operations covered under the RGP, will be available at the site and is not being submitted with this NOI as requested by EPA.

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

Lindsey R. Howard, P.E. (NH)
Staff Environmental Engineer

Kenneth N. Alepidis, P.G. (NH)
Senior Technical Specialist - Geology

Attachments:

Table I – Summary of Groundwater Quality Data
Figure 1 – Site Locus
Figure 2 – Site and Subsurface Location Plan
Figure 3 – Proposed Treatment System Schematic

Appendix A – NOI for RGP
Appendix B – National Register of Historic Places and Massachusetts Historical Commission Documentation
Appendix C – Endangered Species Act Documentation
Appendix D – Laboratory Data Reports
Appendix E – Typical Dewatering Treatment System Information

c: City of Lowell, Eileen Donoghue
Walker Parking Consultants, Christopher Gradziel
Shawmut Design and Construction, Joseph Pollock

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TABLE I
SUMMARY OF ANALYTICAL RESULTS
WALKER CONSULTANTS
LOWELL GARAGE
LOWELL, MA

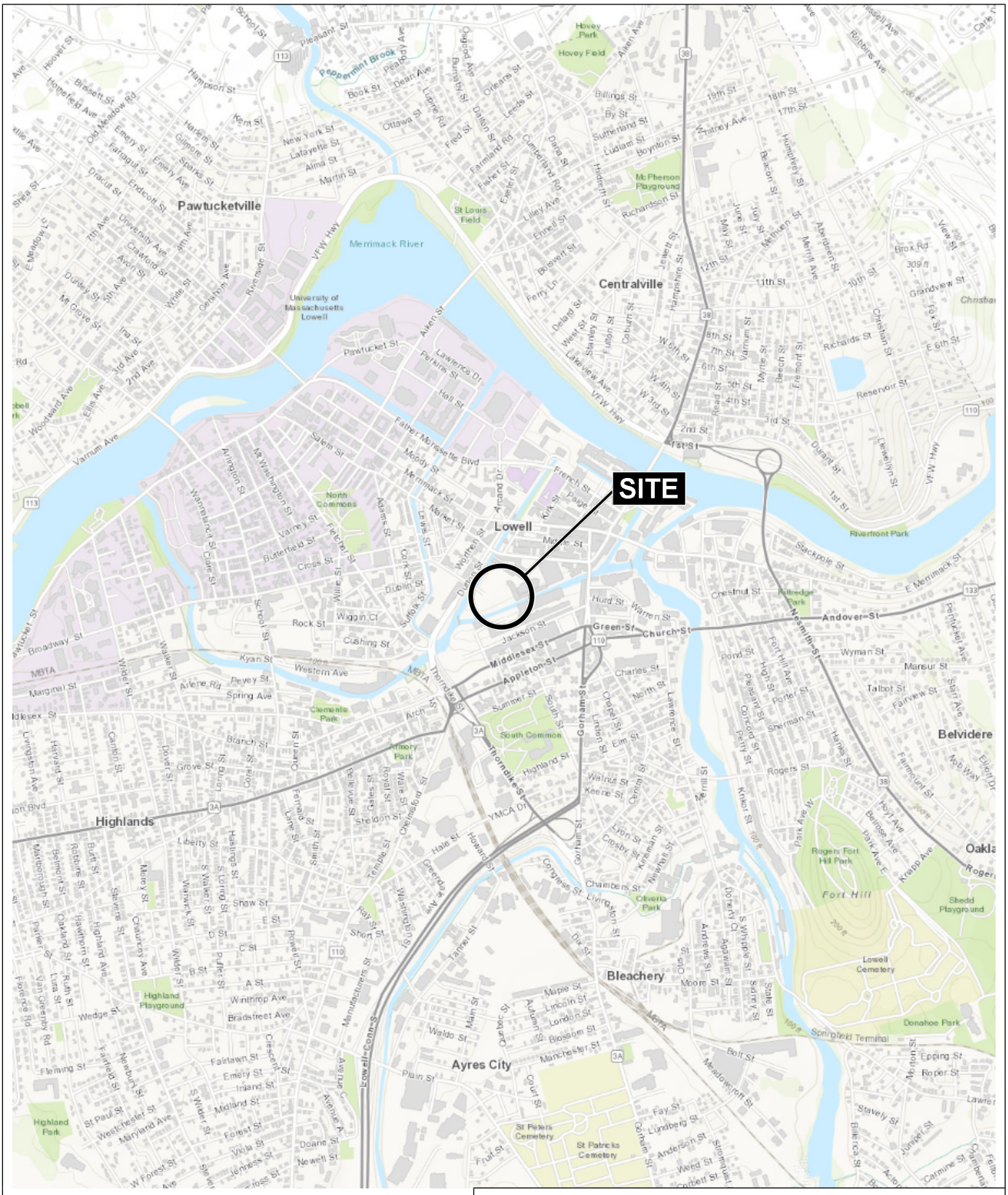
Precharacterization Grid	Action Level						
Location Name	MCP 2014 RCGW-2 Reportable Concentrations	NPDES Project Specific Effluent Criteria	HA17-110(OW)	HA17-110(OW)	LOWELL REC WATER	LOWELL REC WATER	LOWELL REC WATER
Sample Name			HA17-110(OW)-20180719	HA17-110(OW)-2019-08	LOWELL REC WATER-20180719	LOWELL REC WATER-20180801	LOWELL REC WATER-2019-08
Sample Date			07/19/2018	08/06/2019	07/19/2018	08/01/2018	08/06/2019
Sample Type			Primary	Primary	Primary	Primary	Primary
Lab Sample ID			L1827825-01	L1934969-01	L1827825-02	L1829832-01	L1934969-02
Volatile Organic Compounds (ug/L)							
1,1,1-Trichloroethane	4000	200	ND (2)	-	-	-	-
1,1,2-Trichloroethane	900	5	ND (1.5)	-	-	-	-
1,1-Dichloroethane	2000	70	ND (1.5)	-	-	-	-
1,1-Dichloroethene	80	3.2	ND (1)	-	-	-	-
1,2-Dibromoethane (Ethylene Dibromide)	2	0.05	ND (0.01)	-	-	-	-
1,2-Dichlorobenzene	2000	600	ND (5)	-	-	-	-
1,2-Dichloroethane	5	5	ND (1.5)	-	-	-	-
1,3-Dichlorobenzene	6000	320	ND (5)	-	-	-	-
1,4-Dichlorobenzene	60	5	ND (5)	-	-	-	-
Acetone	50000	7970	ND (10)	-	-	-	-
Benzene	1000	5	ND (1)	-	-	-	-
Carbon tetrachloride	2	4.4	ND (1)	-	-	-	-
cis-1,2-Dichloroethene	20	70	ND (1)	-	-	-	-
Ethylbenzene	5000	*	ND (1)	-	-	-	-
m,p-Xylenes	NA	*	ND (2)	-	-	-	-
Methyl Tert Butyl Ether	5000	70	ND (10)	-	-	-	-
Methylene chloride	2000	4.6	ND (1)	-	-	-	-
o-Xylene	NA	*	ND (1)	-	-	-	-
Tert-Amyl Methyl Ether (TAME)	NA	90	ND (20)	-	-	-	-
Tert-Butyl Alcohol (tert-Butanol)	NA	120	ND (100)	-	-	-	-
Tetrachloroethene	50	5	ND (1.5)	-	-	-	-
Toluene	40000	*	ND (1)	-	-	-	-
Trichloroethene	5	5	ND (1)	-	-	-	-
Vinyl chloride	2	2	ND (1)	-	-	-	-
Xylene (total)	3000	*	ND (1)	-	-	-	-
Volatile Organic Compounds SIM (ug/L)							
1,4-Dioxane	6000	200	ND (50)	-	-	-	-
Total VOCs	NA	NA	ND	-	-	-	-
Total BTEX	NA	100	ND	-	-	-	-
Semi-Volatile Organic Compounds (ug/L)							
bis(2-Ethylhexyl)phthalate	50000	101	ND (2.2)	-	-	-	-
Butyl benzylphthalate	10000	+	ND (5)	-	-	-	-
Diethyl phthalate	9000	+	ND (5)	-	-	-	-
Dimethyl phthalate	50000	+	ND (5)	-	-	-	-
Di-n-butylphthalate	5000	+	ND (5)	-	-	-	-
Di-n-octyl phthalate	100000	+	ND (5)	-	-	-	-
Semi-Volatile Organic Compounds (SIM) (ug/L)							
Acenaphthene	6000	**	ND (0.1)	-	-	-	-
Acenaphthylene	40	**	ND (0.1)	-	-	-	-
Anthracene	30	**	ND (0.1)	-	-	-	-
Benzo(a)anthracene	1000	1	ND (0.1)	-	-	-	-
Benzo(a)pyrene	500	1	ND (0.1)	-	-	-	-
Benzo(b)fluoranthene	400	1	ND (0.1)	-	-	-	-
Benzo(g,h,i)perylene	20	**	ND (0.1)	-	-	-	-
Benzo(k)fluoranthene	100	1	ND (0.1)	-	-	-	-
Chrysene	70	1	ND (0.1)	-	-	-	-
Dibenz(a,h)anthracene	40	1	ND (0.1)	-	-	-	-
Fluoranthene	200	**	ND (0.1)	-	-	-	-
Fluorene	40	**	ND (0.1)	-	-	-	-
Indeno(1,2,3-cd)pyrene	100	1	ND (0.1)	-	-	-	-
Naphthalene	700	20	ND (0.1)	-	-	-	-
Pentachlorophenol	200	1	ND (1)	-	-	-	-
Phenanthrene	10000	**	ND (0.1)	-	-	-	-
Pyrene	20	**	ND (0.1)	-	-	-	-
Total SVOCs	NA	NA	ND	-	-	-	-
Total Phthalates	NA	190	ND	-	-	-	-
Group I PAHs	NA	1	ND	-	-	-	-
Group II PAHs	NA	100	ND	-	-	-	-
Total Petroleum Hydrocarbons (ug/L)							
Petroleum hydrocarbons	5000	5000	ND (4000)	-	-	-	-
Metals (ug/L)							
Chromium VI (Hexavalent), Dissolved	300	323	ND (10)	ND (10)	-	ND (10)	-
Antimony, Total	8000	206	ND (4)	ND (4)	-	ND (4)	-
Arsenic, Total	900	104	ND (1)	ND (1)	-	1.57	-
Cadmium, Total	4	10.2	ND (0.2)	ND (0.2)	-	ND (0.2)	-
Chromium, Total	300	323	ND (1)	ND (1)	-	2.36	-
Copper, Total	100000	242	ND (1)	ND (1)	-	14.63	-
Cyanide, Total	30	178000	5	ND (5)	-	-	-
Hardness, Total	NA	NA	269000	146000	-	22600	21200
Iron, Total	NA	5000	ND (50)	ND (50)	-	1630	-
Lead, Total	10	160	ND (1)	ND (1)	-	9.21	-
Mercury, Total	20	0.739	ND (0.2)	ND (0.2)	-	ND (0.2)	-
Nickel, Total	200	1450	ND (2)	ND (2)	-	2.73	-
Selenium, Total	100	235.8	ND (5)	ND (5)	-	ND (5)	-
Silver, Total	7	35.1	ND (0.4)	ND (0.4)	-	ND (0.4)	-
Zinc, Total	900	420	ND (10)	ND (10)	-	63.19	-
Pesticides and PCBs (ug/L)							
Aroclor-1016 (PCB-1016)	5	1	ND (0.25)	-	-	-	-
Aroclor-1221 (PCB-1221)	5	1	ND (0.25)	-	-	-	-
Aroclor-1232 (PCB-1232)	5	1	ND (0.25)	-	-	-	-
Aroclor-1242 (PCB-1242)	5	1	ND (0.25)	-	-	-	-
Aroclor-1248 (PCB-1248)	5	1	ND (0.25)	-	-	-	-
Aroclor-1254 (PCB-1254)	5	1	ND (0.25)	-	-	-	-
Aroclor-1260 (PCB-1260)	5	1	ND (0.2)	-	-	-	-
Other							
pH (lab), Total (pH units)	NA	6.5 - 8.3	-	6.4	6.7	6.7	7.2
Salinity, Total (SU)	NA	NA	ND (2)	-	ND (2)	-	-
Ammonia, Total (ug/L)	NA	Report	ND (75)	79	119	-	ND (75)
Chloride, Total (ug/L)	NA	Report	779000	419000	-	-	-
Chlorine, residual, Total (ug/L)	NA	11	ND (20)	-	-	-	-
Chromium III (Trivalent), Total (ug/L)	600	323	ND (10)	ND (10)	-	ND (10)	-
Total phenols (ug/L)	NA	1080	ND (30)	-	-	-	-
Total Suspended Solids (TSS) (ug/L)	NA	30000	9700	6400	-	-	-

ABBREVIATIONS

- : Not analyzed
mg/L: milligram per liter
NA: Not Applicable
ND (2.5): Result not detected above reporting limit (shown in parentheses)

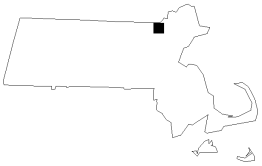
NOTES:

1. Analytes detected in at least one sample are reported herein. For a complete list of analytes see the laboratory data sheets.
2. **Bold** values indicate an exceedance of applicable 2017 NPDES RGP Project Limit Concentrations.
3. *: Indicates effluent limit is limited as total BTEX of 100 ug/l.
4. **: Indicates effluent limit is limited as total Group II PAHs of 100 ug/l.
5. +: Indicates effluent limit is limited as total Phthalates of 190 ug/l.
6. pH and Temperature were collected in the field.



MAP SOURCE: ESRI

SITE COORDINATES: 42°38'35"N, 71°18'46"W



HALEY ALDRICH

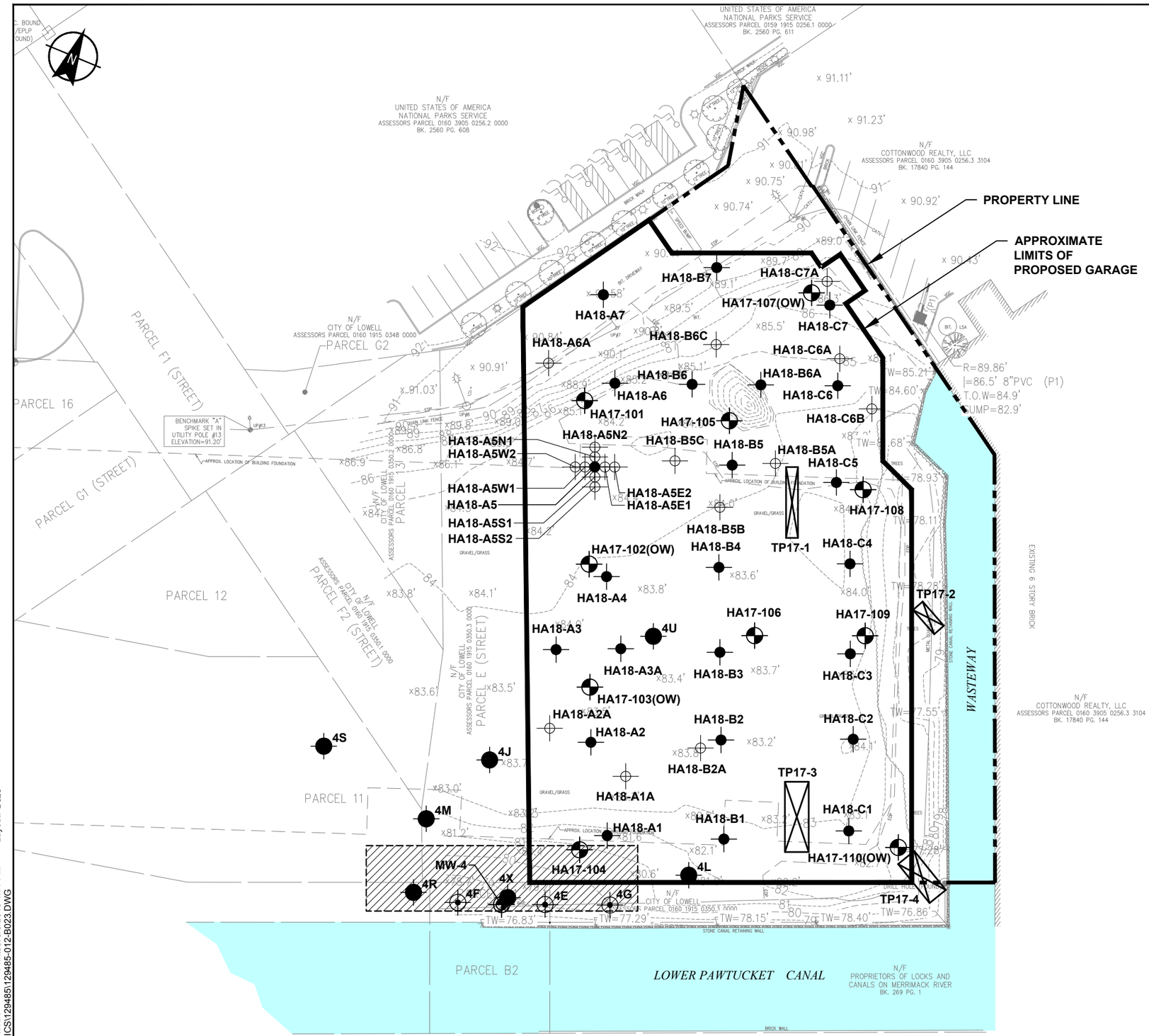
HAMILTON CANAL DISTRICT PARKING GARAGE
PARCEL 14
LOWELL, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
SEPTEMBER 2019

FIGURE 1

129485-002_1_LOCUS.PDF



LEGEND

HA18-A1A	DESIGNATION AND APPROXIMATE LOCATION OF GEOPROBE BORING DRILLED BY CRAWFORD DRILLING SERVICES ON 23 TO 25 JULY 2018
HA18-A1	DESIGNATION AND APPROXIMATE LOCATION OF GEOPROBE BORING DRILLED BY G&M SUBSURFACE FROM 2 THROUGH 5 APRIL 2018
HA17-101	DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY NORTHERN DRILL SERVICE FROM 19 THROUGH 23 JUNE 2017
TP17-1	DESIGNATION AND APPROXIMATE LOCATION OF TEST PIT EXCAVATED BY MARCHESE CONSTRUCTION ON 6 AND 7 JULY 2017
4U	DESIGNATION AND REPORTED LOCATION OF TEST BORING ADVANCED BY OTHERS IN AUGUST 2008
4E	DESIGNATION AND REPORTED LOCATION OF TEST BORING ADVANCED BY OTHERS IN AUGUST 2005
MW-4	DESIGNATION AND REPORTED LOCATION OF TEST BORING ADVANCED BY OTHERS IN AUGUST 2004
(OW)	INDICATES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE
	REPORTED LIMITS OF REMEDIAL EXCAVATION CONDUCTED IN APRIL 2009

NOTES

1. BASE PLAN TAKEN FROM A DRAWING TITLED "EXISTING CONDITIONS PLAN OF LAND, SV-1", PREPARED BY VANASSE HANGEN BRUSTLIN INC., DATED 7 JUNE 2017.
2. ELEVATIONS ARE IN FEET AND REFERENCE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. LOCATIONS OF TEST BORINGS BY OTHERS AND LIMITS OF REMEDIAL EXCAVATION BASED ON FIGURE 4, FROM A REPORT TITLED "CLASS A-3 RESPONSE ACTION OUTCOME REPORT AND ACTIVITY & USE LIMITATION", PREPARED BY TRC ENVIRONMENTAL CORPORATION AND DATED JULY 2010.

0 50 100
SCALE IN FEET

HALEY ALDRICH

HAMILTON CANAL DISTRICT PARKING GARAGE
PARCEL 14
LOWELL, MASSACHUSETTS

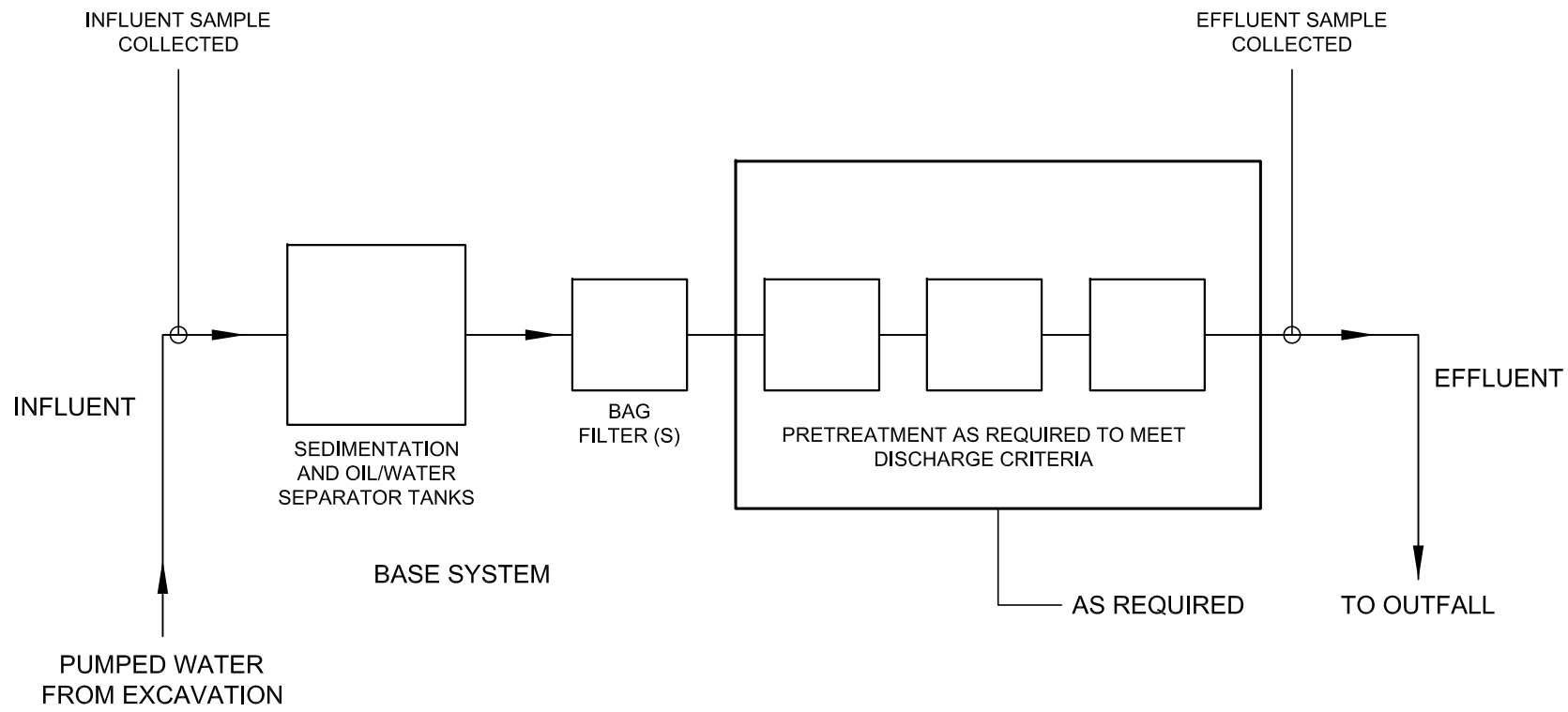
SITE AND SUBSURFACE EXPLORATION LOCATION PLAN

SCALE: AS SHOWN
SEPTEMBER 2019

FIGURE 2

ERVIN, DAYNA Printed: 8/8/2018 4:11 PM Layout: B023
J:\GRAPHICS\129485\129485-012-B023.DWG

G:\38625\NPDES\FIGURES\COPY-A142.DWG



LEGEND:

→ DIRECTION OF FLOW

NOTE:

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

HALEY ALDRICH

HAMILTON CANAL DISTRICT PARKING GARAGE
PARCEL 14
LOWELL, MASSACHUSETTS

PROPOSED TREATMENT SYSTEM SCHEMATIC

SCALE: NONE
SEPTEMBER 2019

FIGURE 3

APPENDIX A

NOI for RGP

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

A. General site information:

1. Name of site: Hamilton Canal District Parcel 14 Parking Garage	Site address: Parcel 14 (350 Dutton Street) Street:		
	City: Lowell	State: MA	Zip: 01854
2. Site owner City of Lowell Owner is (check one): ☐ Federal ☐ State/Tribal ☐ Private ☒ Other; if so, specify: Municipality	Contact Person: Eileen Donoghue, City Manager		
	Telephone: 978-674-4400	Email: edonoghue@lowellma.gov	
	Mailing address: Street: 375 Merrimack Street		
	City: Lowell	State: MA	Zip: 01852
3. Site operator, if different than owner Shawmut Design and Construction	Contact Person: Joseph Pollock		
	Telephone: 603-540-2394	Email:	
	Mailing address: 560 Harrison Avenue Street:		
	City: Boston	State: MA	Zip: 02118
4. NPDES permit number assigned by EPA: N/A NPDES permit is (check all that apply: ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	5. Other regulatory program(s) that apply to the site (check all that apply): ☒ MA Chapter 21e; list RTN(s): 3-25687 ☐ NH Groundwater Management Permit or Groundwater Release Detection Permit:	☐ CERCLA ☐ UIC Program ☐ POTW Pretreatment ☐ CWA Section 404	

B. Receiving water information:

1. Name of receiving water(s):	Waterbody identification of receiving water(s):	Classification of receiving water(s):
Wasteway Canal/Lower Pawtucket Canal	MA84A-29	Class B Category 5

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. Yes - MA84A-29 is on the 303(d) list - Impairments include DDT in fish tissue, lead, mercury in fish tissue, PCBs in fish tissue, No final EPA TMDL

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.	NA - no low flow data for canals
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.	NA - no low flow data for canals and no dilution factor

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

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

C. Source water information:

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

☒ Contaminated groundwater Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☒ Yes ☐ No	☐ Contaminated surface water Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☐ Yes ☐ No	☐ The receiving water ☐ A surface water other than the receiving water; if so, indicate waterbody:	☐ Potable water; if so, indicate municipality or origin: ☒ Other; if so, specify: Although "Contaminated Groundwater" is listed, see table for compounds actually detected

2. Source water contaminants: None above RGP effluent limits	
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): Wasteway Canal	Outfall location(s): (Latitude, Longitude) 42.643381, -71.312655
Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ☒ Indirect discharge, if so, specify: Flows through treatment system directly to Wasteway Canal ☐ 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 ☒ NA Has the operator has received permission from the owner to use such system for discharges? (check one): ☐ Yes ☒ NA if so, explain, with an estimated timeframe for obtaining permission: Has the operator attached a summary of any additional requirements the owner of this system has specified? (check one): ☐ Yes ☒ NA	
Provide the expected start and end dates of discharge(s) (month/year): September 2019 - May 2021 Indicate if the discharge is expected to occur over a duration of: ☐ less than 12 months ☒ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ☒ Yes ☐ No	

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

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

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

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		X	2	4500NH3-BH	75	79	79	Report mg/L	---
Chloride		X	2	300.0	25000	779000	599000	Report µg/l	---
Total Residual Chlorine	X		1	4500CL	20	ND	ND	0.2 mg/L	**11 ug/L**
Total Suspended Solids		X	2	2540D	5000	9700	8050	30 mg/L	—
Antimony Total		X	2	6020A	4	ND	ND	206 µg/L	640
Arsenic Total		X	2	6020A	1	ND	ND	104 µg/L	10
Cadmium Total		X	2	6020A	0.2	ND	ND	10.2 µg/L	0.4648
Chromium III		X	2	6020A	10	ND	ND	323 µg/L	156.7
Chromium VI	X		2	3500CR	10	ND	ND	323 µg/L	11.4
Copper Total	X		2	6020A	1	ND	ND	242 µg/L	17.4
Iron Total		X	2	200.7	50	ND	ND	5,000 µg/L	1000
Lead Total		X	2	6020A	1	ND	ND	160 µg/L	8.06
Mercury Total		X	2	245.1	0.2	ND	ND	0.739 µg/L	0.91
Nickel Total		X	2	6020A	2	ND	ND	1,450 µg/L	96.7
Selenium Total		X	2	6020A	5	ND	ND	235.8 µg/L	5.0
Silver Total	X		2	6020A	0.4	ND	ND	35.1 µg/L	13.3
Zinc Total	X		2	6020A	10	ND	ND	420 µg/L	222.4
Cyanide Total		X	2	4500CN	5	5	5	178 mg/L	5.2
B. Non-Halogenated VOCs									
Total BTEX		X	1	8260C	NA	ND	ND	100 µg/L	---
Benzene		X	1	8260C	1	ND	ND	5.0 µg/L	---
1,4 Dioxane	X		1	8260C-SIM	50	ND	ND	200 µg/L	---
Acetone		X	1	8260C	10	ND	ND	7.97 mg/L	---
Phenol		X	1	8270D	30	ND	ND	1,080 µg/L	300

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	X		1	8260C	1	ND	ND	4.4 µg/L	1.6
1,2 Dichlorobenzene	X		1	8260C	5	ND	ND	600 µg/L	---
1,3 Dichlorobenzene	X		1	8260C	5	ND	ND	320 µg/L	---
1,4 Dichlorobenzene	X		1	8260C	5	ND	ND	5.0 µg/L	---
Total dichlorobenzene	X		1	8260C	NA	NA	NA	763 µg/L in NH	---
1,1 Dichloroethane	X		1	8260C	1.5	ND	ND	70 µg/L	---
1,2 Dichloroethane	X		1	8260C	1.5	ND	ND	5.0 µg/L	---
1,1 Dichloroethylene	X		1	8260C	1	ND	ND	3.2 µg/L	---
Ethylene Dibromide	X		1	8260C	0.01	ND	ND	0.05 µg/L	---
Methylene Chloride	X		1	8260C	1	ND	ND	4.6 µg/L	---
1,1,1 Trichloroethane	X		1	8260C	2	ND	ND	200 µg/L	---
1,1,2 Trichloroethane	X		1	8260C	1.5	ND	ND	5.0 µg/L	---
Trichloroethylene		X	1	8260C	1	ND	ND	5.0 µg/L	---
Tetrachloroethylene		X	1	8260C	1.5	ND	ND	5.0 µg/L	3.3
cis-1,2 Dichloroethylene	X		1	8260C	1	ND	ND	70 µg/L	---
Vinyl Chloride	X		1	8260C	1	ND	ND	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	X		1	8270D	NA	ND	ND	190 µg/L	
Diethylhexyl phthalate	X		1	8270D	2.2	ND	ND	101 µg/L	2.2
Total Group I PAHs		X	1	8270D	NA	ND	ND	1.0 µg/L	---
Benzo(a)anthracene		X	1	8270D	0.1	ND	ND	As Total PAHs	0.0038
Benzo(a)pyrene		X	1	8270D	0.1	ND	ND		0.0038
Benzo(b)fluoranthene		X	1	8270D	0.1	ND	ND		0.0038
Benzo(k)fluoranthene		X	1	8270D	0.1	ND	ND		0.0038
Chrysene		X	1	8270D	0.1	ND	ND		0.0038
Dibenzo(a,h)anthracene		X	1	8270D	0.1	ND	ND		0.0038
Indeno(1,2,3-cd)pyrene		X	1	8270D	0.1	ND	ND		0.0038

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		X	1	8270D	NA	ND	ND	100 µg/L	---
Naphthalene		X	1	8260C	0.1	ND	ND	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs		X	1	608	0.2 -0.25	ND	ND	0.000064 µg/L	---
Pentachlorophenol	X		1	8270D	1.0	ND	ND	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons		X	1	1664A	4000	ND	ND	5.0 mg/L	---
Ethanol								Report mg/L	---
Methyl-tert-Butyl Ether	X		1	8260C	10	ND	ND	70 µg/L	20
tert-Butyl Alcohol	X		1	8260C	100	ND	ND	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	X		1	8260C	20	ND	ND	90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
Hardness		X	2	200.7	660	269,000	207,500		
Salinity		X	1	2520B	2	ND	ND		
pH		X	2			6.42	6.41		
2-Butanone (Methyl Ethyl Ketone)		X	0	8260C		NA	NA		
2-Phenylbutane (sec-Butylbenzene)		X	0	8260C		NA	NA		
Isopropylbenzene (Cumene)		X	0	8260C		NA	NA		
n-Butylbenzene		X	0	8260C		NA	NA		
n-Propylbenzene		X	0	8260C		NA	NA		
2-Methylnaphthalene		X	0	8270DSIM		NA	NA		
bis(2-Ethylhexyl)phthalate		X	0	8270D		NA	NA		
C11-C22 Aromatic Hydrocarbons		X	0			NA	NA		
C19-C36 Aliphatic Hydrocarbons		X	0			NA	NA		
C9-C18 Aliphatic Hydrocarbons		X	0			NA	NA		
Sulfur		X	0			NA	NA		
Conductivity (umhos/cm)		X	0			NA	NA		

See Attached Table 1

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:

Following will be applied IF REQUIRED per effluent monitoring sampling

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 tank and a bag filter and other necessary treatment components (potentially: Ion exchange, GAC, oil/water seperator), to remove suspended solids and undissolved chemical constituents, as shown on Figure 3 of the NPDES permit application.

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

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

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

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

☐ Chlorination ☐ De-chlorination

3. Provide the **design flow capacity** in gallons per minute (gpm) of the most limiting component. Indicate the most limiting component: 150 gpm Is use of a flow meter feasible? (check one): ☒ Yes ☐ No, if so, provide justification:	
Provide the proposed maximum effluent flow in gpm. 150 gpm	
Provide the average effluent flow in gpm. 50 gpm	
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged: NA	

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

F. Chemical and additive information

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

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

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

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)).

See attached manufacturers cut sheets and SDSs for equipment which may be utilized if necessary. This information is only included as a contingency and is not currently needed based on groundwater data. Exact specifications on frequency, duration, quantity, and method of application are not known at this time. If the system eventually requires chemical additives, these details will be provided to EPA.

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

See above

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 ☒ N/A

I. Supplemental information

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

Refer to attached Haley & Aldrich, Inc. letter

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

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

J. Certification requirement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
BMPP certification statement: A BMPP meeting the requirements of this general permit will be implemented upon initiation of discharge.
Notification provided to the appropriate State, including a copy of this NOI, if required. Check one: Yes ☒ No ☐ N/A
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested. Check one: Yes ☐ No ☒
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested. Check one: Yes ☐ No ☐ NA ☒ Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission. Check one: Yes ☐ No ☐ NA ☒
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify: Check one: Yes ☐ No ☐ NA ☒
Signature:  Date: **9/25/2019**
Print Name and Title: Joseph Pollock, Project Manager

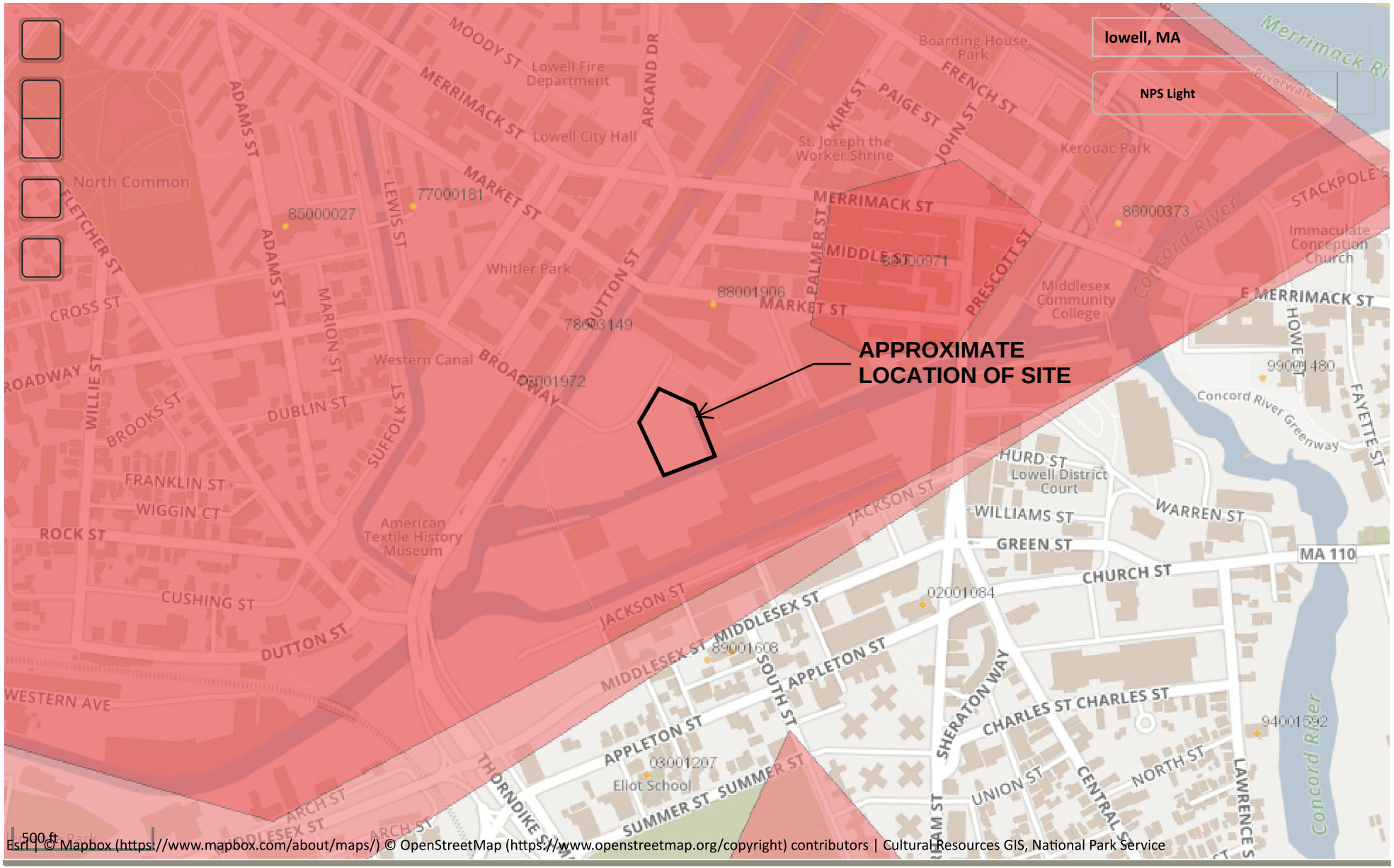
APPENDIX B

National Register of Historic Places and
Massachusetts Historical Commission Documentation

National Register of Historic Places

National Park Service
U.S. Department of the Interior

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



Form No. 10-306 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR FEDERAL PROPERTIES

FOR NPS USE ONLY
RECEIVED SEP 3 1985
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC

AND/OR COMMON
Lowell National Historical Park

2 LOCATION

STREET & NUMBER Multiple
Mailing Address: 169 Merrimack Street _NOT FOR PUBLICATION

CITY, TOWN
Lowell, Massachusetts _ VICINITY OF

CONGRESSIONAL DISTRICT
5

STATE	CODE	COUNTY	CODE
Massachusetts	025	Middlesex	017

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
X DISTRICT	_PUBLIC	X OCCUPIED	_AGRICULTURE	X MUSEUM
_BUILDING(S)	_PRIVATE	_UNOCCUPIED	X COMMERCIAL	X PARK
_STRUCTURE	X BOTH	_WORK IN PROGRESS	X EDUCATIONAL	X PRIVATE RESIDENCE
_SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	_ENTERTAINMENT	X RELIGIOUS
_OBJECT	X IN PROCESS	X YES: RESTRICTED	X GOVERNMENT	_SCIENTIFIC
	_BEING CONSIDERED	_YES: UNRESTRICTED	X INDUSTRIAL	X TRANSPORTATION
		_NO	_MILITARY	_OTHER:

4 AGENCY

REGIONAL HEADQUARTERS: *(If applicable)*
National Park Service
STREET & NUMBER
15 State Street
CITY, TOWN
Boston, _____ VICINITY OF
STATE
Massachusetts

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.
Northern Middlesex County Registry of Deeds
STREET & NUMBER
Gorham Street
CITY, TOWN
Lowell,
STATE
Massachusetts

6 REPRESENTATION IN EXISTING SURVEYS

TITLE Report: Lowell National Historical Park and Preservation District Cultural Resource Inventory by Shepley Bulfinch Richardson & Abbott

DATE
1980
X FEDERAL _STATE _COUNTY _LOCAL

DEPOSITORY FOR SURVEY RECORDS
National Park Service, 15 State Street
CITY, TOWN
Boston,
STATE
Massachusetts

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	__UNALTERED	X ORIGINAL SITE
__GOOD	__RUINS	X ALTERED	__MOVED DATE_____
X FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

Lowell National Historical Park, authorized by Congress on June 5, 1978, represents an innovative concept in the National Park System. The concept minimizes federal property ownership and provides for the preservation of historically significant structures through other public agencies and the private sector. The Park's enabling legislation also empowers the Secretary of the Interior to provide funding and technical assistance through the Lowell Historic Preservation Commission to cooperating owners of historic properties in order to develop and/or preserve significant resources according to Department standards and in ways which complement Park development. The Lowell Historic Preservation District surrounds the Park as a buffer zone and enables federal assistance in the preservation and revitalization of Lowell, while the Park consists of the areas intended for intensive visitor use in the interpretation of Lowell and its canal system.

The Park includes within its boundaries the 5.6 mile power canal system, a portion of the central business district, and three major mill complexes. The area within the Park boundaries totals 134 acres, but present plans envision direct National Park Service ownership of only a handful of buildings, with other property remaining in private hands. The District includes the mills or mill sites of most of the rest of the major textile corporations, the remainder of the historic central business district, and areas along the Concord River where smaller factories flourished outside the main waterpower system.

There are 895 properties within the Park and Preservation Districts. They are classified as follows:

308 residential buildings
- 147 single family
- 62 duplexes
- 99 multiple family

210 commercial buildings
130 buildings within textile mill complexes
27 other industrial structures
16 schools
9 churches
24 government buildings
92 vacant lots
33 components of the canal system
11 bridges
37 miscellaneous structures (theaters, parking garages, playgrounds, etc.)

In terms of condition, the properties (excluding the canals) are classified according to 1979 data as follows:

56 excellent
412 good
244 need minor repair
70 need major repair
8 derelict

In terms of period, the properties (excluding the canals) are classified as follows:

3 pre-1820	93 1870s
20 1820s	78 1880s

44 1830s	122 1890s
78 1840s	166 1900-1925
45 1850s	45 1926-1950
27 1860s	67 post-1950

The Park and the District's most important historical resources are the canal system, the remaining major mill complexes, and the central business district's nineteenth century commercial buildings. The District also includes elements of other historic industrial enterprises, particularly along the Concord River. Residential properties within the District represent most of the range of styles, forms, and periods of Lowell's architectural history, but these houses generally fall short of Lowell's historic houses outside the District in quantity, quality, and concentration.

All properties owned or leased by the National Park Service (except one) are included in at least one of three existing historic districts on the National Register of Historic Places: City Hall Historic District, Locks and Canals Historic District, and Merrimack-Middle Street Historic District. Park-owned and leased properties are listed below:

Old City Hall (City Hall H.D.): The most important early municipal building in Lowell, this structure has served combined government/commercial functions. Constructed in 1830 by the town of Lowell, the building served as the town's (and later the city's) principal meeting hall. However, alterations to the building in 1854 resulted in its conversion to a municipal office building. A private party acquired the building in 1896 and made major changes to the interior and exterior of the structure to facilitate its commercial use, and it has continued to serve a commercial function. There are stores on the first floor; the second and the third floors are vacant; and the cellar is used for storage. The building bears little resemblance to its original Greek Revival appearance. In 1854, a third floor was added, and the first floor level was lowered to the present sidewalk elevation. A one-story brick addition was built on the south side in 1886. Ten years later the owner rebuilt the second and third floor partitions, modernized the first floor partitions to include the one-story western addition, and drastically altered the facades to their present Colonial Revival appearance.

Presently, the storefronts have large display windows, enframed with enameled metal panels. A few elements of late nineteenth century cast iron storefronts are still visible beneath the current treatment. Tall openings spanning both floors still accomodate the main windows of the upper floors, but the openings have been changed from the original ones. In addition, the main facade has gained narrow windows at each end and flanking the central window, and a pediment like central facade gable, set with an ornate fanlight. The narrow windows on the second floor display broken-scroll pediments, while the third floor windows either have triangular pediments or are round arch-headed, with keystones. On the central panel between the second and third floor windows is the inscription: "Old City Hall Building 1830-1896." The other panels have swags in relief. Above the central window, just below the fanlight,

is an entablature with relief swags. The panels, pediments, and other trim are painted white. At the corners of the building are brick pilasters with white-painted Doric capitals. Such pilasters were an early feature of the building, topped with a plain, projecting brick frieze. The frieze is now broken by the tops of the third floor windows. The west side of the building is also formally finished. A double central window on the second floor is flanked by projecting bay windows. On the third floor are three small square windows. A cornice enclosing the gable as a pediment, at the center of which is a fanlight window. Visible atop the roof are the lower portions of paired chimneys. The rear wall features a range of double windows on the floors above the projecting first floor addition. On top of the rear addition in the center of the main block is a small, square, second story addition. Fire escapes span the rear wall. The eastern wall features what is apparently original fenestration. Three bricked-up rectangular windows appear on the ground floor, and three longer windows span floors two and three. The lower three quarters of the central window have been bricked over. The flanking windows feature wooden aprons which divide the long narrow openings into two windows. The eastern gable has two small, square windows in its center.

Kirk Street Agents' House (Linus Child House) (City Hall H.D.): Constructed between 1845 and 1847, this 2½-story brick duplex, with basement, is a significant example of early corporate housing in Lowell. The structure was built by mill workers under the supervision of James H. Rand. The structure was a residence for corporate agents of the Massachusetts and Boott Cotton Mills until 1901. Since that time it has served as a roominghouse, YWCA, school offices, medical clinic, and classrooms. A number of changes have been made to the original bearing brick walls and granite foundations. Brick and frame additions were built and later removed, except for the frame addition on the south unit. The addition on the south unit was repeatedly renovated during the 20th century. Partitions on the inside of the building have been added and some have been removed; some mantles have been taken out and replaced; and all finish material in the third floor of the north unit was removed following a fire. A boiler plant and stack were built behind the north unit, and a tunnel was dug under Kirk Street to connect the plant to the high school. The high school and boiler plant have severely altered the setting.

The Linus Child House was built as an agents' house for the Boott and Massachusetts Companies. Greek Revival in style, it is a double house of brick with brownstone trim, set on a high granite basement. The parapet-linked double chimneys at the end walls and at the center of the roof, along with its basic form relate it to the contemporary boarding houses. However, the use of brownstone for its sills, lintels and trabeated doorways distinguishes it. The cornice with its unornamented, projecting frieze and brick dentils adds a decorative touch to an otherwise severe building.

Moody Street Feeder Gatehouse (Merrimack Gatehouse) (City Hall H.D. and Locks and Canals H.D.) One of the finest canal structures in Lowell, the Merrimack Gatehouse was built in 1848 as part of an improvement to the Lowell canal system. The gatehouse contains three sluice gates that controlled the flow of water from the Western Canal through the new Moody Street Feeder to the Merrimack Canal, increasing the water supply to the Merrimack Mills and regulating the flow to the Boott Mills. For a short time in 1972, the structure housed the Dandylion Flowershop. Since 1976 it has been the site of Lowell's Bicentennial headquarters/visitor center, the Lowell tourist center, the NPS visitor information and interpretive center.

The building extends approximately sixty feet along Dutton Street and the Merrimack Canal. Its southern facade gable faces Merrimack Street. The waters of the Moody Street Feeder flow through the three granite arches on which this structure rests. Incised into a granite block between the southern and central arches is the date "1848." The Merrimack facade has an entrance bay and a single window bay. The Dutton Street facade features a central entrance bay flanked by three window bays. The northern facade is two window bays wide, and the eastern facade has seven window bays. The cornice features brick dentils. Chimneys are situated at the ridge near the end walls. The gate house's three sluice gates are manually operated with counterweighted, rack and pinion equipment, which is original except for the weights. Those were added in 1853. Despite its rather diminutive scale, the Merrimack Gatehouse occupies a commanding position in the downtown streetscape. The effects of its canal-side site is maximized through considerable length compared to width and its crisp detailing (including locally unusual use of Flemish bond brickwork).

Boott Mill (Locks and Canals H.D.): This millyard was constructed and then adapted over a 100-year period by the Boott Corporation, the eighth of ten original major textile corporations in Lowell. Of these original millyards, the Boott Mill complex is the most intact surviving example of the first phase of Lowell's mill construction. All four of the original 1835 mills in the Boott millyard survive as part of an interconnected series of mill buildings. The 1835 company office and counting rooms also survive in their original exterior form. The balance of the complex which is composed of later additions, is also significant because it demonstrates the evolution of the earliest Lowell mills to meet the needs of expanding an increasingly restrictive site, bound by a canal and the river. The Boott Mill complex is one of the few corporations that managed to expand on its site while retaining and enhancing the architectural quality of the mill's principal courtyard. The clock tower and belfry, completed circa 1865, are part of this later phase of construction and survive today as one of the most memorable architectural monuments in Lowell and as a symbol of the park. The Park Service owns two buildings in the complex which (will) house a variety of exhibits. They are Mill #6 and the Countinghouse.

The No. 6 Mill is an "L" plan structure consisting of two sections which are labeled on insurance surveys as No. 6 East (74 feet on the Eastern Canal X 113 feet on Bridge

Street) and No. 6 West (238 feet on the Eastern Canal X 48 feet). Italianate in design, the building contains equal-size bays, each of which contains a single window with an arched brick hood at each story. Octagonal stair towers rise at the northwest corners of No. 6 East and No. 6 West, providing important focal points within the main millyard. Each tower's walls are framed by brick piers and divided horizontally by corbelling at the top of the second and fourth stories; narrow windows with arched hoods are set in the center of the tower's wider faces. Both towers were originally six stories high and had entries with hoods on wooden brackets; only that of No. 6 West remains, that of No. 6 East having been partially blocked by brick. The sixth story and (cast iron) cresting of each tower was removed after 1932 (Insurance Survey). Other alterations to the No. 6 Mill include the rebuilding of the cornice on the west elevation of No. 6 West and the restoration of the mill's windows (12/12 sash). On the mill's millyard (interior) elevation the inner corner of the "L" plan is occupied by a five story brick addition built after 1921. Along the Bridge Street side of No. 6 East is an enclosed railroad bed which enters the building by means of a bridge across the Eastern Canal. Originally the opening for the tracks (which extend to a coal pocket) was one-bay wide, with an arched head resembling window hoods. In 1927, the entry was enlarged into a rectangular opening, one-and-one-half stories high, occupying the eastern three bays of the building's canal elevation. At the same time, the present steel bridge was installed.

Straddling part of the millyard entry, the brick Counting House (100' on Eastern Canal X 30') is the only building to remain substantially unchanged from the millyard's initial development. Fenestration of the structure is irregular, consisting of closely spaced windows at the building's east end and more widely spaced windows at the west end. The building's north elevation also contains irregular fenestration, including some apparent blocking of early doorways and the creation of new entries. Many of the windows may have been added or enlarged. The building's original appearance is unknown. The earliest known view of the Counting House dates to ca. 1875, and shows the south elevation's west end much as it is today. Removed since this photo was taken are an entry hood on brackets, louvered shutters, and an apparent interior chimney which rose north of the roof's ridge.

Boott Mill Boardinghouse (H & H Paper Company) (Locks and Canals H.D.): This building was constructed between 1835 and 1838 as one of a series of boardinghouses for operatives of the Boott Mills and represents the physical relationship between mill operative housing and work locations. The boardinghouses were originally three-story traditional brick buildings with gable roofs. Most of them have been demolished, and the H & H Paper Company had been radically altered. Among other changes, the gable roof and part of the third floor had been removed and replaced by a flat roof; the frame outbuildings had been removed; windows had been bricked in; the interior had been gutted and modified; and a new building had been appended to the rear of the building.

The National Park Service and the Lowell Historic Preservation Commission restored the building to its original appearance in 1984-85 in order to house a series of historical and community exhibits.

Lowell Manufacturing Company (Locks and Canals H.D.): This textile mill was chartered on February 8, 1828, to produce carpets and coarse cotton cloth. In common with the other Lowell textile mills, the Lowell Manufacturing Company complex has a complicated reconstruction history, with current buildings dating from the 1880s to the early 20th century. Part of the complex is currently owned by Market Mills Associates. It is used for housing and lease space. The Park Service leases a portion of the space in Bigelow-Lowell Building #2 for the park's information/orientation center.

Forming the north wall of the millyard, Bigelow-Lowell Building #2 was built on the site of the company's Superintendent's House and on the site of an eight-unit boarding house. Building #2 was constructed in 1902 to enlarge the plant's capacity for weaving Brussels carpets. The structure's plan is irregular, built to conform to the company's property line on Market and Gardner Streets. The building design is uniform on all of its 5-story elevations, consisting of one wide undecorated window surrounded with an arched head, paired sash and paired transoms, in each bay at each story.

Suffolk Manufacturing Company (Wannalancit Mill) (Locks and Canals H.D.): Although the complex was one of the earliest textile manufacturing companies in Lowell, the building that now exists date to a later period of construction, beginning in 1848 and ending in the 1880s. The existing structural system of the three mill buildings is the same. They have masonry load-bearing exterior walls with wood beams supported by wood columns (cast-iron columns are on the first and second floors of building 6 and 8). The Park Service leases space in the complex's turbine room in Mill #6 from the Wannalancit Office and Technology Center for use as a hydropower exhibit. Mill #6 measures 282 feet by 58 feet.

MANAGEMENT EXCLUSIONS

Listed below are the Park-owned properties which are not historic and do not meet National Register criteria. Management of these properties will require treatments sensitive to surrounding historic resources in keeping with National Park Service standards.

Jade Pagoda and Solomon's Yard Goods (Merrimack-Middle Street H.D.): These one-story structures occupy adjacent lots on Merrimack Street next to Old City Hall. The Solomon Building is a modern commercial structure that incorporates the foundation of an earlier 4-story building into its construction. The earlier building was destroyed by fire in 1962. The present building is constructed of tan brick and

is of a rectangular plan. The main facade features a wide display window. A plaque bearing the incription "Solomon Building 1962" appears in the upper central portion of the Merrimack Street facade. The scale and surface treatments of the structure, along with Jade Pagoda to the west, detract from the character of the nearby Old City Hall, St. Anne's Church, and the Welles Block. The Jade Pagoda Restaurant is a one-story brick commercial structure directly adjacent to the Old City Hall. This structure is of a rectangular plan and has a flat roof. Portions of this building and its foundation are remnants of the 1859 Carlton (Weir) Block. Its main facade features modern display windows and a veneer of concrete slabs.

Dutton Street Parking Lot: This site was excluded from the Locks and Canals Historic District, even though the lot occupies a portion of the former Lowell Machine Shop yard. This company and its corporate ancestors were responsible for equipping Lowell's original textile mills with machinery; the company later became the country's leading manufacturer of textile equipment for a time during the mid- to late-nineteenth century. After several corporate reorganizations, however, machine shop buildings on this site were removed in 1931-33. Following archeological investigations, the existing modern parking lot for National Park Service visitors was constructed in 1982-83.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	X COMMUNITY PLANNING	X LANDSCAPE ARCHITECTURE	__RELIGION
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	X SCIENCE
__1500-1599	__AGRICULTURE	X ECONOMICS	__LITERATURE	__SCULPTURE
__1600-1699	X ARCHITECTURE	__EDUCATION	__MILITARY	X SOCIAL/HUMANITARIAN
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER
X 1800-1899	X COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	X TRANSPORTATION
X 1900-	__COMMUNICATIONS	X INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)
		X INVENTION		

SPECIFIC DATES 1800 - Present BUILDER/ARCHITECT various

STATEMENT OF SIGNIFICANCE

Lowell, Massachusetts was America's model industrial city during the first half of the 19th century. Lowell offered the hope that the country would profit socially as well as economically by adopting industrialism as a way of life. The early Lowell system was distinguished by its state-of-the-art technology, the engineers and inventors who worked on its canal system, its mill architecture, enormous production capabilities, rational city planning, and most of all, by its much-heralded work force of Yankee "mill girls." But as industry grew in New England, Lowell's factories aged and became less competitive with newer industrial cities. Profits fell, working conditions deteriorated, and wages were cut. The "mill girls" became disillusioned with the system and were replaced by a succession of immigrant groups eager to find work at any price. The city changed, too, as crowded tenements took the place of Lowell's well regulated system of boardinghouses and as Lowell became a city similar to other New England mill towns. Competition within the textile industry increased continually throughout the 19th century. Eventually, the combination of a cheaper, less unionized work force; newer, more efficient factories and machinery; cheaper real estate; and lower taxes persuaded the textile industry to move south. Eight of Lowell's original ten textile firms closed their doors for good during the 1920s, and the city fell into a depression that lasted through the 1960s. Businesses shut down, real estate prices fell, and unemployment rose. Today, however, Lowell is once again a model for urban development. The city's revitalization has capitalized on its working class, immigrant culture and the pride of its citizens, as well as extensive cooperation among local, state, and federal agencies and the private sector.

Lowell is not, as is sometimes claimed, the birthplace of the industrial revolution in America. Most of the developments associated with this phenomenon in the nation's history had their origins elsewhere. But it was in Lowell that these developments converged in a way that made them revolutionary. Lowell National Historical Park commemorates America's most significant planned industrial city, where new forms of technology, power generation, finance, labor, and industrial organization were combined on a scale that portended today's industrialized and urbanized society.

The importance of Lowell extends well beyond the story of its early years as pioneer and symbol of a new era. The Lowell experience offers unique opportunities to interpret the full socioeconomic, technological, and environmental implications of the industrial revolution, from Lowell's bright beginnings through decades of decline to the present revitalization. Lowell's physical resources include the original 5.6-mile power canal system, major cotton textile mill complexes, and evolutionary streetscapes of commercial and residential structures. Lowell's rich cultural heritage, reflected in the ethnic diversity of its citizens, is equally important.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

Shepley Bulfinch Richardson & Abbott Report: Lowell National Historical Park and Preservation District Cultural Resources Inventory (National Park Service, NARO: Boston) 1980

Coolidge, John Mill and Mansion: A Study of Architecture & Society in Lowell, MA, 1820-1865 (Russell & Russell: New York) reissue 1967

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY 134

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	19	309 910	4724 900
B	19	311 290	4723 840
C	19	309 360	4722 680
D	19	308 540	4724 160

VERBAL BOUNDARY DESCRIPTION

The Park includes within its boundaries Lowell's 5.6-mile power canal system, a portion of the central business district, and three major mill complexes. See attached boundary map; area marked in green constitutes the Lowell National Historical Park boundary.

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE
Robert Weible, Historian

DATE
June 1985

ORGANIZATION
Lowell National Historical Park

STREET & NUMBER
169 Merrimack Street

TELEPHONE
(617) 459-1027

CITY OR TOWN
Lowell,

STATE
Massachusetts

12 CERTIFICATION OF NOMINATION

STATE HISTORIC PRESERVATION OFFICER RECOMMENDATION

YES____ NO____ NONE____

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

In compliance with Executive Order 11593, I hereby nominate this property to the National Register, certifying that the State Historic Preservation Officer has been allowed 90 days in which to present the nomination to the State Review Board and to evaluate its significance. The evaluated level of significance is ✓ National ____State ____Local.

FEDERAL REPRESENTATIVE SIGNATURE Edwin C Bearss

TITLE Chief Historian and Federal Preservation Officer DATE 8/17/85

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

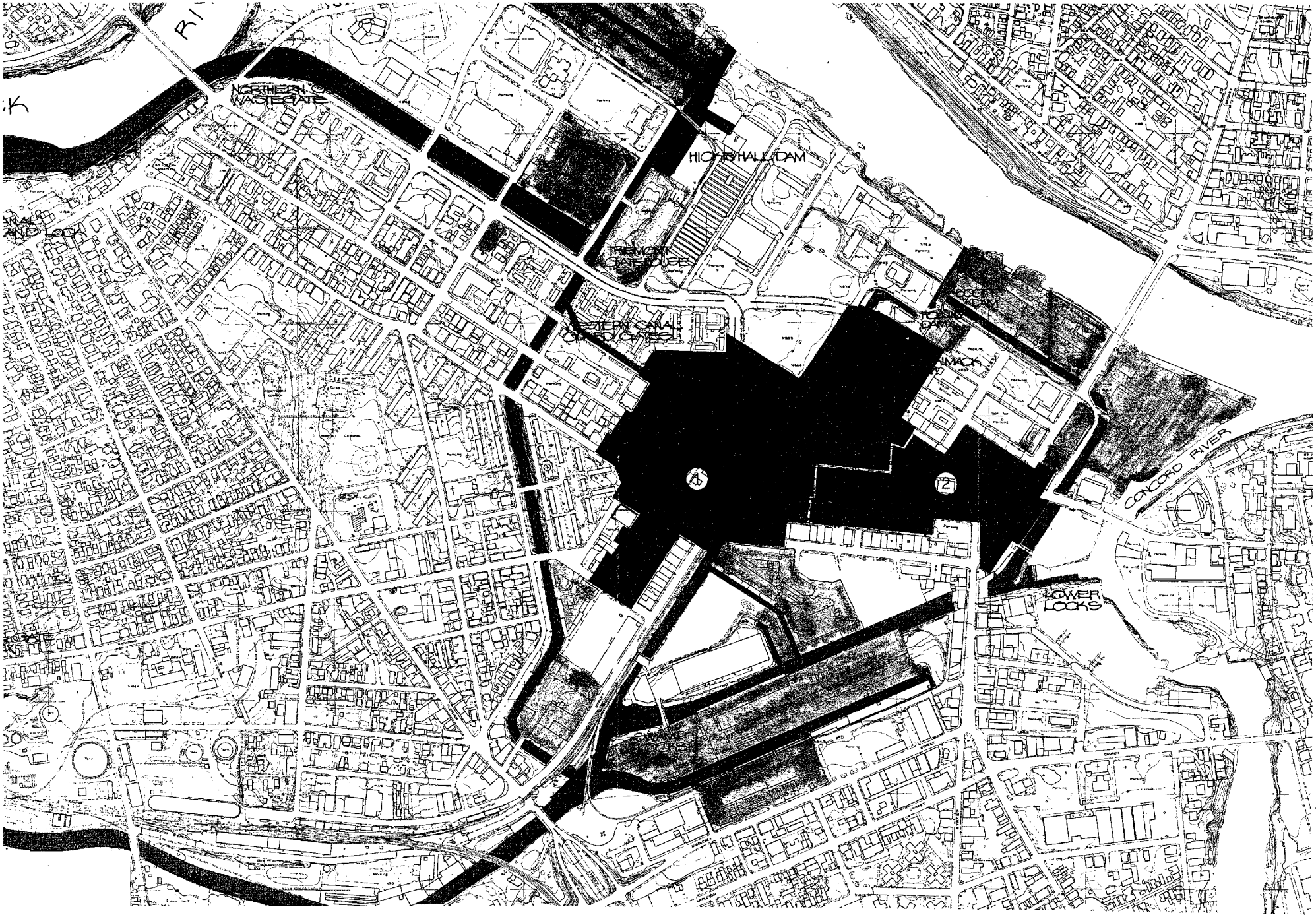
for Keeper DATE 10/18/85

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 899-214



1000 FEET

475 | 40000
DSC | MAY 80

THE INTERIOR
PARK SERVICE

HISTORIC DISTRICTS ■■■ LOWELL NHP

Massachusetts Historical Commission

William Francis Galvin, Secretary of the Commonwealth

Massachusetts Cultural Resource Information System

MACRIS

Scanned forms and photos now available for selected towns!

The Massachusetts Cultural Resource Information System (MACRIS) allows you to search the Massachusetts Historical Commission database for information on historic properties and areas in the Commonwealth.

Users of the database should keep in mind that it does not include information on all historic properties and areas in Massachusetts, nor does it reflect all the information on file on historic properties and areas at the Massachusetts Historical Commission.

Click here to begin your search of the MACRIS database.

Massachusetts Cultural Resource Information System
MACRIS

MHC Home | MACRIS Home

For more information about this page and how to use it, click here.

Inventory No:	LOW.C
Historic Name:	Locks and Canals District
Common Name:	
Address:	
City/Town:	Lowell
Village/Neighborhood:	Downtown
Local No:	
Year Constructed:	
Architect(s):	
Architectural Style(s):	
Use(s):	Abandoned or Vacant; Industrial Complex or District; Other Transportation; Utilities Other
Significance:	Archaeology, Historic; Architecture; Commerce; Engineering; Industry; Transportation
Area(s):	
Designation(s):	Nat'l Register District (08/13/1976); Nat'l Historic Landmark (12/22/1977); Nat'l Register District (06/05/1978); Local Historic District (12/13/1983)
Building Material(s):	

New Search Previous

MHC Home | MACRIS Home

APPENDIX C

ESA Documentation

United States Department of the Interior

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

In Reply Refer To:
Consultation Code: 05E1NE00-2018-SLI-2562
Event Code: 05E1NE00-2018-E-06004
Project Name: Lowell Garage

July 30, 2018

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

To Whom It May Concern:

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

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

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

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

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

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

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

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

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

Attachment(s):

- Official Species List

Official Species List

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

This species list is provided by:

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

Project Summary

Consultation Code: 05E1NE00-2018-SLI-2562

Event Code: 05E1NE00-2018-E-06004

Project Name: Lowell Garage

Project Type: DEVELOPMENT

Project Description: Temporary construction dewatering

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/42.64327983706718N71.3129798844956W

Counties: Middlesex, MA

Endangered Species Act Species

There is a total of 0 threatened, endangered, or candidate species on this species list.

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

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

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

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

Critical habitats

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

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

January 20, 2017

To Whom It May Concern:

This project was reviewed for the presence of federally listed or proposed, threatened or endangered species or critical habitat per instructions provided on the U.S. Fish and Wildlife Service's New England Field Office website:

http://www.fws.gov/newengland/EndangeredSpec-Consultation.htm (accessed January 2017)

Based on information currently available to us, no federally listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under section 7 of the Endangered Species Act is not required. No further Endangered Species Act coordination is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your cooperation. Please contact Maria Tur of this office at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

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.

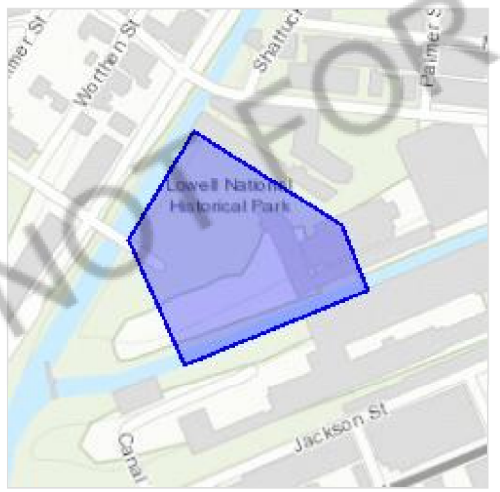
Project information

NAME

Lowell Garage

LOCATION

Middlesex County, Massachusetts



DESCRIPTION

Temporary construction dewatering

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. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

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

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

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

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

Migratory birds

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

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

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

Additional information can be found using the following links:

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

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

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

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

	BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo Coccyzus erythropthalmus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler Cardellina canadensis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird Euphagus carolinus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper

Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

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

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

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

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

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

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

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

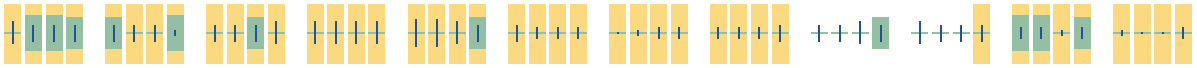
No Data (–)
A week is marked as having no data if there were no survey events for that week.

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

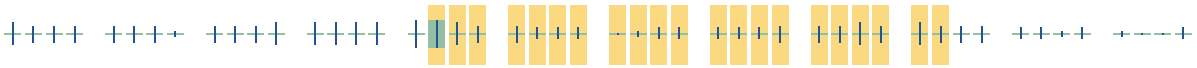
■ probability of presence ■ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

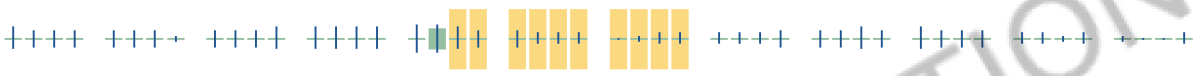
Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



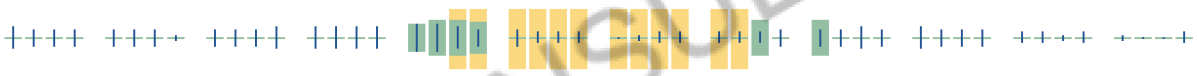
Black-billed Cuckoo
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



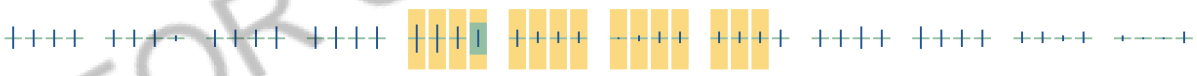
Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



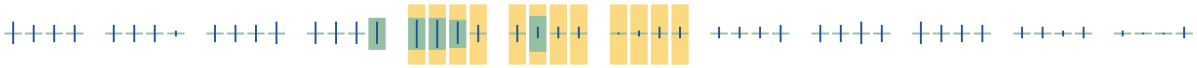
Canada Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



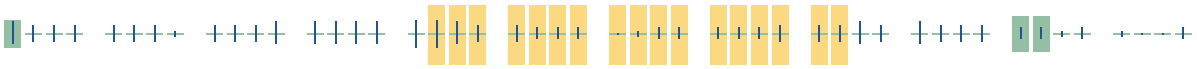
Eastern Whip-poor-will
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

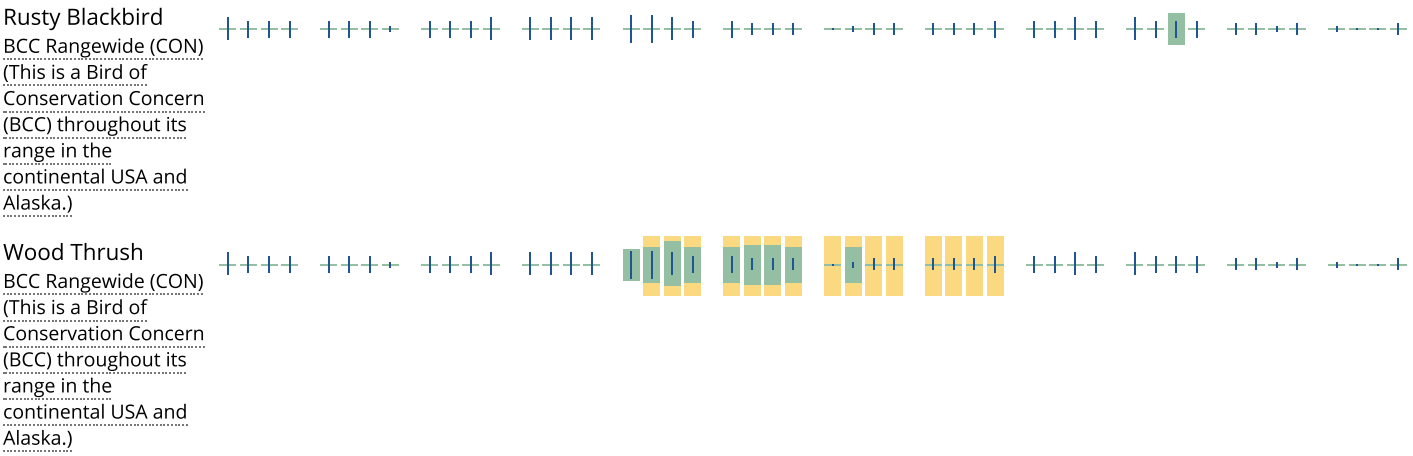


Prairie Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



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





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

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

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

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

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

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data 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:

RIVERINE

- R2UBHx
- 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.

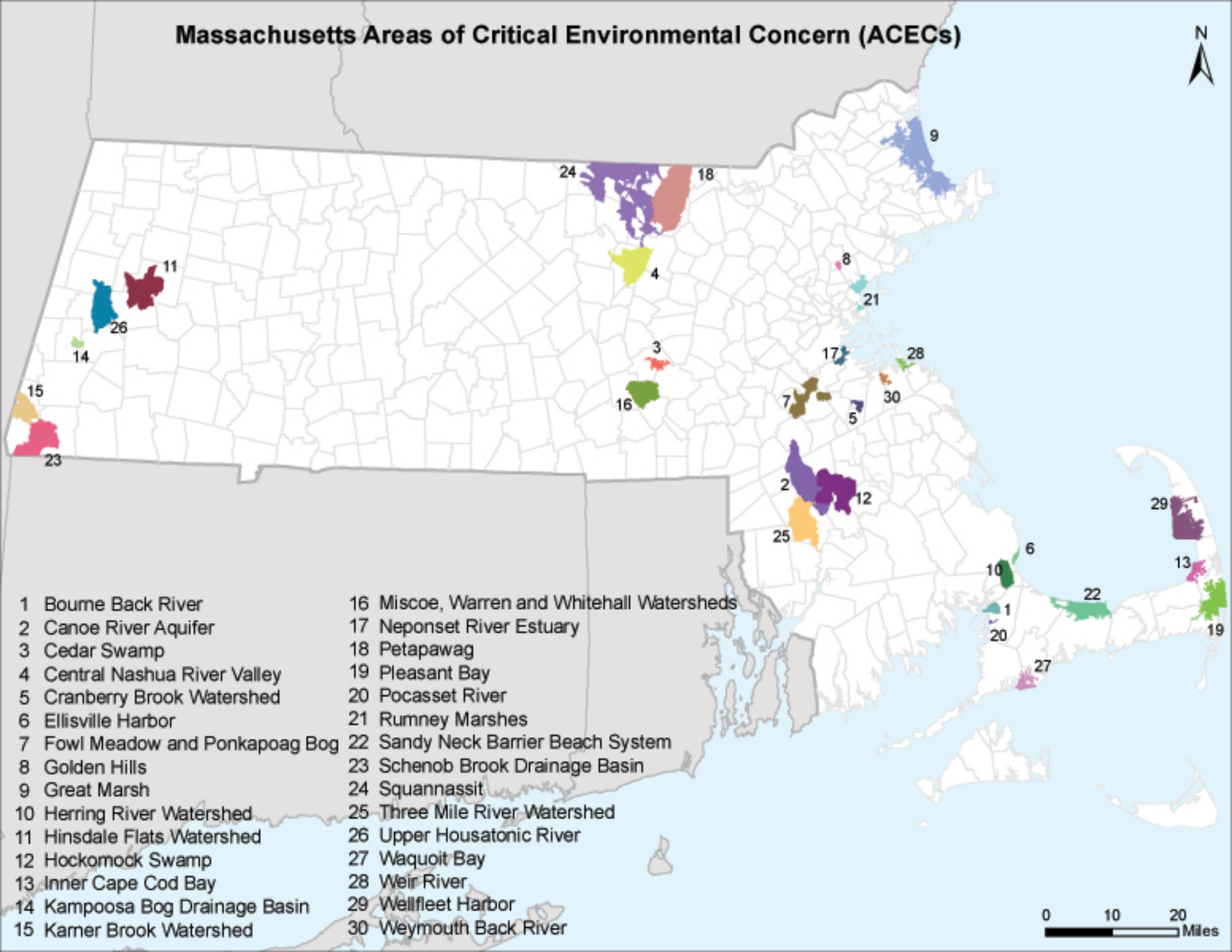
Data exclusions

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.

Massachusetts Areas of Critical Environmental Concern (ACECs)



1 Bourne Back River
2 Canoe River Aquifer
3 Cedar Swamp
4 Central Nashua River Valley
5 Cranberry Brook Watershed
6 Ellisville Harbor
7 Fowl Meadow and Ponkapoag Bog
8 Golden Hills
9 Great Marsh
10 Herring River Watershed
11 Hinsdale Flats Watershed
12 Hockomock Swamp
13 Inner Cape Cod Bay
14 Kampoosa Bog Drainage Basin
15 Karner Brook Watershed
16 Miscoe, Warren and Whitehall Watersheds
17 Neponset River Estuary
18 Petapawag
19 Pleasant Bay
20 Pocasset River
21 Rumney Marshes
22 Sandy Neck Barrier Beach System
23 Schenob Brook Drainage Basin
24 Squannassit
25 Three Mile River Watershed
26 Upper Housatonic River
27 Waquoit Bay
28 Weir River
29 Wellfleet Harbor
30 Weymouth Back River

MASSACHUSETTS AREAS OF CRITICAL ENVIRONMENTAL CONCERN
November 2010

Total Approximate Acreage: 268,000 acres
Approximate acreage and designation date follow ACEC names below.

Bourne Back River
(1,850 acres, 1989) Bourne

Canoe River Aquifer and Associated Areas (17,200 acres, 1991) Easton, Foxborough, Mansfield, Norton, Sharon, and Taunton

Cedar Swamp
(1,650 acres, 1975) Hopkinton and Westborough

Central Nashua River Valley
(12,900 acres, 1996) Bolton, Harvard, Lancaster, and Leominster

Cranberry Brook Watershed
(1,050 acres, 1983) Braintree and Holbrook

Ellisville Harbor
(600 acres, 1980) Plymouth

Fowl Meadow and Ponkapoag Bog
(8,350 acres, 1992) Boston, Canton, Dedham, Milton, Norwood, Randolph, Sharon, and Westwood

Golden Hills
(500 acres, 1987) Melrose, Saugus, and Wakefield

Great Marsh (originally designated as Parker River/Essex Bay)
(25,500 acres, 1979) Essex, Gloucester, Ipswich, Newbury, and Rowley

Herring River Watershed
(4,450 acres, 1991) Bourne and Plymouth

Hinsdale Flats Watershed
(14,500 acres, 1992) Dalton, Hinsdale, Peru, and Washington

Hockomock Swamp
(16,950 acres, 1990) Bridgewater, Easton, Norton, Raynham, Taunton, and West Bridgewater

Inner Cape Cod Bay
(2,600 acres, 1985) Brewster, Eastham, and Orleans

Kampoosa Bog Drainage Basin
(1,350 acres, 1995) Lee and Stockbridge

Karner Brook Watershed
(7,000 acres, 1992) Egremont and Mount Washington

Miscoe, Warren, and Whitehall Watersheds
(8,700 acres, 2000) Grafton, Hopkinton, and Upton

Neponset River Estuary
(1,300 acres, 1995) Boston, Milton, and Quincy

Petapawag
(25,680 acres, 2002) Ayer, Dunstable, Groton, Pepperell, and Tyngsborough

Pleasant Bay
(9,240 acres, 1987) Brewster, Chatham, Harwich, and Orleans

Pocasset River
(160 acres, 1980) Bourne

Rumney Marshes
(2,800 acres, 1988) Boston, Lynn, Revere, Saugus, and Winthrop

Sandy Neck Barrier Beach System
(9,130 acres, 1978) Barnstable and Sandwich

Schenob Brook Drainage Basin
(13,750 acres, 1990) Mount Washington and Sheffield

Squannassit
(37,420 acres, 2002) Ashby, Ayer, Groton, Harvard, Lancaster, Lunenburg, Pepperell, Shirley, and Townsend

Three Mile River Watershed
(14,280 acres, 2008) Dighton, Norton, Taunton

Upper Housatonic River
(12,280 acres, 2009) Lee, Lenox, Pittsfield, Washington

Waquoit Bay
(2,580 acres, 1979) Falmouth and Mashpee

Weir River
(950 acres, 1986) Cohasset, Hingham, and Hull

Wellfleet Harbor
(12,480 acres, 1989) Eastham, Truro, and Wellfleet

Weymouth Back River
(800 acres, 1982) Hingham and Weymouth

ACEC acreages above are based on MassGIS calculations and may differ from numbers originally presented in designation documents and other ACEC publications due to improvements in accuracy of GIS data and boundary clarifications. Listed acreages have been rounded to the nearest 50 or 10 depending on whether boundary clarification has occurred. For more information please see, http://www.mass.gov/dcr/stewardship/acec/aboutMaps.htm.

Towns with ACECs within their Boundaries — November 2010

TOWN	ACEC
Ashby	Squannassit
Ayer	Petapawag
	Squannassit
Barnstable	Sandy Neck Barrier Beach System
Bolton	Central Nashua River Valley
Boston	Rumney Marshes
	Fowl Meadow and Ponkapoag Bog
	Neponset River Estuary
Bourne	Pocasset River
	Bourne Back River
	Herring River Watershed
Braintree	Cranberry Brook Watershed
Brewster	Pleasant Bay
	Inner Cape Cod Bay
Bridgewater	Hockomock Swamp
Canton	Fowl Meadow and Ponkapoag Bog
Chatham	Pleasant Bay
Cohasset	Weir River
Dalton	Hinsdale Flats Watershed
Dedham	Fowl Meadow and Ponkapoag Bog
Dighton	Three Mile River Watershed
Dunstable	Petapawag
Eastham	Inner Cape Cod Bay
	Wellfleet Harbor
Easton	Canoe River Aquifer
	Hockomock Swamp
Egremont	Karner Brook Watershed
Essex	Great Marsh
Falmouth	Waquoit Bay
Foxborough	Canoe River Aquifer
Gloucester	Great Marsh
Grafton	Miscoe-Warren-Whitehall Watersheds
Groton	Petapawag
	Squannassit
Harvard	Central Nashua River Valley
	Squannassit
Harwich	Pleasant Bay
Hingham	Weir River
	Weymouth Back River
Hinsdale	Hinsdale Flats Watershed
Holbrook	Cranberry Brook Watershed
Hopkinton	Miscoe-Warren-Whitehall Watersheds
	Cedar Swamp
Hull	Weir River
Ipswich	Great Marsh
Lancaster	Central Nashua River Valley
	Squannassit
Lee	Kampoosa Bog Drainage Basin
	Upper Housatonic River
Lenox	Upper Housatonic River
Leominster	Central Nashua River Valley
Lunenburg	Squannassit
Lynn	Rumney Marshes
Mansfield	Canoe River Aquifer
Mashpee	Waquoit Bay
Melrose	Golden Hills
Milton	Fowl Meadow and Ponkapoag Bog
	Neponset River Estuary
Mt. Washington	Karner Brook Watershed
	Schenob Brook
Newbury	Great Marsh
Norton	Hockomock Swamp
	Canoe River Aquifer
	Three Mile River Watershed
Norwood	Fowl Meadow and Ponkapoag Bog
Orleans	Inner Cape Cod Bay
	Pleasant Bay
Pepperell	Petapawag
	Squannassit
Peru	Hinsdale Flats Watershed
Pittsfield	Upper Housatonic River
Plymouth	Herring River Watershed
	Ellisville Harbor
Quincy	Neponset River Estuary
Randolph	Fowl Meadow and Ponkapoag Bog
Raynham	Hockomock Swamp
Revere	Rumney Marshes
Rowley	Great Marsh
Sandwich	Sandy Neck Barrier Beach System
Saugus	Rumney Marshes
	Golden Hills
Sharon	Canoe River Aquifer
	Fowl Meadow and Ponkapoag Bog
Sheffield	Schenob Brook
Shirley	Squannassit
Stockbridge	Kampoosa Bog Drainage Basin
Taunton	Hockomock Swamp
	Canoe River Aquifer
	Three Mile River Watershed
Truro	Wellfleet Harbor
Townsend	Squannassit
Tyngsborough	Petapawag
Upton	Miscoe-Warren-Whitehall Watersheds
Wakefield	Golden Hills
Washington	Hinsdale Flats Watershed
	Upper Housatonic River
Wellfleet	Wellfleet Harbor
W Bridgewater	Hockomock Swamp
Westborough	Cedar Swamp
Westwood	Fowl Meadow and Ponkapoag Bog
Weymouth	Weymouth Back River
Winthrop	Rumney Marshes

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FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Barnstable	Piping Plover	Threatened	Coastal Beaches	All Towns
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Chatham
	Sandplain gerardia	Endangered	Open areas with sandy soils.	Sandwich and Falmouth.
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Bourne (north of the Cape Cod Canal)
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Berkshire	Bog Turtle	Threatened	Wetlands	Egremont and Sheffield
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Bristol	Piping Plover	Threatened	Coastal Beaches	Fairhaven, Dartmouth, Westport
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Fairhaven, New Bedford, Dartmouth, Westport
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Taunton
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Dukes	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Piping Plover	Threatened	Coastal Beaches	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Aquinnah and Chilmark
	Sandplain gerardia	Endangered	Open areas with sandy soils.	West Tisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Essex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Gloucester, Essex and Manchester
	Piping Plover	Threatened	Coastal Beaches	Gloucester, Essex, Ipswich, Rowley, Revere, Newbury, Newburyport and Salisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Franklin	Northeastern bulrush	Endangered	Wetlands	Montague, Warwick
	Dwarf wedgemussel	Endangered	Mill River	Whately
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampshire	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Hadley
	Puritan tiger beetle	Threatened	Sandy beaches along the Connecticut River	Northampton and Hadley
	Dwarf wedgemussel	Endangered	Rivers and Streams.	Hatfield, Amherst and Northampton
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampden	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Southwick
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Middlesex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Groton
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Nantucket	Piping Plover	Threatened	Coastal Beaches	Nantucket
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Nantucket
	American burying beetle	Endangered	Upland grassy meadows	Nantucket
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Plymouth	Piping Plover	Threatened	Coastal Beaches	Scituate, Marshfield, Duxbury, Plymouth, Wareham and Mattapoisett
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Kingston, Middleborough, Carver, Plymouth, Bourne, Wareham, Halifax, and Pembroke
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Plymouth, Marion, Wareham, and Mattapoisett.
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Suffolk	Piping Plover	Threatened	Coastal Beaches	Revere, Winthrop
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Worcester	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Leominster
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

[1]Migratory only, scattered along the coast in small numbers

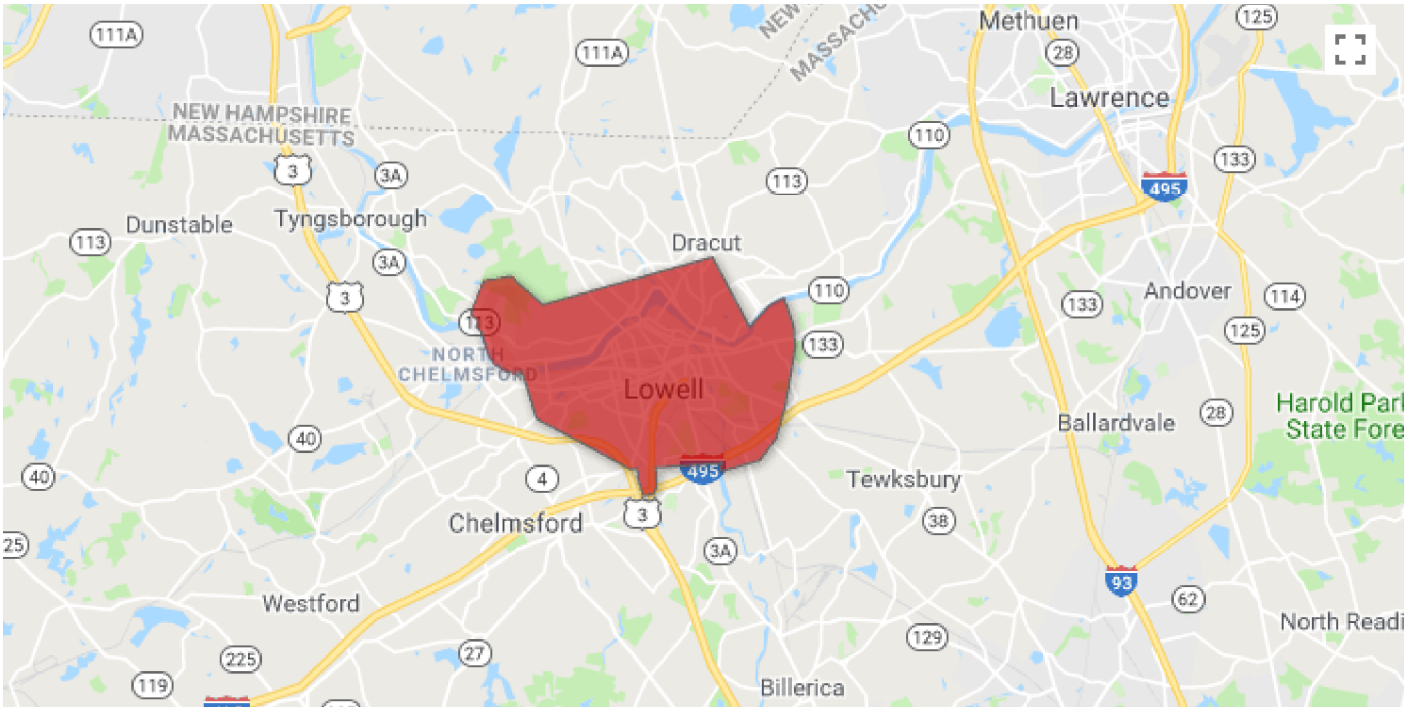
-Eastern cougar and gray wolf are considered extirpated in Massachusetts.
-Endangered gray wolves are not known to be present in Massachusetts, but dispersing individuals from source populations in Canada may occur statewide.
-Critical habitat for the Northern Red-bellied Cooter is present in Plymouth County.

Updated 02/05/2016

The Natural Heritage & Endangered Species Program maintains a list of all documented MESA-listed species observations in the Commonwealth. Please select a town if you would like to see a table showing which listed species have been observed in that town. The selected town will also be highlighted on the map. Alternatively you can specify either the Common Name or Scientific Name of a species to see it's distribution on the map and table showing the towns it has been observed in. Clicking on a column header in the table will sort the column. Clicking again on the same column heading will reverse the sort order.

The Town List and Species Viewer will be updated at regular intervals as new data is accepted and entered into the NHESP database.

Town: LOWELL or Species (Common Name): or Species (Scientific Name):



Google Map data ©2018 Google Report a map error

Showing 1 to 8 of 8 entries Search:

First Previous 1 Next Last

Town	Taxonomic Group	Scientific Name	Common Name	MESA Status	Most Recent Obs
LOWELL	Butterfly/Moth	Cicinnus melsheimeri	Melsheimer's Sack Bearer	T	Historic
LOWELL	Vascular Plant	Deschampsia cespitosa ssp. glauca	Tufted Hairgrass	E	1882
LOWELL	Vascular Plant	Elymus villosus	Hairy Wild Rye	E	1882
LOWELL	Reptile	Emydoidea blandingii	Blanding's Turtle	T	2007
LOWELL	Bird	Falco peregrinus	Peregrine Falcon	T	2017
LOWELL	Dragonfly/Damselfly	Gomphus vastus	Cobra Clubtail	SC	2004

Town	Taxonomic Group	Scientific Name	Common Name	MESA Status	Most Recent Obs
LOWELL	Vascular Plant	Liatris scariosa var. novae-angliae	New England Blazing Star	SC	1882
LOWELL	Dragonfly/Damselfly	Neurocordulia obsoleta	Umber Shadowdragon	SC	2004

Show 100 ▼ entries

Show Additional Info

APPENDIX D

Laboratory Data Reports

ANALYTICAL REPORT

Lab Number:	L1827825
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Mike Cronan
Phone:	(617) 886-7477
Project Name:	LOWELL GARAGE NPDES RGP
Project Number:	129485-010
Report Date:	07/26/18

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: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1827825-01	HA17-110 (OW)	WATER	ALABANY STREET, BOSTON, MA	07/19/18 10:00	07/19/18
L1827825-02	LOWELL REC WATER	WATER	ALABANY STREET, BOSTON, MA	07/19/18 10:40	07/19/18

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1827825
Project Number:	129485-010	**Report Date:**	07/26/18

Case Narrative

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

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

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

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1827825
Project Number:	129485-010	**Report Date:**	07/26/18

Case Narrative (continued)

Report Revision

July 26, 2018: The project number has been amended.

Sample Receipt

The analyses performed were specified by the client.

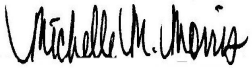
Microextractables

The WG1138442-3 MS recovery, performed on L1827825-01 (HA17-110 (OW)), is outside the acceptance criteria for 1,2-dibromoethane (124%).

Semivolatile Organics by SIM

WG1138228: A Matrix Spike and Matrix Spike Duplicate were prepared with the sample batch, however, the native sample was not available for reporting; therefore, the Matrix Spike and Matrix Spike Duplicate results could not be 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:  Michelle M. Morris

Title: Technical Director/Representative Date: 07/26/18

ORGANICS

VOLATILES

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1827825

Project Number: 129485-010 **Report Date:** 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01 Date Collected: 07/19/18 10:00
Client ID: HA17-110 (OW) Date Received: 07/19/18
Sample Location: ALABANY STREET, BOSTON, MA Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1
Analytical Date: 07/22/18 23:02
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	1.5	--	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[1]	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: LOWELL GARAGE NPDES RGP **Lab Number:** L1827825

Project Number: 129485-010 **Report Date:** 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01 Date Collected: 07/19/18 10:00

Client ID: HA17-110 (OW) Date Received: 07/19/18

Sample Location: ALABANY STREET, BOSTON, MA Field Prep: Refer to COC

Sample Depth:

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

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	111		60-140
Fluorobenzene	113		60-140
4-Bromofluorobenzene	99		60-140

Project Name: LOWELL GARAGE NPDES RGP
Lab Number: L1827825
Project Number: 129485-010
Report Date: 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01
Client ID: HA17-110 (OW)
Sample Location: ALABANY STREET, BOSTON, MA
Date Collected: 07/19/18 10:00
Date Received: 07/19/18
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1-SIM
Analytical Date: 07/22/18 23:02
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	122		60-140
4-Bromofluorobenzene	100		60-140

Project Name: LOWELL GARAGE NPDES RGP
Lab Number: L1827825
Project Number: 129485-010
Report Date: 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01
Client ID: HA17-110 (OW)
Sample Location: ALABANY STREET, BOSTON, MA

Date Collected: 07/19/18 10:00
Date Received: 07/19/18
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 07/23/18 17:51
Analyst: AWS

Extraction Method: EPA 504.1
Extraction Date: 07/23/18 16:35

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

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 07/23/18 17:03
Analyst: AWS

Extraction Method: EPA 504.1
Extraction Date: 07/23/18 16:35

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01 Batch: WG1138442-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1827825

Project Number: 129485-010 **Report Date:** 07/26/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 07/22/18 18:47
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1138516-8					
Methylene chloride	ND		ug/l	1.0	--
1,1-Dichloroethane	ND		ug/l	1.5	--
Carbon tetrachloride	ND		ug/l	1.0	--
1,1,2-Trichloroethane	ND		ug/l	1.5	--
Tetrachloroethene	ND		ug/l	1.5	--
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[1]	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: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 07/22/18 18:47
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1138516-8					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	110		60-140
Fluorobenzene	111		60-140
4-Bromofluorobenzene	97		60-140

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1-SIM
Analytical Date: 07/22/18 18:47
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1138564-4					
1,4-Dioxane	ND		ug/l	50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	121		60-140
4-Bromofluorobenzene	98		60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab	Associated sample(s): 01		Batch: WG1138442-2						
1,2-Dibromoethane	117		-		80-120	-			A

Lab Control Sample Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1138516-7								
Methylene chloride	100		-		60-140	-		28
1,1-Dichloroethane	90		-		50-150	-		49
Carbon tetrachloride	100		-		70-130	-		41
1,1,2-Trichloroethane	90		-		70-130	-		45
Tetrachloroethene	95		-		70-130	-		39
1,2-Dichloroethane	100		-		70-130	-		49
1,1,1-Trichloroethane	105		-		70-130	-		36
Benzene	105		-		65-135	-		61
Toluene	100		-		70-130	-		41
Ethylbenzene	100		-		60-140	-		63
Vinyl chloride	100		-		5-195	-		66
1,1-Dichloroethene	95		-		50-150	-		32
cis-1,2-Dichloroethene	100		-		60-140	-		30
Trichloroethene	95		-		65-135	-		48
1,2-Dichlorobenzene	90		-		65-135	-		57
1,3-Dichlorobenzene	90		-		70-130	-		43
1,4-Dichlorobenzene	95		-		65-135	-		57
p/m-Xylene	100		-		60-140	-		30
o-xylene	95		-		60-140	-		30
Acetone[1]	90		-		40-160	-		30
Methyl tert butyl ether	90		-		60-140	-		30
Tert-Butyl Alcohol	78		-		60-140	-		30
Tertiary-Amyl Methyl Ether	95		-		60-140	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1138516-7								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Pentafluorobenzene	103				60-140
Fluorobenzene	106				60-140
4-Bromofluorobenzene	97				60-140

Lab Control Sample Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1138564-3								
1,4-Dioxane	120		-		60-140	-		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Fluorobenzene	115				60-140
4-Bromofluorobenzene	96				60-140

Matrix Spike Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*	*Column*
Microextractables by GC - Westborough Lab	Associated sample(s): 01			QC Batch ID: WG1138442-3			QC Sample: L1827825-01		Client ID: HA17-110 (OW)				
1,2-Dibromoethane	ND	0.25	0.309	**124**	Q	-	-		80-120	-		20	A

SEMIVOLATILES

Project Name: LOWELL GARAGE NPDES RGP
Lab Number: L1827825
Project Number: 129485-010
Report Date: 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01
Client ID: HA17-110 (OW)
Sample Location: ALABANY STREET, BOSTON, MA

Date Collected: 07/19/18 10:00
Date Received: 07/19/18
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1
Analytical Date: 07/24/18 15:33
Analyst: ALS

Extraction Method: EPA 625.1
Extraction Date: 07/23/18 09:01

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	64		15-314
2-Fluorobiphenyl	69		55-108
4-Terphenyl-d14	77		52-109

Project Name: LOWELL GARAGE NPDES RGP
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SAMPLE RESULTS

Lab ID: L1827825-01
Client ID: HA17-110 (OW)
Sample Location: ALABANY STREET, BOSTON, MA

Date Collected: 07/19/18 10:00
Date Received: 07/19/18
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1-SIM
Analytical Date: 07/24/18 11:35
Analyst: DV

Extraction Method: EPA 625.1
Extraction Date: 07/23/18 08:54

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

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	43		35-77
Phenol-d6	34		24-61
Nitrobenzene-d5	76		15-314
2-Fluorobiphenyl	63		55-108
2,4,6-Tribromophenol	88		52-123
4-Terphenyl-d14	70		52-109

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1
Analytical Date: 07/23/18 23:19
Analyst: SZ

Extraction Method: EPA 625.1
Extraction Date: 07/22/18 11:35

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1138227-1					
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	91		15-314
2-Fluorobiphenyl	81		55-108
4-Terphenyl-d14	98		52-109

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1-SIM
Analytical Date: 07/23/18 16:45
Analyst: DV

Extraction Method: EPA 625.1
Extraction Date: 07/22/18 11:50

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1138228-1					
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	50		35-77
Phenol-d6	38		24-61
Nitrobenzene-d5	91		15-314
2-Fluorobiphenyl	70		55-108
2,4,6-Tribromophenol	95		52-123
4-Terphenyl-d14	82		52-109

Lab Control Sample Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1138227-2								
Bis(2-ethylhexyl)phthalate	85		-		29-137	-		30
Butyl benzyl phthalate	87		-		1-140	-		30
Di-n-butylphthalate	90		-		8-120	-		30
Di-n-octylphthalate	91		-		19-132	-		30
Diethyl phthalate	85		-		1-120	-		30
Dimethyl phthalate	83		-		1-120	-		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Nitrobenzene-d5	97				15-314
2-Fluorobiphenyl	81				55-108
4-Terphenyl-d14	99				52-109

Lab Control Sample Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1138228-2								
Acenaphthene	88		-		60-132	-		30
Fluoranthene	99		-		43-121	-		30
Naphthalene	85		-		36-120	-		30
Benzo(a)anthracene	90		-		42-133	-		30
Benzo(a)pyrene	94		-		32-148	-		30
Benzo(b)fluoranthene	94		-		42-140	-		30
Benzo(k)fluoranthene	95		-		25-146	-		30
Chrysene	92		-		44-140	-		30
Acenaphthylene	91		-		54-126	-		30
Anthracene	94		-		43-120	-		30
Benzo(ghi)perylene	81		-		1-195	-		30
Fluorene	92		-		70-120	-		30
Phenanthrene	90		-		65-120	-		30
Dibenzo(a,h)anthracene	83		-		1-200	-		30
Indeno(1,2,3-cd)pyrene	85		-		1-151	-		30
Pyrene	98		-		70-120	-		30
Pentachlorophenol	68		-		38-152	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1138228-2								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	55				35-77
Phenol-d6	42				24-61
Nitrobenzene-d5	96				15-314
2-Fluorobiphenyl	74				55-108
2,4,6-Tribromophenol	95				52-123
4-Terphenyl-d14	88				52-109

PCBS

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01
Client ID: HA17-110 (OW)
Sample Location: ALABANY STREET, BOSTON, MA

Date Collected: 07/19/18 10:00
Date Received: 07/19/18
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 127,608.3
Analytical Date: 07/24/18 03:50
Analyst: JW

Extraction Method: EPA 608.3
Extraction Date: 07/23/18 00:20
Cleanup Method: EPA 3665A
Cleanup Date: 07/23/18
Cleanup Method: EPA 3660B
Cleanup Date: 07/23/18

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

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	86		37-123	A
Decachlorobiphenyl	48		38-114	A
2,4,5,6-Tetrachloro-m-xylene	90		37-123	B
Decachlorobiphenyl	65		38-114	B

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 127,608.3
Analytical Date: 07/24/18 02:23
Analyst: JW

Extraction Method: EPA 608.3
Extraction Date: 07/22/18 14:09
Cleanup Method: EPA 3665A
Cleanup Date: 07/23/18
Cleanup Method: EPA 3660B
Cleanup Date: 07/23/18

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1138251-1						
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	58		37-123	A
Decachlorobiphenyl	44		38-114	A
2,4,5,6-Tetrachloro-m-xylene	58		37-123	B
Decachlorobiphenyl	53		38-114	B

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 Batch: WG1138251-2									
Aroclor 1016	77		-		50-140	-		36	A
Aroclor 1260	48		-		8-140	-		38	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	59				37-123	A
Decachlorobiphenyl	41				38-114	A
2,4,5,6-Tetrachloro-m-xylene	58				37-123	B
Decachlorobiphenyl	49				38-114	B

METALS

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1827825

Project Number: 129485-010 **Report Date:** 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01 Date Collected: 07/19/18 10:00

Client ID: HA17-110 (OW) Date Received: 07/19/18

Sample Location: ALABANY STREET, BOSTON, MA Field Prep: Refer to COC

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	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Iron, Total	ND		mg/l	0.050	--	1	07/20/18 12:00	07/21/18 09:04	EPA 3005A	19,200.7	PE
Lead, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	07/20/18 15:31	07/24/18 14:19	EPA 245.1	3,245.1	MG
Nickel, Total	ND		mg/l	0.00200	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	07/20/18 12:00	07/23/18 19:02	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	269		mg/l	0.660	NA	1	07/20/18 12:00	07/21/18 09:04	EPA 3005A	19,200.7	PE
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		07/23/18 19:02	NA	107,-	

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1827825

Project Number: 129485-010 **Report Date:** 07/26/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1137803-1										
Antimony, Total	ND		mg/l	0.00400	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Lead, Total	ND		mg/l	0.00100	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	07/20/18 12:00	07/23/18 15:28	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1137804-1										
Iron, Total	ND		mg/l	0.050	--	1	07/20/18 12:00	07/24/18 15:17	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: WG1137804-1										
Hardness	ND		mg/l	0.660	NA	1	07/20/18 12:00	07/24/18 15:17	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1137878-1										
Mercury, Total	ND		mg/l	0.00020	--	1	07/20/18 15:31	07/24/18 13:33	3,245.1	MG

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1137803-2								
Antimony, Total	105		-		85-115	-		
Arsenic, Total	106		-		85-115	-		
Cadmium, Total	112		-		85-115	-		
Chromium, Total	98		-		85-115	-		
Copper, Total	106		-		85-115	-		
Lead, Total	110		-		85-115	-		
Nickel, Total	98		-		85-115	-		
Selenium, Total	108		-		85-115	-		
Silver, Total	110		-		85-115	-		
Zinc, Total	109		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1137804-2								
Iron, Total	106		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1137804-2								
Hardness	97		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1137878-2								
Mercury, Total	109		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137803-3 QC Sample: L1827677-01 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.4554	91		-	-		70-130	-		20
Arsenic, Total	ND	0.12	0.1240	103		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05986	117		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2091	104		-	-		70-130	-		20
Copper, Total	ND	0.25	0.2802	112		-	-		70-130	-		20
Lead, Total	ND	0.51	0.6117	120		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.5180	104		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1250	104		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05833	117		-	-		70-130	-		20
Zinc, Total	ND	0.5	0.5555	111		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137803-5 QC Sample: L1827677-02 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.5056	101		-	-		70-130	-		20
Arsenic, Total	0.0011	0.12	0.08557	70		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.06001	118		-	-		70-130	-		20
Chromium, Total	1.608	0.2	1.849	120		-	-		70-130	-		20
Copper, Total	0.4133	0.25	0.6847	108		-	-		70-130	-		20
Lead, Total	0.0028	0.51	0.5984	117		-	-		70-130	-		20
Nickel, Total	0.0194	0.5	0.5198	100		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.06899	**57**	Q	-	-		70-130	-		20
Silver, Total	ND	0.05	0.05749	115		-	-		70-130	-		20
Zinc, Total	0.0104	0.5	0.5585	110		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137804-3 QC Sample: L1827677-01 Client ID: MS Sample										
Iron, Total	ND	1	1.10	110		-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137804-3 QC Sample: L1827677-01 Client ID: MS Sample										
Hardness	15.2	66.2	79.8	98		-	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137804-7 QC Sample: L1827677-02 Client ID: MS Sample										
Iron, Total	105	1	104	**0**	Q	-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137804-7 QC Sample: L1827677-02 Client ID: MS Sample										
Hardness	19.5	66.2	84.0	98		-	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137878-3 QC Sample: L1827615-01 Client ID: MS Sample										
Mercury, Total	ND	0.005	0.00494	99		-	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137878-5 QC Sample: L1827615-02 Client ID: MS Sample										
Mercury, Total	ND	0.005	0.00500	100		-	-	70-130	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137804-4 QC Sample: L1827677-01 Client ID: DUP Sample						
Iron, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137804-8 QC Sample: L1827677-02 Client ID: DUP Sample						
Iron, Total	105	101	mg/l	4		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137878-4 QC Sample: L1827615-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1137878-6 QC Sample: L1827615-02 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-01
Client ID: HA17-110 (OW)
Sample Location: ALABANY STREET, BOSTON, MA
Date Collected: 07/19/18 10:00
Date Received: 07/19/18
Field Prep: Refer to COC

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
SALINITY	ND		SU	2.0	--	1	-	07/21/18 02:57	121,2520B	MA
Solids, Total Suspended	9.7		mg/l	5.0	NA	1	-	07/20/18 23:59	121,2540D	CW
Cyanide, Total	0.005		mg/l	0.005	--	1	07/23/18 12:00	07/23/18 14:25	121,4500CN-CE	LH
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	07/20/18 07:00	121,4500CL-D	MA
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	07/20/18 12:14	07/20/18 22:56	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	--	1	07/20/18 23:55	07/21/18 01:30	74,1664A	MM
Phenolics, Total	ND		mg/l	0.030	--	1	07/20/18 07:46	07/21/18 05:57	4,420.1	GD
Chromium, Hexavalent	ND		mg/l	0.010	--	1	07/20/18 06:00	07/20/18 06:38	1,7196A	MA
Anions by Ion Chromatography - Westborough Lab										
Chloride	779.		mg/l	12.5	--	25	-	07/23/18 02:33	44,300.0	JR

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1827825
Report Date: 07/26/18

SAMPLE RESULTS

Lab ID: L1827825-02
Client ID: LOWELL REC WATER
Sample Location: ALABANY STREET, BOSTON, MA
Sample Depth:
Matrix: Water

Date Collected: 07/19/18 10:40
Date Received: 07/19/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
SALINITY	ND		SU	2.0	--	1	-	07/21/18 02:57	121,2520B	MA
pH (H)	6.7		SU	-	NA	1	-	07/20/18 07:27	121,4500H+-B	MA
Nitrogen, Ammonia	0.119		mg/l	0.075	--	1	07/20/18 12:14	07/20/18 22:58	121,4500NH3-BH	AT

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1827825

Project Number: 129485-010 **Report Date:** 07/26/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1137646-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	07/20/18 06:00	07/20/18 06:36	1,7196A	MA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1137685-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	07/20/18 07:00	121,4500CL-D	MA
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1137708-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	07/20/18 12:14	07/20/18 22:52	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1137713-1										
Phenolics, Total	ND		mg/l	0.030	--	1	07/20/18 07:46	07/21/18 05:53	4,420.1	GD
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1137900-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	07/20/18 23:55	07/21/18 01:30	74,1664A	MM
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1137984-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	07/20/18 23:59	121,2540D	CW
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1138445-1										
Cyanide, Total	ND		mg/l	0.005	--	1	07/23/18 12:00	07/23/18 14:09	121,4500CN-CE	LH
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1138629-1										
Chloride	ND		mg/l	0.500	--	1	-	07/22/18 18:09	44,300.0	JR

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1137646-2								
Chromium, Hexavalent	92		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1137679-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1137685-2								
Chlorine, Total Residual	93		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1137708-2								
Nitrogen, Ammonia	96		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1137713-2								
Phenolics, Total	86		-		70-130	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1137900-2								
TPH	72		-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1138040-1								
SALINITY	99		-			-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1138445-2					
Cyanide, Total	98	-	90-110	-	
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1138629-2					
Chloride	104	-	90-110	-	

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137646-4 QC Sample: L1827825-01 Client ID: HA17-110 (OW)												
Chromium, Hexavalent	ND	0.1	0.096	96		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137685-4 QC Sample: L1827825-01 Client ID: HA17-110 (OW)												
Chlorine, Total Residual	ND	0.248	0.24	97		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1137708-4 QC Sample: L1827825-01 Client ID: HA17-110 (OW)												
Nitrogen, Ammonia	ND	4	3.88	97		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137713-4 QC Sample: L1827825-01 Client ID: HA17-110 (OW)												
Phenolics, Total	ND	0.4	0.34	84		-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137900-4 QC Sample: L1827615-02 Client ID: MS Sample												
TPH	ND	20.2	11.4	**56**	Q	-	-		64-132	-		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1138445-4 QC Sample: L1827664-02 Client ID: MS Sample												
Cyanide, Total	ND	0.2	0.203	102		-	-		90-110	-		30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1138629-3 QC Sample: L1827677-06 Client ID: MS Sample												
Chloride	24.4	4	27.3	**73**	Q	-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137646-3 QC Sample: L1827825-01 Client ID: HA17-110 (OW)						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1137679-2 QC Sample: L1827825-02 Client ID: LOWELL REC WATER						
pH (H)	6.7	6.7	SU	0		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137685-3 QC Sample: L1827825-01 Client ID: HA17-110 (OW)						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1137708-3 QC Sample: L1827825-01 Client ID: HA17-110 (OW)						
Nitrogen, Ammonia	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137713-3 QC Sample: L1827825-01 Client ID: HA17-110 (OW)						
Phenolics, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137900-3 QC Sample: L1827615-01 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1137984-2 QC Sample: L1828047-01 Client ID: DUP Sample						
Solids, Total Suspended	80	68	mg/l	16		29
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1138040-2 QC Sample: L1827825-01 Client ID: HA17-110 (OW)						
SALINITY	ND	ND	SU	NC		
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1138445-3 QC Sample: L1827664-01 Client ID: DUP Sample						
Cyanide, Total	ND	ND	mg/l	NC		30

Lab Duplicate Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1827825

Report Date: 07/26/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1138629-4 QC Sample: L1827677-06 Client ID: DUP Sample					
Chloride	24.4	24.4	mg/l	0	18

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1827825-01A	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1827825-01A1	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1827825-01B	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1827825-01B1	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1827825-01C	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1827825-01C1	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1827825-01D	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		504(14)
L1827825-01E	Vial Na2S2O3 preserved	A	NA		3.8	Y	Absent		504(14)
L1827825-01F	Plastic 250ml HNO3 preserved	A	<2	<2	3.8	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1827825-01G	Plastic 250ml HNO3 preserved	A	<2	<2	3.8	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)
L1827825-01H	Plastic 950ml unpreserved	A	7	7	3.8	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1)
L1827825-01I	Amber 120ml unpreserved	A	7	7	3.8	Y	Absent		SALINITY(28)
L1827825-01J	Plastic 250ml NaOH preserved	A	7	7	3.8	Y	Absent		TCN-4500(14)
L1827825-01K	Amber 950ml H2SO4 preserved	A	<2	<2	3.8	Y	Absent		TPHENOL-420(28)
L1827825-01L	Plastic 950ml unpreserved	A	7	7	3.8	Y	Absent		TSS-2540(7)
L1827825-01M	Amber 1000ml HCl preserved	A	NA		3.8	Y	Absent		TPH-1664(28)
L1827825-01N	Amber 1000ml HCl preserved	A	NA		3.8	Y	Absent		TPH-1664(28)
L1827825-01O	Amber 1000ml Na2S2O3	A	7	7	3.8	Y	Absent		625.1-SIM-RGP(7)
L1827825-01P	Amber 1000ml Na2S2O3	A	7	7	3.8	Y	Absent		625.1-SIM-RGP(7)
L1827825-01Q	Amber 1000ml Na2S2O3	A	7	7	3.8	Y	Absent		625.1-RGP(7)
L1827825-01R	Amber 1000ml Na2S2O3	A	7	7	3.8	Y	Absent		625.1-RGP(7)

*Values in parentheses indicate holding time in days

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1827825
Report Date: 07/26/18

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1827825-01S	Amber 1000ml Na2S2O3	A	7	7	3.8	Y	Absent		PCB-608.3(7)
L1827825-01T	Amber 1000ml Na2S2O3	A	7	7	3.8	Y	Absent		PCB-608.3(7)
L1827825-01U	Plastic 500ml H2SO4 preserved	A	<2	<2	3.8	Y	Absent		NH3-4500(28)
L1827825-02A	Plastic 60ml unpreserved	A	7	7	3.8	Y	Absent		PH-4500(.01)
L1827825-02B	Amber 120ml unpreserved	A	7	7	3.8	Y	Absent		SALINITY(28)
L1827825-02C	Plastic 500ml H2SO4 preserved	A	<2	<2	3.8	Y	Absent		NH3-4500(28)

*Values in parentheses indicate holding time in days

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1827825
Project Number:	129485-010	**Report Date:**	07/26/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
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.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
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

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

Terms

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

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

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

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

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

Report Format: Data Usability Report

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1827825
Project Number:	129485-010	**Report Date:**	07/26/18

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.

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

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

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

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

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

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

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

Report Format: Data Usability Report

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1827825
Project Number:	129485-010	**Report Date:**	07/26/18

REFERENCES

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

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

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

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: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

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

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

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

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

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

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

CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581 — 8 Walkup Dr. — TEL: 508-898-9220 — FAX: 508-898-9193
Mansfield, MA 02048 — 320 Forbes Blvd — TEL: 508-822-9300 — FAX: 508-822-3288

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

Page 1 of 1

Date Rec'd in Lab: 7/19/18

ALPHA Job #: L1827825

H&A Information

H&A Client: Walker Consultants
H&A Address 465 Medford St
Boston, MA 02129-1400
H&A Phone: 617-886-7400
H&A Fax:
H&A Email: Kalepidis, Lhoward

Project Information

Project Name: Lowell Garage NPDES RGP
Project Location: Albany Street, Boston, MA
Project # 129485-010
(Use Project name as Project #) ☐
Project Manager: M. Cronan/D. Bell
ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:
(only if pre approved) ☐ # of Days: 5 Day

Deliverables

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

Billing Information

☑ Same as Client Info
PO #

Regulatory Requirements (Program/Criteria)

MA NPDES RGP

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha

Other project specific requirements/comments:

**Field Filtered
PLEASE RUN FOR FULL 2017 RGP SUITE, MINUS ETHANOL
Analyze using the EPA 2017 RGP Approved Testing Methods

Please specify Metals or TAL.

ANALYSIS

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	TSS-2540, TRC-4500	TCN-4500, 504	8260, 8260-SIM for Dioxane	HEXCR-3500, Trivalent Chromium	8270TCL (also including Diethylhexylphthalate),	8270TCL-SIM	Total Metals: Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Zn, Fe,	CL-300	Ammonia	Salinity, hardness	TPH-1664, PCB-608, TPHENOL-420	**HOLD DISSOLVED METALS	pH	Salinity			Total # Bottles
2274259	HA17-110(OW)	7/19/18	1000	AQ	STP	X	X	X	X	X	X	X	X	X	X	X	X					24
-01	Lowell Rec Water	↓	1010	AQ	↓									X				X	X			3

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

Sample Specific Comments

Container Type	P	P	A	P	A	A	P	P	P	A	A	P	P	A			
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
	7/19/18		7/19/18 16:10
	7/19/18 16:12		7/19/18 17:17
	7/19/18 1905		7/19/18 1905

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 (1/26/2016)

ANALYTICAL REPORT

Lab Number:	L1829832
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Mike Cronan
Phone:	(617) 886-7477
Project Name:	LOWELL GARAGE NPDES RGP
Project Number:	129485-010
Report Date:	08/07/18

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: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1829832
Report Date: 08/07/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1829832-01	LOWELL REC WATER	WATER	ALBANY STREET, BOSTON, MA	08/01/18 10:15	08/01/18

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1829832
Project Number: 129485-010 **Report Date:** 08/07/18

Case Narrative

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

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

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

Please contact Client Services at 800-624-9220 with any questions.

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: 08/07/18

METALS

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1829832
Report Date: 08/07/18

SAMPLE RESULTS

Lab ID: L1829832-01
Client ID: LOWELL REC WATER
Sample Location: ALBANY STREET, BOSTON, MA
Date Collected: 08/01/18 10:15
Date Received: 08/01/18
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	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Arsenic, Total	0.00157		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Cadmium, Total	ND		mg/l	0.00020	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Chromium, Total	0.00236		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Copper, Total	0.01463		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Iron, Total	1.63		mg/l	0.050	--	1	08/04/18 10:15	08/06/18 14:39	EPA 3005A	19,200.7	LC
Lead, Total	0.00921		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Mercury, Total	ND		mg/l	0.00020	--	1	08/03/18 11:52	08/04/18 14:16	EPA 245.1	3,245.1	KA
Nickel, Total	0.00273		mg/l	0.00200	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Selenium, Total	ND		mg/l	0.00500	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Silver, Total	ND		mg/l	0.00040	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Zinc, Total	0.06319		mg/l	0.01000	--	1	08/04/18 10:15	08/06/18 19:00	EPA 3005A	3,200.8	MG
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	22.6		mg/l	0.660	NA	1	08/04/18 10:15	08/06/18 14:39	EPA 3005A	19,200.7	LC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		08/06/18 19:00	NA	107,-	

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1829832

Project Number: 129485-010 **Report Date:** 08/07/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1142701-1										
Mercury, Total	ND		mg/l	0.00020	--	1	08/03/18 11:52	08/04/18 12:43	3,245.1	KA

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: WG1142937-1										
Antimony, Total	ND		mg/l	0.00400	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Arsenic, Total	ND		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Cadmium, Total	ND		mg/l	0.00020	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Chromium, Total	ND		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Copper, Total	ND		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Lead, Total	ND		mg/l	0.00100	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Nickel, Total	ND		mg/l	0.00200	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Selenium, Total	ND		mg/l	0.00500	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Silver, Total	ND		mg/l	0.00040	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG
Zinc, Total	ND		mg/l	0.01000	--	1	08/04/18 10:15	08/06/18 17:41	3,200.8	MG

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: WG1142939-1										
Iron, Total	ND		mg/l	0.050	--	1	08/04/18 10:15	08/06/18 10:10	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1829832
Report Date: 08/07/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01 Batch: WG1142939-1										
Hardness	ND		mg/l	0.660	NA	1	08/04/18 10:15	08/06/18 15:25	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1829832

Report Date: 08/07/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1142701-2								
Mercury, Total	105		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1142937-2								
Antimony, Total	96		-		85-115	-		
Arsenic, Total	101		-		85-115	-		
Cadmium, Total	101		-		85-115	-		
Chromium, Total	97		-		85-115	-		
Copper, Total	101		-		85-115	-		
Lead, Total	102		-		85-115	-		
Nickel, Total	99		-		85-115	-		
Selenium, Total	104		-		85-115	-		
Silver, Total	99		-		85-115	-		
Zinc, Total	104		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1142939-2								
Iron, Total	107		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1142939-2								
Hardness	102		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1829832
Report Date: 08/07/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142701-3 QC Sample: L1829015-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00403	81		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142701-5 QC Sample: L1829016-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00382	76		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142937-3 QC Sample: L1829833-01 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.6227	124		-	-		70-130	-		20
Arsenic, Total	0.00154	0.12	0.1215	100		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.04939	97		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.1950	98		-	-		70-130	-		20
Copper, Total	0.00117	0.25	0.2430	97		-	-		70-130	-		20
Lead, Total	0.00146	0.51	0.5129	100		-	-		70-130	-		20
Nickel, Total	0.00308	0.5	0.4900	97		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1133	94		-	-		70-130	-		20
Silver, Total	ND	0.05	0.04751	95		-	-		70-130	-		20
Zinc, Total	0.01686	0.5	0.5183	100		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1829832
Report Date: 08/07/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142937-5 QC Sample: L1829833-02 Client ID: MS Sample										
Antimony, Total	ND	0.5	0.5809	116		-	-	70-130	-	20
Arsenic, Total	0.00155	0.12	0.1286	106		-	-	70-130	-	20
Cadmium, Total	ND	0.051	0.05312	104		-	-	70-130	-	20
Chromium, Total	ND	0.2	0.1998	100		-	-	70-130	-	20
Copper, Total	0.00254	0.25	0.2561	101		-	-	70-130	-	20
Lead, Total	0.00389	0.51	0.5486	107		-	-	70-130	-	20
Nickel, Total	0.00395	0.5	0.5054	100		-	-	70-130	-	20
Selenium, Total	ND	0.12	0.1331	111		-	-	70-130	-	20
Silver, Total	ND	0.05	0.05024	100		-	-	70-130	-	20
Zinc, Total	0.04489	0.5	0.5623	103		-	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142939-3 QC Sample: L1829833-01 Client ID: MS Sample										
Iron, Total	7.13	1	7.88	75		-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142939-3 QC Sample: L1829833-01 Client ID: MS Sample										
Hardness	394	66.2	439	**68**	Q	-	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142939-7 QC Sample: L1829833-02 Client ID: MS Sample										
Iron, Total	2.21	1	3.20	99		-	-	75-125	-	20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142939-7 QC Sample: L1829833-02 Client ID: MS Sample										
Hardness	370	66.2	430	91		-	-	75-125	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1829832

Report Date: 08/07/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142701-4 QC Sample: L1829015-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142701-6 QC Sample: L1829016-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142937-4 QC Sample: L1829833-01 Client ID: DUP Sample						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	0.00154	0.00140	mg/l	10		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	ND	ND	mg/l	NC		20
Copper, Total	0.00117	0.00127	mg/l	8		20
Lead, Total	0.00146	0.00147	mg/l	0		20
Nickel, Total	0.00308	0.00310	mg/l	1		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.01686	0.01540	mg/l	9		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1829832

Report Date: 08/07/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142937-6 QC Sample: L1829833-02 Client ID: DUP Sample					
Antimony, Total	ND	ND	mg/l	NC	20
Arsenic, Total	0.00155	0.00147	mg/l	5	20
Cadmium, Total	ND	ND	mg/l	NC	20
Chromium, Total	ND	ND	mg/l	NC	20
Copper, Total	0.00254	0.00267	mg/l	5	20
Lead, Total	0.00389	0.00378	mg/l	3	20
Nickel, Total	0.00395	0.00396	mg/l	0	20
Selenium, Total	ND	ND	mg/l	NC	20
Silver, Total	ND	ND	mg/l	NC	20
Zinc, Total	0.04489	0.04253	mg/l	5	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142939-4 QC Sample: L1829833-01 Client ID: DUP Sample					
Iron, Total	7.13	6.57	mg/l	8	20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1142939-8 QC Sample: L1829833-02 Client ID: DUP Sample					
Iron, Total	2.21	2.22	mg/l	0	20

INORGANICS
&
MISCELLANEOUS

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1829832
Report Date: 08/07/18

SAMPLE RESULTS

Lab ID: L1829832-01
Client ID: LOWELL REC WATER
Sample Location: ALBANY STREET, BOSTON, MA
Sample Depth:
Matrix: Water

Date Collected: 08/01/18 10:15
Date Received: 08/01/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	6.7		SU	-	NA	1	-	08/02/18 01:40	121,4500H+-B	MA
Chromium, Hexavalent	ND		mg/l	0.010	--	1	08/02/18 01:29	08/02/18 01:53	1,7196A	UN

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1829832
Report Date: 08/07/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1142005-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	08/02/18 01:29	08/02/18 01:48	1,7196A	UN

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1829832

Report Date: 08/07/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1141994-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1142005-2								
Chromium, Hexavalent	94		-		85-115	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1829832
Report Date: 08/07/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1142005-4 QC Sample: L1829832-01 Client ID: LOWELL REC WATER												
Chromium, Hexavalent	ND	0.1	0.097	97		-	-		85-115	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1829832

Report Date: 08/07/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1141994-2 QC Sample: L1829833-01 Client ID: DUP Sample						
pH	6.8	6.8	SU	0		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1142005-3 QC Sample: L1829832-01 Client ID: LOWELL REC WATER						
Chromium, Hexavalent	ND	ND	mg/l	NC		20

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1829832
Report Date: 08/07/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1829832-01A	Plastic 250ml HNO3 preserved	A	<2	<2	4.0	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),HARDU(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),TRICR-CALC(1),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1829832-01B	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		HEXCR-7196(1),PH-4500(.01)

*Values in parentheses indicate holding time in days

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1829832
Project Number:	129485-010	**Report Date:**	08/07/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
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.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
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

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

Terms

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

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

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

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

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

Report Format: Data Usability Report

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1829832
Project Number:	129485-010	**Report Date:**	08/07/18

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.

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

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

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

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

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

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

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

Report Format: Data Usability Report

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1829832
Project Number:	129485-010	**Report Date:**	08/07/18

REFERENCES

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

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

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

107 Alpha Analytical - In-house calculation method.

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

LIMITATION OF LIABILITIES

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

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

Certification Information

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

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

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

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

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

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

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

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

CHAIN OF CUSTODY

ALPHA

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

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

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

Page 1 of 1

Date Rec'd in Lab: 08/01/18

ALPHA Job #: L1829832

H&A Information

H&A Client: Walker Consultants

H&A Address: 465 Medford St

Boston, MA 02129-1400

H&A Phone: 617-886-7400

H&A Fax:

H&A Email: Kalepidis, Lhoward

Project Information

Project Name: Lowell Garage NPDES RGP

Project Location: Albany Street, Boston, MA

Project #: 129485-010

(Use Project name as Project #)

Project Manager: M. Cronan/D. Bell

ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:

(only if pre approved) ☐ # of Days: 5 Day

Deliverables

☑ Email ☐ Fax

☐ EQuIS (1 File) ☑ EQuIS (4 File)

☐ Other:

Regulatory Requirements (Program/Criteria)

MA NPDES RGP

Note: Select State from menu & identify criteria.

Billing Information

☑ Same as Client Info

PO #

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:

☐ NJ ☐ NY

☐ Other:

These samples have been previously analyzed by Alpha

Other project specific requirements/comments:

Analyze using the EPA 2017 RGP Approved Testing Methods. Metals are full RGP list.

Please specify Metals or TAL.

ANALYSIS

ALPHA Lab ID (Lab Use Only)	Lowell Rec Water	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Total Metals: Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Zn, Fe	HEXCR-3500, Trivalent Chromium	hardness	pH	Total # Bottles
29832-01	Lowell Rec Water	8/1/18	1015	AQ	AF	X	X	X	X	2

Sample Filtration

☐ Done ☐ Lab to do

Preservation

☐ Lab to do

(Please Specify below)

Sample Specific Comments

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
	8/1/18		8/1/18 1630
	8/1/18 1612		8/1/18 1640
	8/1/18 1810		8/1/18 1812

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

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

ANALYTICAL REPORT

Lab Number:	L1934969
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Denis Bell
Phone:	(617) 886-7300
Project Name:	LOWELL GARAGE NPDES RGP
Project Number:	129485-010
Report Date:	08/15/19

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: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1934969
Report Date: 08/15/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1934969-01	HA17-110(OW)-2019-08	WATER	LOWELL, MA	08/06/19 10:15	08/06/19
L1934969-02	LOWELL REC WATER-2019-08	WATER	LOWELL, MA	08/06/19 11:10	08/06/19

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1934969
Project Number:	129485-010	**Report Date:**	08/15/19

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:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1934969
Project Number:	129485-010	**Report Date:**	08/15/19

Case Narrative (continued)

Sample Receipt

The analyses performed were specified by the client.

L1934969-02: Containers for the Total Suspended Solids and Total Cyanide analyses were received for the "LOWELL REC WATER-2019-08" sample, but were not listed on the chain of custody. The analyses were not performed at the client's request.

Total Metals

The WG1270212-2 LCS recoveries, associated with L1934969-01 (HA17-110(OW)-2019-08), are above the acceptance criteria for selenium (124%) and zinc (136%); however, the associated sample is non-detect to the RL for these target analytes. The results of the original analysis are reported.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Melissa Sturgis Melissa Sturgis

Title: Technical Director/Representative Date: 08/15/19

METALS

Project Name: LOWELL GARAGE NPDES RGP
Lab Number: L1934969
Project Number: 129485-010
Report Date: 08/15/19

SAMPLE RESULTS

Lab ID: L1934969-01
Client ID: HA17-110(OW)-2019-08
Sample Location: LOWELL, MA
Date Collected: 08/06/19 10:15
Date Received: 08/06/19
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	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Iron, Total	ND		mg/l	0.050	--	1	08/07/19 13:32	08/08/19 02:49	EPA 3005A	19,200.7	AB
Lead, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	08/09/19 11:51	08/12/19 13:22	EPA 245.1	3,245.1	GD
Nickel, Total	ND		mg/l	0.00200	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	08/07/19 13:32	08/12/19 20:06	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	146		mg/l	0.660	NA	1	08/07/19 13:32	08/08/19 02:49	EPA 3005A	19,200.7	AB
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		08/12/19 20:06	NA	107,-	

Project Name: LOWELL GARAGE NPDES RGP
Lab Number: L1934969
Project Number: 129485-010
Report Date: 08/15/19

SAMPLE RESULTS

Lab ID: L1934969-02
Client ID: LOWELL REC WATER-2019-08
Sample Location: LOWELL, MA
Date Collected: 08/06/19 11:10
Date Received: 08/06/19
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 Hardness by SM 2340B - Mansfield Lab											
Hardness	21.2		mg/l	0.660	NA	1	08/07/19 13:32	08/08/19 02:53	EPA 3005A	19,200.7	AB

Project Name: LOWELL GARAGE NPDES RGP **Lab Number:** L1934969

Project Number: 129485-010 **Report Date:** 08/15/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1269562-1										
Iron, Total	ND		mg/l	0.050	--	1	08/07/19 13:32	08/08/19 00:54	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): 01-02 Batch: WG1269562-1										
Hardness	ND		mg/l	0.660	NA	1	08/07/19 13:32	08/08/19 00:54	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: WG1270212-1										
Antimony, Total	ND		mg/l	0.00400	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Lead, Total	ND		mg/l	0.00100	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	08/07/19 13:32	08/12/19 19:40	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1934969
Report Date: 08/15/19

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: WG1270646-1										
Mercury, Total	ND		mg/l	0.00020	--	1	08/09/19 11:51	08/12/19 13:08	3,245.1	GD

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1934969

Report Date: 08/15/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1269562-2								
Iron, Total	109		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 Batch: WG1269562-2								
Hardness	96		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1270212-2								
Antimony, Total	92		-		85-115	-		
Arsenic, Total	112		-		85-115	-		
Cadmium, Total	114		-		85-115	-		
Chromium, Total	110		-		85-115	-		
Copper, Total	103		-		85-115	-		
Lead, Total	114		-		85-115	-		
Nickel, Total	103		-		85-115	-		
Selenium, Total	**124**	Q	-		85-115	-		
Silver, Total	108		-		85-115	-		
Zinc, Total	**136**	Q	-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1270646-2								
Mercury, Total	91		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1934969
Report Date: 08/15/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1269562-3 QC Sample: L1933777-01 Client ID: MS Sample												
Iron, Total	ND	1	1.12	112		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1269562-3 QC Sample: L1933777-01 Client ID: MS Sample												
Hardness	37.5	66.2	100	94		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1270212-3 QC Sample: L1900008-75 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.4300	86		-	-		70-130	-		20
Arsenic, Total	0.01046	0.12	0.1248	95		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05879	115		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2066	103		-	-		70-130	-		20
Copper, Total	ND	0.25	0.2441	98		-	-		70-130	-		20
Lead, Total	ND	0.51	0.5659	111		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.5038	101		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1512	126		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05249	105		-	-		70-130	-		20
Zinc, Total	ND	0.5	0.5481	110		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1270646-3 QC Sample: L1933455-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00497	99		-	-		70-130	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1934969
Report Date: 08/15/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1269562-4 QC Sample: L1933777-01 Client ID: DUP Sample						
Iron, Total	ND	ND	mg/l	NC		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1269562-4 QC Sample: L1933777-01 Client ID: DUP Sample						
Hardness	37.5	35.6	mg/l	5		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1270212-4 QC Sample: L1900008-75 Client ID: DUP Sample						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	0.01046	0.01129	mg/l	8		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	ND	ND	mg/l	NC		20
Copper, Total	ND	ND	mg/l	NC		20
Lead, Total	ND	ND	mg/l	NC		20
Nickel, Total	ND	ND	mg/l	NC		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1270646-4 QC Sample: L1933455-01 Client ID: DUP Sample						
Mercury, Total	ND	0.00087	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1934969
Report Date: 08/15/19

SAMPLE RESULTS

Lab ID: L1934969-01
Client ID: HA17-110(OW)-2019-08
Sample Location: LOWELL, MA
Sample Depth:
Matrix: Water

Date Collected: 08/06/19 10:15
Date Received: 08/06/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	6.4		mg/l	5.0	NA	1	-	08/07/19 14:25	121,2540D	DR
Cyanide, Total	ND		mg/l	0.005	--	1	08/07/19 13:55	08/07/19 16:24	121,4500CN-CE	LH
pH (H)	6.4		SU	-	NA	1	-	08/07/19 00:45	121,4500H+-B	DS
Nitrogen, Ammonia	0.079		mg/l	0.075	--	1	08/07/19 06:21	08/07/19 21:49	121,4500NH3-BH	AT
Chromium, Hexavalent	ND		mg/l	0.010	--	1	08/07/19 01:00	08/07/19 03:14	1,7196A	MA
Anions by Ion Chromatography - Westborough Lab										
Chloride	419.		mg/l	25.0	--	50	-	08/08/19 18:55	44,300.0	AT

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1934969
Report Date: 08/15/19

SAMPLE RESULTS

Lab ID: L1934969-02
Client ID: LOWELL REC WATER-2019-08
Sample Location: LOWELL, MA
Sample Depth:
Matrix: Water

Date Collected: 08/06/19 11:10
Date Received: 08/06/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	7.2		SU	-	NA	1	-	08/07/19 00:45	121,4500H+-B	DS
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	08/07/19 06:21	08/07/19 21:50	121,4500NH3-BH	AT

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010
Lab Number: L1934969
Report Date: 08/15/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1269411-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	08/07/19 06:21	08/07/19 21:33	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1269414-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	08/07/19 01:00	08/07/19 03:02	1,7196A	MA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1269508-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	08/07/19 14:25	121,2540D	DR
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1269574-1										
Cyanide, Total	ND		mg/l	0.005	--	1	08/07/19 13:55	08/07/19 16:08	121,4500CN-CE	LH
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1270491-1										
Chloride	ND		mg/l	0.500	--	1	-	08/08/19 18:17	44,300.0	AT

Lab Control Sample Analysis

Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP

Project Number: 129485-010

Lab Number: L1934969

Report Date: 08/15/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1269374-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1269411-2								
Nitrogen, Ammonia	96		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1269414-2								
Chromium, Hexavalent	99		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1269574-2								
Cyanide, Total	93		-		90-110	-		
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1270491-2								
Chloride	100		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1934969
Report Date: 08/15/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1269411-4 QC Sample: L1934918-01 Client ID: MS Sample												
Nitrogen, Ammonia	2.46	4	6.12	92		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1269414-4 QC Sample: L1934969-01 Client ID: HA17-110(OW)-2019-08												
Chromium, Hexavalent	ND	0.1	0.099	99		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1269574-4 QC Sample: L1934937-02 Client ID: MS Sample												
Cyanide, Total	ND	0.2	0.190	95		-	-		90-110	-		30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1270491-3 QC Sample: L1935116-02 Client ID: MS Sample												
Chloride	9.68	4	13.6	98		-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1934969
Report Date: 08/15/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1269374-2 QC Sample: L1933671-01 Client ID: DUP Sample						
pH	3.3	3.3	SU	0		5
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1269411-3 QC Sample: L1934918-01 Client ID: DUP Sample						
Nitrogen, Ammonia	2.46	2.52	mg/l	2		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1269414-3 QC Sample: L1934969-01 Client ID: HA17-110(OW)-2019-08						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1269508-2 QC Sample: L1934963-05 Client ID: DUP Sample						
Solids, Total Suspended	130	120	mg/l	8		29
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1269574-3 QC Sample: L1934937-01 Client ID: DUP Sample						
Cyanide, Total	0.007	0.011	mg/l	**37**	Q	30
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1270491-4 QC Sample: L1935116-02 Client ID: DUP Sample						
Chloride	9.68	9.70	mg/l	0		18

Project Name: LOWELL GARAGE NPDES RGP
Project Number: 129485-010

Lab Number: L1934969
Report Date: 08/15/19

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(*)
L1934969-01A	Plastic 120ml H2SO4 preserved	A	<2	<2	4.2	Y	Absent		NH3-4500(28)
L1934969-01B	Plastic 250ml unpreserved	A	7	7	4.2	Y	Absent		CL-300(28),HEXCR-7196(1),PH-4500(.01)
L1934969-01C	Plastic 250ml NaOH preserved	A	>12	>12	4.2	Y	Absent		TCN-4500(14)
L1934969-01D	Plastic 950ml HNO3 preserved	A	<2	<2	4.2	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)
L1934969-01E	Plastic 950ml unpreserved	A	7	7	4.2	Y	Absent		TSS-2540(7)
L1934969-02A	Plastic 120ml H2SO4 preserved	A	<2	<2	4.2	Y	Absent		NH3-4500(28)
L1934969-02B	Plastic 250ml unpreserved	A	7	7	4.2	Y	Absent		PH-4500(.01)
L1934969-02C	Plastic 950ml HNO3 preserved	A	<2	<2	4.2	Y	Absent		HARDU(180),HOLD-METAL-TOTAL(180)
L1934969-02D	Plastic 250ml NaOH preserved	A	>12	>12	4.2	Y	Absent		ARCHIVE()
L1934969-02E	Plastic 950ml unpreserved	A	7	7	4.2	Y	Absent		ARCHIVE()

*Values in parentheses indicate holding time in days

Project Name:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1934969
Project Number:	129485-010	**Report Date:**	08/15/19

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:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1934969
Project Number:	129485-010	**Report Date:**	08/15/19

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:	LOWELL GARAGE NPDES RGP	**Lab Number:**	L1934969
Project Number:	129485-010	**Report Date:**	08/15/19

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.

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

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: 8/6/19

ALPHA Job #: L1934969

Project Information
- Project Name: Lowell Garage
- Project Location: Lowell, MA
- Project #: 129485-010
- (Use Project name as Project #)
- Project Manager: D Bell
- ALPHAQuote #:

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

H&A Information
- H&A Client: Walker Consultants
- H&A Address: 465 Medford St, Boston, MA 02129-1400
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: MCronan, Lhoward

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

Regulatory Requirements (Program/Criteria)
MA NPDES RGP

Note: Select State from menu & identify criteria.

Billing Information
☑ Same as Client Info
PO #

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

These samples have been previously analyzed by Alpha

Other project specific requirements/comments:

**Field Filtered
Analyze using the EPA 2017 RGP Approved Testing Methods

Please specify Metals or TAL.

ANALYSIS

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	TSS	Cyanide	8260, 8260-SIM for Dioxane	HEXCR-3500, Trivalent Chromium	8270TCL (also including Diethylhexylphthalate),	8270TCL-SIM	Total Metals: Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Zn, Fe, Hg	Chloride	Ammonia	Hardness	TPH-1664, PCB-608, TPHENOL-420	**HOLD DISSOLVED METALS	pH	Salinity			Sample Specific Comments	Total Bottles
34969-01	HA17-110(OW)-2019-08	8-6-19	1015	AQ	DMS	X	X					X	X	X	X			X					5
-02	Lowell Rec Water-2019-08	8-6-19	1110	AQ	DMS							X		X	X			X				TOTAL METALS HOLD**	5
Container Type						P	P					P	P	P	P			P					
Preservative						A	E					C	A	D	C			A					

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

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

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

Relinquished By:	Date/Time	Received By:	Date/Time
	8-6-19/1235	Eleanor ATL	8/6/19 1235

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)

APPENDIX E

Typical Dewatering Treatment System Information

Lockwood Remediation Technologies, LLC

700 Series Floc Logs

Polyacrylamide Sediment and Turbidity Control Applicator Logs

700 Series Floc Logs are a group of soil-specific tailored log-blocks that contain blends of water treatment components and polyacrylamide co-polymer for water clarification. They reduce and prevent fine particles and colloidal clays from suspension in stormwater. There are several types of Floc Logs designed to treat most water and soil types. Contact Applied Polymer Systems, Inc. or your local distributor for free testing and site-specific application information.

Primary Applications

- Mine tailings and waste pile ditches
- Stormwater drainage from construction and building sites
- Road and highway construction runoff ditches
- Ditch and treatment system placement for all forms of highly turbid waters (less than 4% solids)
- Dredging operations as a flocculent

Features and Benefits

- Removes solubilized soils and clay from water
- Prevents colloidal solutions in water within ditch systems
- Binds cationic metals within water, reducing solubilization
- Binds pesticides and fertilizers within runoff water
- Reduces operational and cleanup costs
- Reduces environmental risks and helps meet compliance

Specifications / Compliances

- ANSI/NSF Standard 60 Drinking water treatment chemical additives
- 48h or 96h Acute Toxicity Tests (*D. magna* or *O. mykiss*)
- 7 Day Chronic Toxicity Tests *(P. promealas* or *C. dubia*

Packaging

700 Series Floc Logs are packaged in boxes of four (4)

Technical Information

Appearance - semi-solid block
Biodegradable internal coconut skeleton
Percent Moisture - 40% maximum
pH 0.5% Solution - 6-8
Shelf Life – up to 5 years when stored out of UV rays

Office: 774-450-7177 • Fax: 888-835-0617 89 Crawford Street • Leominster, MA 01453

Placement

Floc Logs are designed for placement within ditches averaging three feet wide by two feet deep. Floc log placement is based on gallon per minute flow rates. Note: actual GPM or dosage will vary based on site criteria and soil/water testing.

Directions for Use

(Water and Floc Log Mixing is Very Important!)

700 Series Floc Logs should be placed within the upper quarter to half of a *stabilized* ditch system or as close as possible to active earth moving activities. Floc Logs have built in ropes with attachment loops which can be looped over stakes to ensure they remain where placed. Mixing is key! If the flow rate is too slow, adding sand bags, cinder blocks, etc., can create the turbulence required for proper mixing. Floc Logs are designed to treat dirty water, not liquid mud; when the water contains heavy solids (exceeding 4%), it will be necessary to create a sediment or grit pit to let the heavy solids settle before treating the water.

Floc Logs must not be placed in areas where heavy erosion would result in the Floc Logs becoming buried. Where there is heavy sedimentation, maintenance will be required.

700 Series Floc Logs can easily be moved to different locations as site conditions change. Water quality will be improved with the addition of a dispersion field or soft armor covered ditch checks below the Floc Log(s) to collect flocculated particulate. Construction of mixing weirs may be required in areas where short ditch lines, swelling clays, heavy particle concentrations, or steep slopes may be encountered.

Cleanup:

Latex or rubber gloves are recommended for handling during usage. Use soap and water to wash hands after handling.

Precautions / Limitations

- 700 Series Floc Logs are extremely slippery when wet.
- Clean up spills quickly. Do not use water unless necessary as extremely slippery conditions will result and if water is necessary, use pressure washer.
- Floc Log will remain viable for up to 5 years when stored out of UV rays.
- 700 Series Floc Logs have been specifically tailored to specific water and soil types and samples must be tested. Testing is necessary and is free.

Updated November 4, 2015

Applied Polymer Systems, Inc.

Safety Data Sheet

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name: APS 703d #3 Floc Log®

Supplied:
Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

2. HAZARD IDENTIFICATION

Placement of these materials on wet walking surface will create extreme slipping hazard.

3. COMPOSITION/INFORMAION ON INGREDIENTS

Identification of the preparation: Anionic water-soluble Co-polymer gel

4. FIRST AID MEASURES

Inhalation: None

Skin contact: Contact with wet skin could cause dryness and chapping. Wash with water and soap. Use of gloves recommended.

Eye contact: Rinse thoroughly with plenty of water, also under the eyelids, seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.

Special fire-fighting precautions: Floc Logs that become wet render surfaces extremely slippery.

Protective equipment for firefighters: No special equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: No special precautions required.

Methods for cleaning up: Dry wipe as well as possible, Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Wash hands after handling.

Storage: Keep in a cool, dry place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: Use dry handling areas only.

Personal protection equipment

Respiratory Protection:	None
Hand protection:	Dry cloth, leather or rubber gloves.
Eye Protection:	Safety glasses with side shields. Do not wear contact lenses.
Skin protection:	No special protective clothing required.
Hygiene measures:	Wash hands before breaks and at end of work day.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	Granular semi-solid gel
Color:	Blue
Odor:	None
pH:	7.73
Melting point:	N/A
Flash point:	N/A
Vapor density:	N/A

10. STABILITY AND REACTIVITY

Stability: Product is stable, no hazardous polymerization will occur.

Materials to avoid: Oxidizing agents may cause exothermic reactions.

Hazardous decomposition products: Thermal decomposition may produce nitrogen oxides (NOx), carbon oxides.

11. TOXICOLOGICAL INFORMATION

Acute toxicity (EPA-821-R-02-012)

LC 50 (Survival) / *Ceriodaphnia dubia* / 48h / 673 ppm
NOAEC (Survival) / *Ceriodaphnia dubia* / 48h / 420 ppm
LC 50 / *Oncorhynchus mykiss* / 96h / 2928 ppm

12. ECOLOGICAL INFORMATION

Chronic toxicity (EPA-821-R-02-013)

IC 25 (Survival) / *P. promelas* / 7 day / 77.8 ppm
NOEC (Survival) / *P. promelas* / 7 day / 52.5 ppm

IC 25 (Survival) / *C. dubia* / 7 day / 78.7 ppm
NOEC (Survival) / *C. dubia* / 7 day / 52.7 ppm

IC 25 (Growth) / *P. promelas* / 7 day / 50.1 ppm
NOEC (Growth) / *P. promelas* / 7 day / 52.5 ppm

IC 25 (Reproduction) / *C. dubia* / 7 day / 66.8 ppm
NOEC (Reproduction) / *C. dubia* / 7 day / 52.5 ppm

Bioaccumulation: The product is not expected to bioaccumulate.
Persistence / degradability: Not readily biodegradable: (~85% after 180 days).

13. DISPOSAL CONSIDERATIONS

Waste from residues/unused products.
Any disposal practice must be in compliance with local, state and federal laws and regulations (contact local or state environmental agency for specific rules).

14. TRANSPORT INFORMATION

Not regulated by DOT, RCRA status-Not a hazardous waste

15. REGULATORY INFORMATION

TSCA Chemical Substances Inventory: All components of this product are either listed on the inventory or are exempt from listing.

SARA Section 311 / 312 Hazard Class:	**Not concerned**
RCRA Status:	**Not RCRA hazardous**

16. OTHER INFORMATION

NFPA and HMIS ratings:

NFPA	**Health:**	**1**	**Flammability:**	**0**	**Reactivity:**	**0**
HMIS	**Health**	**1**	**Flammability**	**0**	**Reactivity**	**0**

DATE EDITED: Nov 4th 2015

Updated 1-11-16

Applied Polymer Systems, Inc.

Safety Data Sheet

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name: APS 712 Silt Stop

Supplied:
Applied Polymer Systems Inc.
Woodstock, GA 30189
Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

2. HAZARD IDENTIFICATION

Aqueous solutions and powders that become wet render surfaces extremely slippery.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification of the preparation: Anionic water-soluble co-polymer blend

4. FIRST AID MEASURES

Inhalation: Move to fresh air. Wear dust mask while handling.

Skin contact: Contact with wet skin could cause chapping and dryness. Wash with water and soap. In case of persistent skin irritation, consult a physician.

Eye contact: Rinse thoroughly with plenty of water, also under the eyelids, seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.
Special fire-fighting precautions: Aqueous solutions or powders that become wet render surfaces extremely slippery.
Protective equipment for firefighters: No special equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: No special precautions required.

Methods for cleaning up: Do Not flush with water. Clean up promptly by sweeping or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Avoid dust formation. Do not breath dust. Use dust mask during handling. Wash hands after handling.

Storage: Keep in a cool, dry place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dust.

Personal protection equipment

Respiratory Protection:	Dust safety masks are recommended where dusting may occur.
Hand protection:	Dry cloth, leather or rubber gloves.
Eye Protection:	Safety glasses with side shields or face masks. Do not wear contact lenses.
Skin protection:	No special protective clothing required.
Hygiene measures:	Wash hands before breaks and at end of work day.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	Granular solid
Color:	White / Brown
Odor:	None
pH:	7.02
Melting point:	N/A
Flash point:	N/A
Vapor density:	N/A

10. STABILITY AND REACTIVITY

Stability:	Product is stable, no hazardous polymerization will occur.
Materials to avoid:	Oxidizing agents may cause exothermic reactions.
Hazardous decomposition products:	Thermal decomposition may produce nitrogen oxides (NOx), carbon oxides.

11. TOXICOLOGICAL /

Oral:	LD 50 / *Rattus norvegicus* / oral / > 5000 mg / kg
Inhalation:	The product is not expected to be toxic by inhalation. Use dust mask while handling.
Bioaccumulation:	The product is not expected to bioaccumulate.
Persistence / degradability:	Not readily biodegradable: (~40% after 28 days)

Acute toxicity

LC 50 / *Ceriodaphnia dubia* / 48h / 1,617 ppm
LC 50 / *Pimephales promelas* / 48 h / >6,720 ppm
LC 50 / *Pimephales promelas* / 96 h / >6,720 ppm

12. ECOLOGICAL INFORMATION

Chronic toxicity

IC 25 (Survival) / *Ceriodaphnia dubia* / 7day / 122.5 ppm
NOEC (Survival) / *Ceriodaphnia dubia* / 7day / 52.5 ppm

IC 25 (Reproduction) / *Ceriodaphnia dubia* / 7day / 59.3 ppm
NOEC (Reproduction) / *Ceriodaphnia dubia* / 7day / 52.5 ppm

13. DISPOSAL CONSIDERATIONS

Waste from residues/unused products.
Any disposal practice must be in compliance with local, state and federal laws and regulations (contact local or state environmental agency for specific rules).

14. TRANSPORT AND REGULATORY INFORMATION

Not regulated by DOT, **RCRA status-Not a hazardous waste**

15. TRANSPORT AND REGULATORY INFORMATION

TSCA Chemical Substances Inventory:	**All components of this product are either listed on the inventory or are exempt from listing.**
SARA Section 311 / 312 Hazard Class:	**Not concerned**
RCRA Status:	**Not RCRA hazardous**

16. OTHER INFORMATION

NFPA and HMIS ratings:

NFPA	**Health:**	**1**	**Flammability:**	**1**	**Reactivity:**	**0**
HMIS	**Health**	**1**	**Flammability**	**1**	**Reactivity**	**0**

DATE EDITED: Jan 11th 2016

Updated November 4, 2015

Applied Polymer Systems, Inc.

Safety Data Sheet

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name: APS 706b Floc Log ®

Supplied:
519 Industrial Drive
Woodstock, GA 30189
Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

2. HAZARD IDENTIFICATION

Identification of the preparation: Anionic water-soluble Co-polymer gel mix

3. COMPOSITION/INFORMATION ON INGREDIENTS

Placement of these materials on wet walking surface will create extreme slipping hazard.

4. FIRST AID MEASURES

Inhalation: None

Skin contact: Contact with wet skin can cause dryness and chapping. Wash with water and soap.

Eye contact: Rinse thoroughly with plenty of water, also under the eyelids, seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.

Special fire-fighting precautions: Floc Logs that become wet render surfaces extremely slippery.

Protective equipment for firefighters: No special equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: No special precautions required.

Methods for cleaning up: Dry wipe as well as possible, Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Wash hands after handling.

Storage: Keep in a cool, dry place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: Use dry handling areas only.

Personal protection equipment

Respiratory Protection: None
Hand protection: Dry cloth, leather or rubber gloves.
Eye Protection: Safety glasses with side shields. Do not wear contact lenses.
Skin protection: No special protective clothing required.
Hygiene measures: Wash hands before breaks and at end of work day.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Granular semi-solid gel
Color: Blue
Odor: None
pH: 7.66
Melting point: N/A
Flash point: N/A
Vapor density: N/A

10. STABILITY AND REACTIVITY

Stability: Product is stable, no hazardous polymerization will occur.

Materials to avoid: Oxidizing agents may cause exothermic reactions.

Hazardous decomposition products: Thermal decomposition may produce nitrogen oxides (NOx), carbon oxides.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

LC 50 / *Daphnia magna* / 48h / >420mg/L
LC 50 / *Oncorhynchus mykiss* / 96h / 637 ppm

12. ECOLOGICAL INFORMATION

Chronic toxicity

IC 25 (Survival) / P. promelas / 7 day / >1680 ppm
NOEC (Survival) / P. promelas / 7 day / 1680 ppm

IC 25 (Survival) / C. dubia / 7 day / 257.3 ppm
NOEC (Survival) / C. dubia / 7 day / 210 ppm

IC 25 (Growth) / P. promelas / 7 day / >1680 ppm
NOEC (Survival) / P. promelas / 7 day / 1680 ppm

IC 25 (Reproduction) / C. dubia / 7 day / 91.6 ppm
NOEC (Reproduction) / C. dubia / 7 day / 105 ppm

Bioaccumulation: The product is not expected to bioaccumulate.

Persistence / degradability: Not readily biodegradable: (85% after 180 days).

13. DISPOSAL CONSIDERATIONS

Waste from residues/unused products.
Any disposal practice must be in compliance with local, state and federal laws and regulations (contact local or state environmental agency for specific rules).

14. TRANSPORT INFORMATION

Not regulated by DOT, RCRA status-Not a hazardous waste

15. REGULATORY INFORMATION

TSCA Chemical Substances Inventory: **All components of this product are either listed on the inventory or are exempt from listing.**

SARA Section 311 / 312 Hazard Class: **Not concerned**
RCRA Status: **Not RCRA hazardous**

16. OTHER INFORMATION

NFPA and HMIS ratings:

NFPA	**Health:**	**1**	**Flammability:**	**0**	**Reactivity:**	**0**
HMIS	**Health**	**1**	**Flammability**	**0**	**Reactivity**	**0**

DATE EDITED: Nov 4th 2015

Updated 10-29-15

Applied Polymer Systems, Inc.

Safety Data Sheet

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name: APS 705 Silt Stop

Supplied:

Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189

Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

2. HAZARD IDENTIFICATION

Aqueous solutions or powders that become wet render surfaces extremely slippery.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification of the preparation: Anionic water-soluble Co-polymer

4. FIRST AID MEASURES

Inhalation: Move to fresh air. Use dust mask when handling.

Skin contact: Contact with wet skin could cause chapping and dryness. Wash with water and soap. In case of persistent skin irritation, consult a physician.

Eye contact: Rinse thoroughly with plenty of water, also under the eyelids; seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.

Special fire-fighting precautions: Aqueous solutions or powders that become wet render surfaces extremely slippery.

Protective equipment for firefighters: No special equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: No special precautions required.

Methods for cleaning up: Do Not flush with water. Clean up promptly by sweeping or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Avoid dust formation. Do not breath dust. Use dust mask during handling. Wash hands after handling.

Storage: Keep in a cool, dry place. (0-30^0 C)

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dust.
Personal protection equipment
Respiratory Protection: Dust safety masks are recommended where dusting may occur.
Hand protection: Dry cloth, leather or rubber gloves.
Eye Protection: Safety glasses with side shields or face masks. Do not wear contact lenses.
Skin protection: No special protective clothing required.
Hygiene measures: Wash hands before breaks and at end of work day.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Granular solid
Color: White
Odor: None
pH: 7-8
Melting point: N/A
Flash point: N/A
Vapor density: N/A

10. STABILITY AND REACTIVITY

Stability: Product is stable, no hazardous polymerization will occur.
Materials to avoid: Oxidizing agents may cause exothermic reactions.
Hazardous decomposition products: Thermal decomposition may produce nitrogen oxides (NOx), carbon oxides.

11. TOXICOLOGICAL INFORMATION

Acute toxicity: (EPA/600/4-90/027F)

LD 50 / *Rattus norvegicus* / oral / > 5000 mg/kg
LC 50 / *Oncorhynchus mykiss* / 96h / 530 mg/L
LC 50 / *Daphnia magna* / 48h / >420mg/L
EC 50 / *Selenastrum capricornutum* / 96h / >500mg/L

12. ECOLOGICAL INFORMATION

Chronic Toxicity : (EPA/600/R-98/182)

IC_{25} (Survival) / *P. promelas* / 7 day / 358 ppm
NOEC (Survival) / *P. promelas* / 7 day / 840 ppm

IC_{25} (Survival) / *C. dubia* / 7 day / 157.5 ppm
NOEC (Survival) / *C. dubia* / 7 day / 105 ppm

IC_{25} (Growth) / *P. promelas* / 7 day / 94 ppm
NOEC (Growth) / *P. promelas* / 7 day / 105 ppm

IC_{25} (Reproduction) / *C. dubia* / 7 day / 27.7 ppm
NOEC (Reproduction) / *C. dubia* / 7 day / 26.25 ppm

Inhalation: The product is not expected to be toxic by inhalation.

Dermal: The results of testing on rabbits showed no toxicity even at high dose levels.

Bioaccumulation: The product is not expected to bioaccumulate.

Persistence / degradability: Not readily biodegradable: (~40% after 28 days).

Chronic toxicity: A 2 yr feeding study on rats did not reveal adverse health effects.

13. DISPOSAL CONSIDERATIONS

Waste from residues/unused products.
Any disposal practice must be in compliance with local, state and federal laws and regulations (contact local or state environmental agency for specific rules).

14. TRANSPORT INFORMATION

Not regulated by DOT, RCRA status-Not a hazardous waste

15. REGULATORY INFORMATION

TSCA Chemical Substances Inventory: **All components of this product are either listed on the inventory or are exempt from listing.**

SARA Section 311 / 312 Hazard Class: **Not concerned**
RCRA Status: **Not RCRA hazardous**

16. TRANSPORT AND REGULATORY INFORMATION

NFPA and HMIS ratings:

NFPA	**Health:**	**1**	**Flammability:**	**1**	**Reactivity:**	**0**
HMIS	**Health**	**1**	**Flammability**	**1**	**Reactivity**	**0**

DATE EDITED: Oct. 29th 2015

Updated November 4, 2015

Applied Polymer Systems, Inc.

Safety Data Sheet

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name: APS 703d Floc Log®

Supplied:
Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

2. HAZARD IDENTIFICATION

Placement of these materials on wet walking surface will create extreme slipping hazard.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification of the preparation: Anionic water-soluble Co-polymer gel

4. FIRST AID MEASURES

Inhalation: None

Skin contact: Contact with wet skin could cause dryness and chapping. Wash with water and soap.

Eye contact: Rinse thoroughly with plenty of water, also under the eyelids, seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.

Special fire-fighting precautions: Floc Logs that become wet render surfaces extremely slippery.

Protective equipment for firefighters: No special equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: No special precautions required.

Methods for cleaning up: Dry wipe as well as possible, Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Wash hands after handling.

Storage: Keep in a cool, dry place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: Use dry handling areas only.

Personal protection equipment

Respiratory Protection:	**None**
Hand protection:	**Dry cloth, leather or rubber gloves.**
Eye Protection:	**Safety glasses with side shields. Do not wear contact lenses.**
Skin protection:	**No special protective clothing required.**
Hygiene measures:	**Wash hands before breaks and at end of work day.**

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	**Granular semi-solid gel**
Color:	**Blue**
Odor:	**None**
pH:	**7.37**
Melting point:	**N/A**
Flash point:	**N/A**
Vapor density:	**N/A**

10. STABILITY AND REACTIVITY

Stability: **Product is stable, no hazardous polymerization will occur.**

Materials to avoid: **Oxidizing agents may cause exothermic reactions.**

Hazardous decomposition products: **Thermal decomposition may produce nitrogen oxides (NOx), carbon oxides.**

11. TOXICOLOGICAL INFORMATION

Acute toxicity (EPA/600/4-90/027F)

LD 50 / *Rattus norvegicus* / oral / > 5000 mg/kg
LC 50 / *Daphnia magna* / 48h / >383mg/L
LC 50 / *Oncorhynchus mykiss* / 96h / 1900 mg/L

Chronic toxicity (EPA/600/4-91/002)

IC 25 (Survival) / *P. promelas* / 7 day / 110 ppm
NOEC (Survival) / *P. promelas* / 7 day/ 105 ppm

IC 25 (Survival) / *C. dubia* / 7 day / 99.8 ppm
NOEC (Survival) / *C. dubia* / 7 day/ 52.5 ppm

IC 25 (Growth) / *P. promelas* / 7 day / 130 ppm
NOEC (Growth) / *P. promelas* / 7 day / 105 ppm

IC 25 (Reproduction) / *C. dubia* / 7 day / 58.2 ppm
NOEC (Reproduction) / *C. dubia* / 7 day / 105 ppm

12. ECOLOGICAL INFORMATION

Fish: LC 50 / *Pimephales promelas* / 96h / >1000 mg/l
Water Flea: LC 50 / *Daphnia magna* / 48h / 383mg/l
Algae: EC 50 / *Selenastrum capricornutum* / 96h / >500mg/l

Bioaccumulation: The product is not expected to bioaccumulate.
Persistence / degradability: Not readily biodegradable: (~85% after 180 days).

13. DISPOSAL INFORMATION

Waste from residues/unused products.
Any disposal practice must be in compliance with local, state and federal laws and regulations (contact local or state environmental agency for specific rules).

14. TRANSPORT INFORMATION

Not regulated by DOT, RCRA status-Not a hazardous waste

15. REGULATORY INFORMATION

TSCA Chemical Substances Inventory: All components of this product are either listed on the inventory or are exempt from listing.

SARA Section 311 / 312 Hazard Class: **Not concerned**
RCRA Status: **Not RCRA hazardous**

16. OTHER INFORMATION

NFPA and HMIS ratings:

NFPA	**Health:**	**1**	**Flammability:**	**0**	**Reactivity:**	**0**
HMIS	**Health**	**1**	**Flammability**	**0**	**Reactivity**	**0**

DATE EDITED: Nov 4th 2015

Technical Guidance for the Use of Polyacrylamides (PAM) and PAM Blends for Soil Erosion Control and Storm Water clarification

(Courtesy of Applied Polymer Systems, Inc.)

Practice Description

PAM is a water-soluble anionic polyacrylamide product used to minimize soil erosion caused by water and wind to decrease soil sealing by binding soil particles, especially clays, to hold them on site. In addition, these types of materials may also be used as a water treatment additive to remove suspended particles from runoff. When PAM is used on construction sites in the Southeast it is typically applied with temporary seeding and or mulching on areas where the timely establishment of temporary erosion control is so critical that seedings and mulching need additional reinforcement. It may be used alone on sites where no disturbances will occur until site work is continued and channel erosion is not a significant potential problem. Permanent grassing applications can be better established using PAM as a tackifier and soil conditioner.

PAMs are manufactured in various forms to be used on specific soil types, and are generally applied at a rate of up to 25 pounds/acre for dry products and 2 ½ gallons/acre of emulsion-liquid products. Using the wrong form of a PAM on a soil will result in some degree of performance failure, and increase the potential for this material to enter surface waters. PAM used alone may not reduce NTU values resulting in non-compliance water quality discharges or poor soil binding conditions. Site-specific soil-PAM testing must be performed. Exceeding the maximum application rates for this product does not increase the effectiveness of the product.

Block or Log forms of PAM and PAM blends are manufactured for specific use in drainage waterways to remove suspended particulates from runoff.

General Components of the Practice

Prior to the start of construction, a qualified professional should design the application of PAM and plans and specifications should be available to field personnel.

The application should conform to the design and specifications provided in the plans. Typical applications include the following components.

- Site Preparation
- Equipment Preparation
- PAM Application

Application

Site Preparation

Prepare site following design and specifications.

Equipment Preparation

If using a liquid application system, pump a surfactant through the injection system before and after injecting concentrated liquid PAM into sprinkler irrigation systems to help prevent valves and tubing from clogging.

PAM used in hydroseeding applications should be added as the last additive to the mix.

After their use, rinse all PAM mixing and application equipment thoroughly with water to avoid formation of PAM residues. Rinse residue should be applied to soil areas to create binding to the soil structure and increase erosion reduction.

PAM Application- Criteria for Land applied PAM Specifications

PAM shall be mixed and/or applied in accordance with all Occupational Safety and Health Administration (OSHA) Material Safety Data Sheet (MSDS) requirements and the manufacturer's recommendations for the specified use conforming to all federal, state and local laws, rules and regulations.

1.) Toxicity

All venders and suppliers of PAM, PAM mix or blends shall present or supply a written toxicity report which verifies that the PAM, PAM mix or blend exhibits acceptable toxicity parameters which meet or exceed the EPA requirements for the state and federal water quality standards. Whole effluent testing does not meet this requirement as primary reactions have occurred and toxic potentials have been reduced. **Cationic forms of PAM, polymers and chitosan are not allowed for use under this guideline due to their high levels of toxicity to aquatic organisms. Emulsions shall never be applied directly to stormwater runoff or riparian waters due to surfactant toxicity.**

2.) Performance

All venders and suppliers of PAM, PAM mix or blends shall supply written "site specific" testing results demonstrating that a performance of 95% or greater reduction of NTU or TSS from stormwater discharges.

Emulsion batches shall be mixed following recommendations of a testing laboratory that determines the proper product and rate to meet site requirements. Application method shall insure uniform coverage to the target area. **(Emulsions shall never be applied directly to stormwater runoff or riparian waters)**

Dry form (powder) may be applied by hand spreader or a mechanical spreader. Mixing with dry silica sand will aid in spreading. Pre-mixing of dry form PAM into fertilizer, seed or other soil amendments is allowed when specified in the design plan. Application method shall insure uniform coverage to the target area.

Block or Log forms shall be applied following site testing results to assure proper placement and performance and shall meet or exceed state and federal water quality requirements.

Common Problems

Consult with a registered design professional for assistance if any of the following occur:

- Problems with application equipment clogging.
- PAM alone may not meet testing requirements for NTU reduction and soil stabilization. Site specific "blends" may be needed to meet these requirements.
- Application specifications for PAM cannot be met; alternatives may be required. Unapproved application techniques could lead to failure.
- Visible erosion occurs after application.

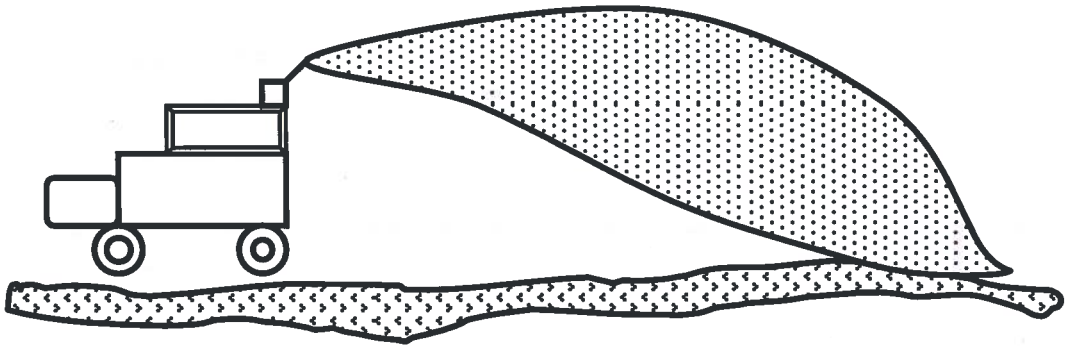
Maintenance

An operation and maintenance plan must be prepared for use by the operator responsible for PAM application. Plan items should include the following items.

- Reapply PAM to disturbed or tilled areas that require continued erosion control.
- Maintain equipment to provide uniform application rates.
- Rinse all PAM mixing and application equipment thoroughly with water to avoid formation of PAM residues and discharge rinse water to soil areas where PAM stabilization may be helpful.
- Downstream deposition from the use of PAM may require periodic sediment removal to maintain normal functions.

PM-H

(Silt Stop Application of Temporary and Permanent Grassing)



Notes:

1) **For use on all slope conditions which are not matted.**

2) **Application rate shall be 1.5 gallons of Silt Stop emulsion/acre or 10 pounds of Silt Stop powder/acre.**

3) **Silt Stop emulsion or powder shall be added to all hydroseeding mixes at a rate of 3000 gallons of mix/acre.**

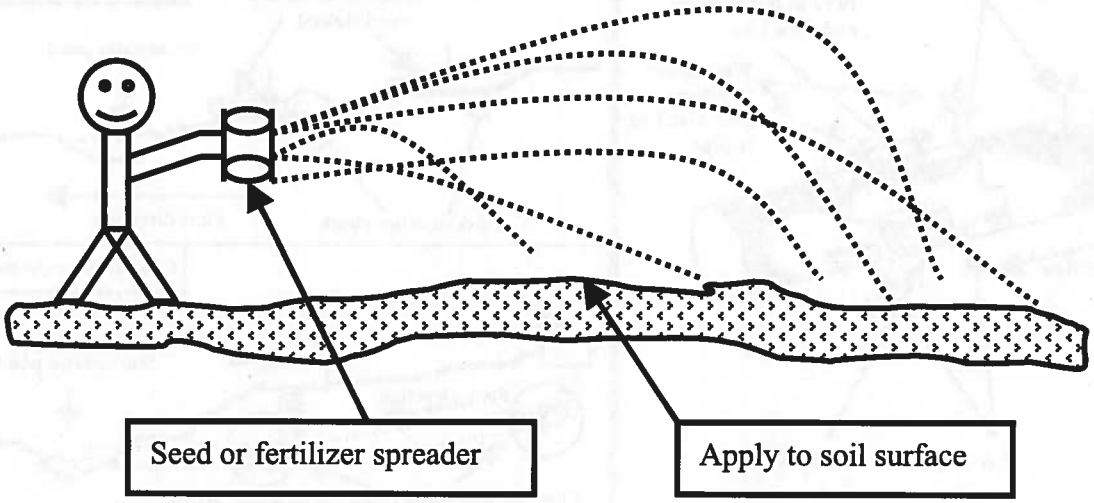
4) **Silt Stop shall be the final additive to the hydroseeding mix.**

5) **Straw cover may be applied over the hydroseeded application.**

(All Silt Stop shall be site specific, soil tested achieving 95% NTU reduction or better and must have acute and chronic toxicity testing reports.)

PM-D

PM (Dry Silt Stop Form)



Notes:

1) **Dry Silt Stop shall be applied using a seed or fertilizer spreader or may be mixed with other dry spread additives.**

2) **Dry Silt Stop shall be covered with straw, mulch, matting or jute.**

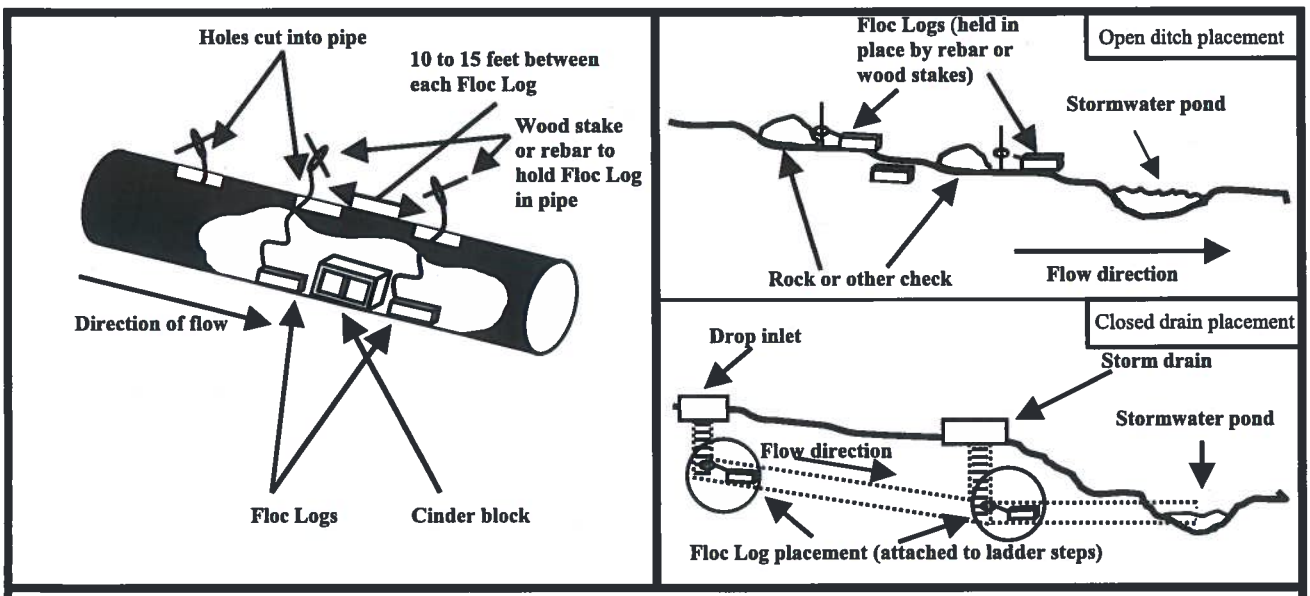
3) **Application rate shall be 10 pounds/acre but not greater than 25 pounds/acre.**

4) **For use on all slope conditions.**

(All Silt Stop shall be site specific, soil tested achieving 95% NTU reduction or better and must have acute and chronic toxicity testing reports.)

PM-F

(Floc Log placement for pipes, ditch and storm drains)



Notes:

1) **Place Floc Logs far enough upstream in turbid flows to allow adequate mixing time. (Mixing time and Floc Log type are determined from the sample analysis.)**

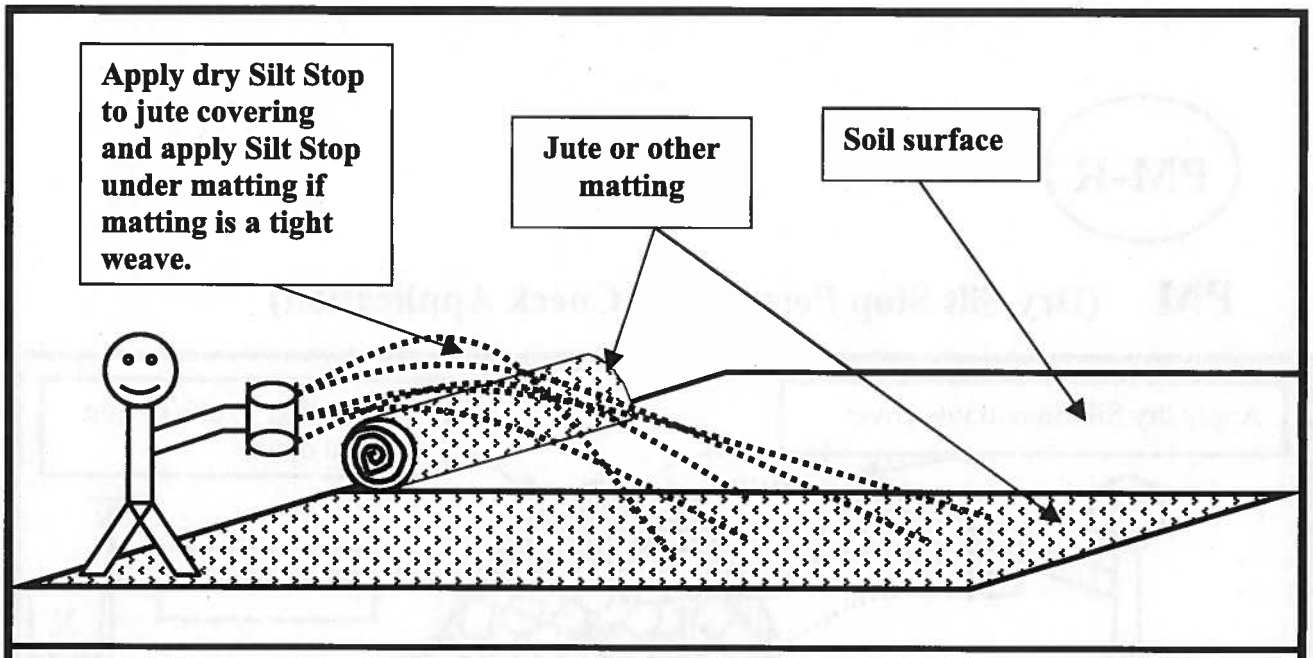
2) **Floc Logs should be placed 10 to 15 feet apart in a row or at points of highest water velocity; whichever is most convenient.**

3) **The number of Floc Logs placed on the site is based on results from the sample analysis. Floc Logs shall be placed in <u>all</u> catch basins and after <u>all</u> downsides of rock checks.**

(All Floc Logs shall be site specific, soil tested achieving 95% NTU reduction or better and must have acute and chronic toxicity testing reports.)

PM-M

(Dry Silt Stop Form Soft Armoring Technique for Matting)



Notes:

1) **For use on all slope conditions.**

2) **One layer of jute or other matting shall be applied to the surface of all exposed soil on 1:1 slopes.**

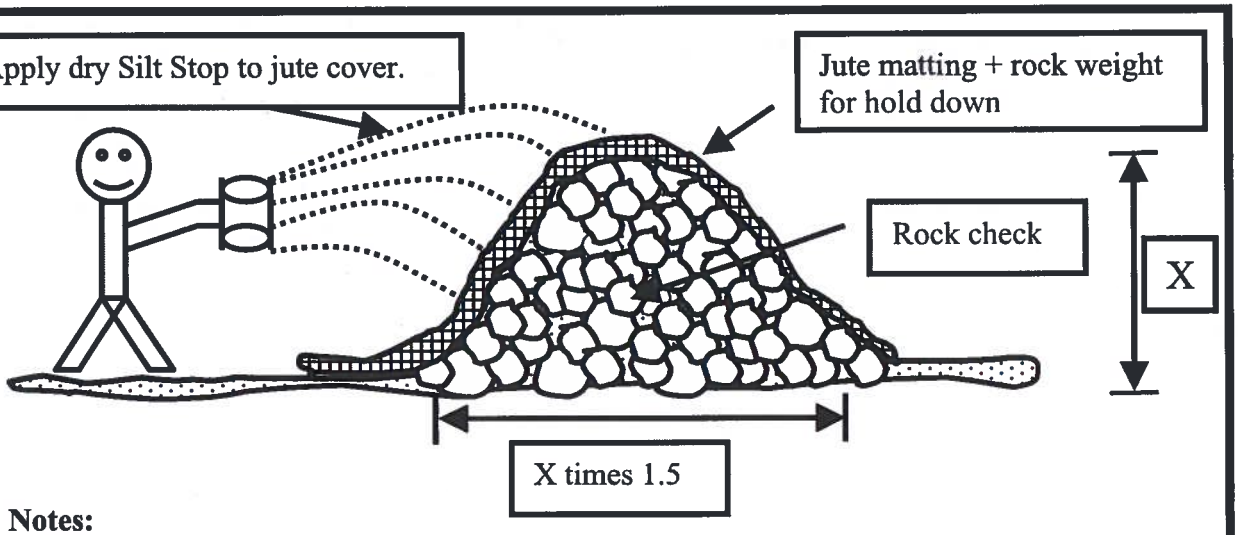
3) **Dry Silt Stop shall be applied to the soil if tight weave matting is used and also to the jute or burlap matting cover using a seed or fertilizer spreader.**

4) **Application rate shall be 10 pounds/acre but not greater than 25 pounds/acre.**

(All Silt Stop shall be site specific, soil tested achieving 95% NTU reduction or better and must have acute and chronic toxicity testing reports.)

PM-R

PM (Dry Silt Stop Form Rock Check Application)



Notes:

1) One layer of jute matting shall be applied to the surface of all rock checks.

2) Dry Silt Stop shall be applied to the jute cover using a seed or fertilizer spreader.

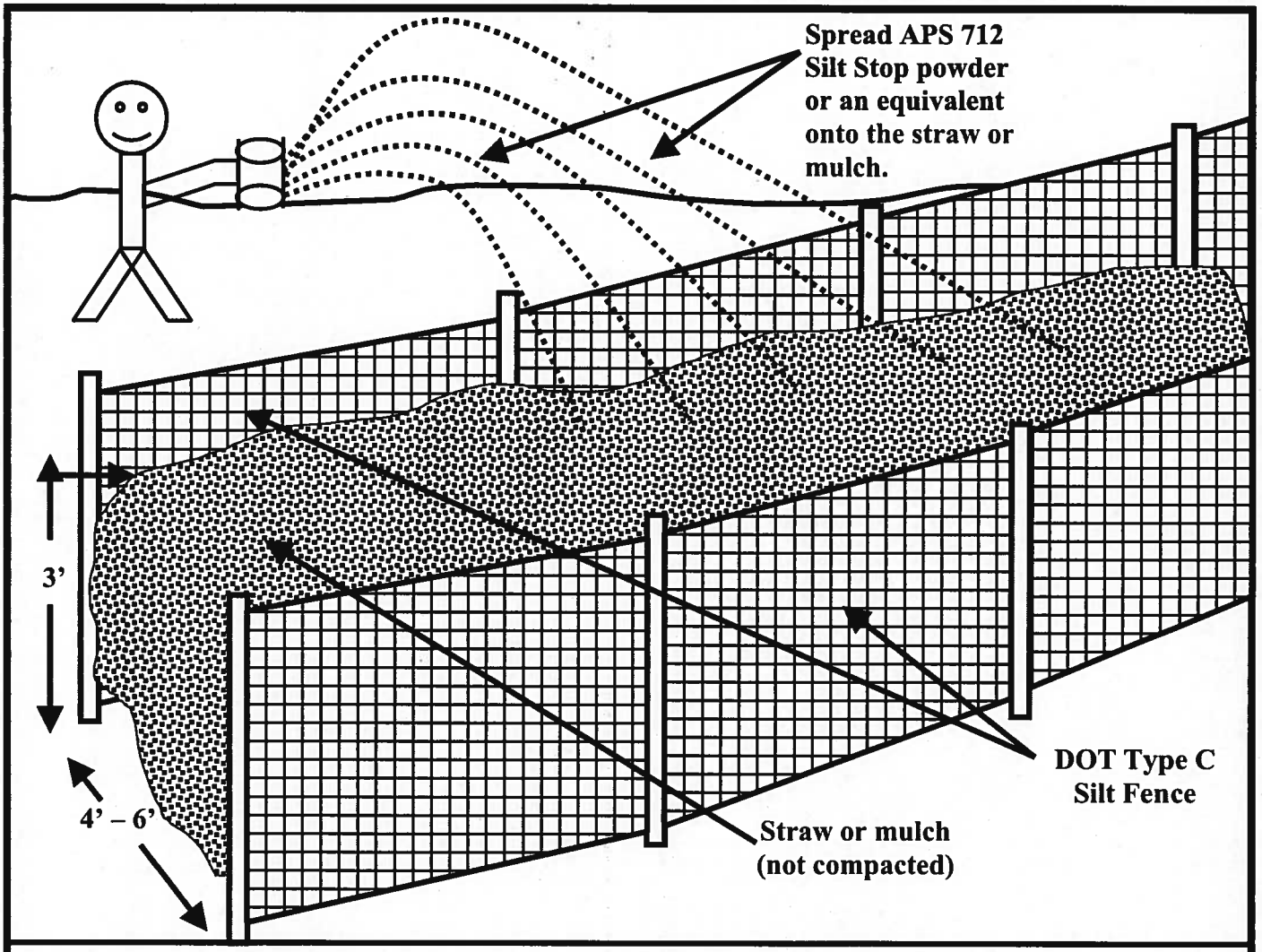
3) Application rate shall be 10 pounds/acre but not greater than 25 pounds/acre.

(All Silt Stop shall be site specific, soil tested achieving 95% NTU reduction or better and must have acute and chronic toxicity testing reports.)

SRB

(SRB) Sediment Retention Barrier

Use for fine sediment retention between silt fences. Install at low areas during grading.



1) Use in all low areas during the grading phase.

2) Place 2 rows of DOT type C silt fence 4 to 6 feet apart. Place straw or mulch 3 feet deep between the silt fences.

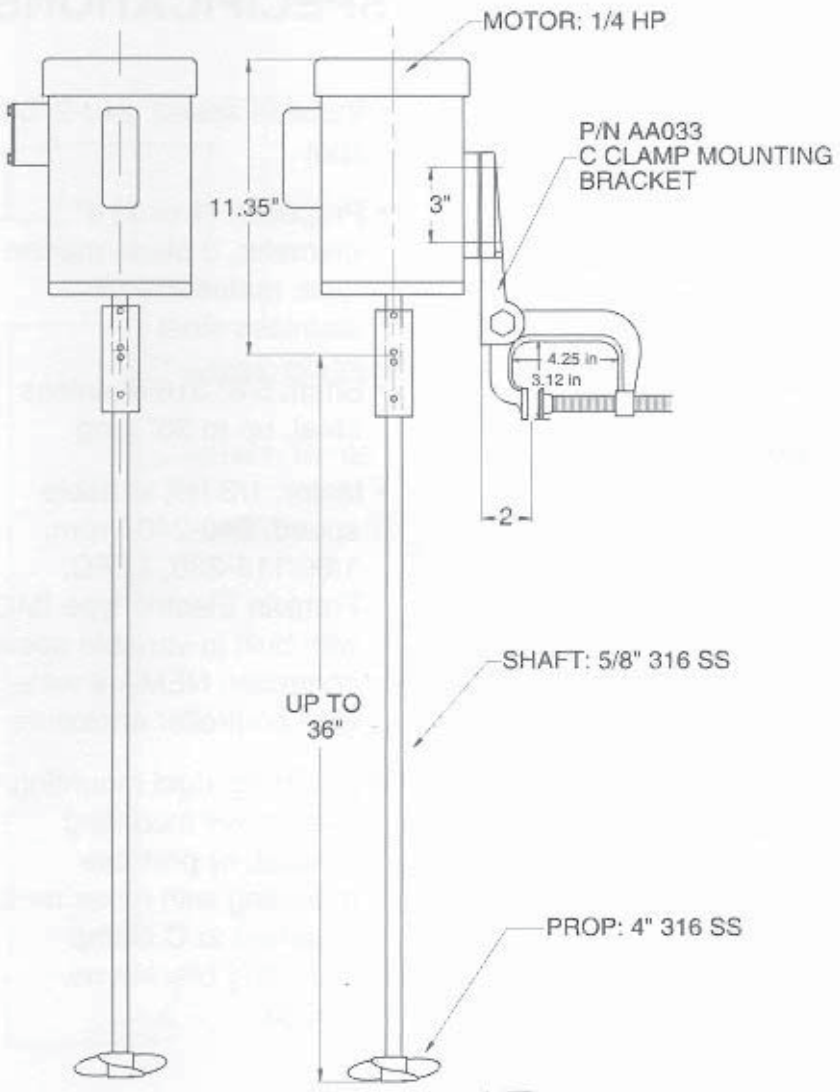
3) Dry Silt Stop powder or an equivalent should be spread throughout the straw or mulch using a seed or fertilizer spreader.

(All Silt Stop shall be site specific, soil tested achieving 95% NTU reduction or better and must have acute and chronic toxicity testing reports.)

pH System Components

MADDEN

MIXER MODEL NO. AA102A



AA102A

SPECIFICATIONS

- Speed: 1,725 rpm
- Propeller: (1 or 2) 4" diameter, 3 blade marine type, material: 316 stainless steel
- Shaft: 5/8" 316 stainless steel, up to 36" long
- Motor: 1/4 HP, 1,725 rpm, 1/60/115-230, capacitor start, or 3/60/230-460, TEFC
- Mounting: rigid mounting to fixed mixer mounting bracket, or portable mounting with mixer motor mounted to C clamp mounting bracket no. AA033.

PULSAFEEDER®
An IDEX Water & Wastewater Business

pulsafeeder.com

The Pulsatron Series E Plus offers manual control over stroke length and stroke rate as standard with the option to choose between 4-20mA and external pace inputs for automatic control.

Twenty distinct models are available, having pressure capabilities to 300 PSIG (21 BAR) @ 3 GPD (0.5 lph), and flow capacities to 600 GPD (94.6 lph) @ 30 PSIG (2 BAR), with a turndown ratio of 100:1. Metering performance is reproducible to within ± 2% of maximum capacity.
Please refer to the reverse side for Series E PLUS specifications.

Features

- Automatic Control, available with 4-20mADC direct or external pacing, with stop function.
- Manual Control by on-line adjustable stroke rate and stroke length.
- Auto-Off-Manual switch.
- Highly Reliable timing circuit.
- Circuit Protection against voltage and current upsets.
- Panel Mounted Fuse.
- Solenoid Protection by thermal overload with auto-reset.
- Water Resistant, for outdoor and indoor applications.
- Indicator Lights, panel mounted.
- Guided Ball Check Valve Systems, to reduce back flow and enhance outstanding priming characteristics.
- Safe & Easy Priming with durable leak-free bleed valve assembly (standard).

Controls

Manual Stroke Rate
- Turn-Down Ratio 10:1

Manual Stroke Length
- Turn-Down Ratio 10:1

4-20mADC Direct or External Pacing with Stop
- Automatic Control

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)

PULSAtron® Series E Plus Electronic Metering Pumps

PULSAtron® Series E Plus

Specifications and Model Selection

MODEL		LPK2	LPB2	LPA2	LPD3	LPB3	LPA3	LPK3	LPF4	LPD4	LPB4	LPH4	LPG4	LPE4	LPK5	LPH5	LPH6	LPK7	LPH7	LPJ7	LPH8
Capacity	GPH	0.13	0.21	0.25	0.5	0.50	0.50	0.60	0.85	0.90	1.00	1.70	1.75	1.85	2.50	3.15	5.00	8.00	10.00	10.00	25.00
nominal	GPD	3	5	6	12	12	12	14	20	22	24	41	42	44	60	76	120	192	240	240	600
(max.)	LPH	0.5	0.8	0.9	1.9	1.9	1.9	2.3	3.2	3.4	3.8	6.4	6.6	7	9.5	11.9	18.9	30.3	37.9	37.9	94.6
Pressure	PSIG	300	250	150	250	150	100	100	250	150	100	250	150	100	150	150	100	50	35	80	30
(max.)	BAR	21	17	10	17	10	7	7	17	10	7	17	10	7	10	10	7	3.3	2.4	5.5	2
Connections	Tubing	1/4" ID X 3/8" OD 3/8" ID X 1/2" OD													3/8" ID X 1/2" OD 1/2" ID X 3/4" OD (LPH8 ONLY)						
	Piping	1/4" FNPT													1/4" FNPT 1/2" FNPT						

Engineering Data

Pump Head Materials Available:	GFPPL
	PVC
	PVDF
	316 SS
Diaphragm:	PTFE-faced CSPE-backed
Check Valves Materials Available:	
Seats/O-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:	+/- 2% at maximum capacity
Viscosity Max CPS :	

For viscosity up to 3000 CPS, select connection size 3, 4, B or C with 316SS ball material. Flow rate will determine connection/ball size. Greater than 3000 CPS require spring loaded ball checks. See Selection Guide for proper connection.

Stroke Frequency Max SPM:	125
Stroke Frequency Turn-Down Ratio:	10:1
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:	1.0 Amps
@ 230 VAC; Amps:	0.5 Amps
Peak Input Power:	300 Watts
Average Input Power @ Max SPM:	130 Watts

Custom Engineered Designs – Pre-Engineered Systems

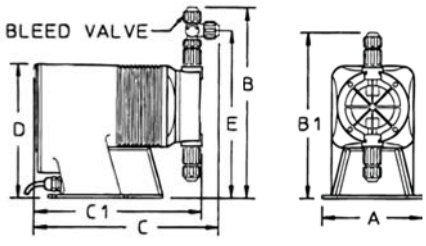
Pre-Engineered Systems

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 HDPE frame offers maximum chemical compatibility and structural rigidity. Each system is factory assembled and hydrostatically tested prior to shipment.

Dimensions

Series E Plus Dimensions (inches)																	
Model No.	A	B	B1	C	C1	D	E	Shpg Wt	Model No.	A	B	B1	C	C1	D	E	Shpg Wt
LPA2	5.4	10.3	-	10.8	-	7.5	8.9	13	LPH4	6.2	10.9	-	11.2	-	8.2	9.5	21
LPA3	5.4	10.6	-	10.7	-	7.5	9.2	13	LPH5	6.2	11.3	-	11.2	-	8.2	9.9	21
LPB2	5.4	10.3	-	10.8	-	7.5	8.9	13	LPH6	6.2	11.3	-	11.9	-	8.2	9.9	21
LPB3	5.4	10.6	-	10.7	-	7.5	9.2	13	LPH7	6.1	11.7	-	11.9	-	8.2	10.3	21
LPB4	5.4	10.6	-	10.7	-	7.5	9.2	13	LPH8*	6.1	-	10.9	-	11.3	8.2	-	26
LPD3	5.4	10.6	-	11.2	-	7.5	9.2	15	LPK2	5.4	10.3	-	10.8	-	7.5	8.9	13
LPD4	5.4	10.6	-	11.2	-	7.5	9.2	15	LPK3	5.4	10.6	-	10.7	-	7.5	9.2	13
LPE4	5.4	10.6	-	11.2	-	7.5	9.2	15	LPK5	5.4	10.9	-	11.7	-	7.5	9.5	18
LPF4	5.4	10.6	-	11.7	-	7.5	9.2	18	LPK7	6.1	11.7	-	11.2	-	8.2	10.3	21
LPG4	5.4	10.6	-	11.7	-	7.5	9.2	18	LPJ7	6.1	10	-	10.7	-	-	-	21

NOTE: Inches X 2.54 = cm /* the LPH8 is designed without a bleed valve available



+GF+® Signet pH/ORP Controllers

Versatile mounting options allow you to customize the installation for particular applications

NEW

- Large, scratch-resistant, self-healing display

+GF+ Signet controllers are designed for broad application and ease of setup and operation. Multiple mounting options allow for installation best suited to your particular application. Intuitive software and four-button keypad arrangement make it easy to access important information such as measurement values, calibration data, relay setup menus, and more.

Optional universal mounting kit allows for mounting of field-mount units on pipes, tanks, and walls. RC filter kit prevents premature wearing of the relay outputs by providing protection from electrical noise. Order separately below.

Required *System Components*

1. Controller
2. Preamplifier
3. Electrode

Field-mount controller 56560-20

Panel-mount controller 56560-30

Specifications

ISO9001:2000 CERTIFIED SUPPLIER · c UL us · CE · IP65 Meter only · 2 year warranty Meter only

Model		+GF+ Signet 8750-1	+GF+ Signet 8750-2	+GF+ Signet 8750-3
Range	pH	0.00 to 14.00	0.00 to 14.00	0.00 to 14.00
	mV	–1000 to 2000 mV	–1000 to 2000 mV	–1000 to 2000 mV
	Temperature	–13 to 248°F (–25 to 120°C)	–13 to 248°F (–25 to 120°C)	–13 to 248°F (–25 to 120°C)
Resolution	pH	0.01	0.01	0.01
	mV	1 mV	1 mV	1 mV
	Temperature	0.1°C (0.1°F)	0.1°C (0.1°F)	0.1°C (0.1°F)
Accuracy	pH	±0.03	±0.03	±0.03
	mV	±2 mV	±2 mV	±2 mV
	Temperature	±0.5°C (±1°F)	±0.5°C (±1°F)	±0.5°C (±1°F)
Temperature compensation		Automatic, 3 kΩ Balco	Automatic, 3 kΩ Balco	Automatic, 3 kΩ Balco
Control type		On/off (limit) or proportional	On/off (limit) or proportional	On/off (limit) or proportional
Number of set points		Two (low, high)	Two (low, high)	Two (low, high)
Output	Relay	—	Two SPDT relays, 5 A at 30 VDC or 250 VAC resistive load maximum	—
	Current	One 4 to 20 mA, isolated, fully adjustable and reversible	One 4 to 20 mA, isolated, fully adjustable and reversible	Two 4 to 20 mA, isolated, fully adjustable and reversible
	Open collector	One open-collector, optically isolated, 50 mA max	—	Two open-collector, optically isolated, 50 mA max
Dead band		User adjustable	User adjustable	User adjustable
Housing		NEMA 4X (IP65) front panel	NEMA 4X (IP65) front panel	NEMA 4X (IP65) front panel
Display		2 x 16 alphanumeric LCD	2 x 16 alphanumeric LCD	2 x 16 alphanumeric LCD
Dimensions (W x H x D)		Field-mount: 3 13/16" x 3 13/16" x 4 3/16" (96 x 96 x 106 mm) Panel-mount: 3 13/16" x 3 13/16" x 3 13/16" (96 x 96 x 97 mm)		
Power		12 to 24 VDC	12 to 24 VDC	12 to 24 VDC

1 Controllers

Catalog number	Model	Mounting style	Price
S-56560-18 S-56560-28	+GF+ Signet 8750-1 +GF+ Signet 8750-1P	Field mount Panel mount, ¼ DIN	
S-56560-20 S-56560-30	+GF+ Signet 8750-2 +GF+ Signet 8750-2P	Field mount Panel mount, ¼ DIN	
S-56560-22 S-56560-32	+GF+ Signet 8750-3 +GF+ Signet 8750-3P	Field mount Panel mount, ¼ DIN	

S-05631-50 Universal mounting kit for field-mount units . . . . . .
S-19007-52 RC filter kit for relay use. Pack of 2 . . . . . .
S-17106-20 NIST-traceable calibration . . . . . .

2 Preamplifiers

Preamplifiers protect the relatively weak output signal of the pH or ORP electrode from electrical interferences common in industrial environments and are required for initial system installation. Unique DryLoc® connectors allow you to quickly form robust assemblies for submersible and in-line applications.

Catalog number	Thread size	Price
S-56560-03 S-56560-04	¾" NPT(M) ISO 7-1 R¾"	

DryLoc® pH and ORP electrodes

3 Electrodes

Feature-packed pH and ORP electrodes feature unique DryLoc connectors which offer resistance to intrusion from dirt and moisture. Extended reference path length extends electrode life over traditional combination electrodes. Electrode bodies are Ryton® PPS for added chemical resistance and feature a ¾" NPT(M) or ISO 7-1 R¾" threads for in-line installation. Flat-surface electrodes minimize abrasion and breakage problems by allowing sediment to sweep past the measurement surface. Bulb-style electrodes feature quick response and are well-suited to general-purpose applications. HF-resistant electrodes resist hydrofluoric acid in concentration less than 2%. LC-bulb electrodes are designed for ultrapure, low-conductivity water applications. All have a 3 kΩ Balco ATC element and measure 0 to 14 pH.

Catalog number	Type	Thread size	Price
S-56561-02 S-56561-03	pH, flat surface	¾" NPT(M) ISO 7-1 R¾"	
S-56561-10 S-56561-11	pH, bulb style	¾" NPT(M) ISO 7-1 R¾"	
S-56561-06 S-56561-07	pH, HF-resistant bulb	¾" NPT(M) ISO 7-1 R¾"	
S-56561-14 S-56561-15	pH, LC bulb	¾" NPT(M) ISO 7-1 R¾"	
S-56561-16 S-56561-17	ORP, flat surface	¾" NPT(M) ISO 7-1 R¾"	

NorFalco Inc.
NorFalco Sales Inc.

Material Safety Data Sheet

77% - 100% SULFURIC ACID

SECTION 1. PRODUCT IDENTIFICATION

Trade Name	**77 % - 100 % Sulfuric Acid**
Product Code	None
Manufacturers/Distributors	NorFalco Inc., 6000 Lombardo Center, The Genesis Blg, suite 650 Seven Hills, OH 44131 NorFalco Sales Inc., 6755 Mississauga Road, Suite 304, Mississauga, Ontario L5N 7Y2
Information Contact	André Auger, Administration Assistant
Product Information	1-905-542-6901 (Mississauga)
Phone Number (Transportation Emergency)	Canada 1-877-ERP-ACID (377-2243)
Phone Number (Transportation Emergency)	U.S.A. 1-800-424-9300 CHEMTREC
Phone Number (Medical Emergency)	**1-418-656-8090**
Phone Number (Emergency)	**CANUTEC 1-613-996-6666**
Synonyms	Dihydrogen Sulfate ; Oil of Vitriol ; Vitriol Brown Oil ; Sulphuric Acid. Acide sulfurique (French)
Name / Chemical Formula	Sulfuric Acid / H_2SO_4
Chemical Family	Acid
Utilization	Chemical industries ; Water treatment ; Fertilizer ; Pulp and Paper.

Manufacturers CEZinc on behalf of Noranda Income Limited Partnership, Salaberry-de-Valleyfield (Quebec) Canada J6T 6L4
Xstrata Copper, Home Smelter, Rouyn-Noranda (Quebec) J9X 5B6
Xstrata Zinc, Brunswick Smelting, Belledune, New Brunswick E0B 1G0
Xstrata Copper, Kidd Metallurgical Division, Timmins, Ontario P4N 7K1
Xstrata Nickel, Sudbury Operations, Falconbridge, Ontario P0M 1S0

SECTION 2. HAZARDS IDENTIFICATION

WHMIS (Canada) CLASS D-1A : Very toxic material causing immediate and serious effects
CLASS E : Corrosive material

Labeling (EEC) C Corrosive

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Name	CAS #	Percentage (%)	# CE	R Phrases[1]
Sulfuric (Acid)	7664-93-9	77 % to 100 %	231-639-5	R35
60 Deg Technical		77.7		
66 Deg Technical		93.2		
1.835 Electrolyte		93.2		
98 % Technical		98		
99 % Technical		99		
100 % Technical		100		
Water	7732-18-5	0-22		

Note 1 : See section 15 for the complete wording of risk phrases.

SECTION 4. FIRST-AID MEASURES

Eye Contact Remove contact lenses if present. Immediately flush eyes with plenty of water, holding eyelids open for at least 15 minutes. Consult a physician. Possibility of conjonctivitis, severe irritation, severe burns, permanent eye damage.

Skin Contact Remove contaminated clothing and shoes as quickly as possible protecting your hands and body. Place under a deluge shower for 15 minutes. Flush exposed skin gently and thoroughly with running water (Pay particular attention to : Folds, crevices, creases, groin). Call a physician if irritation persists. May irritate skin, cause burns (Highly corrosive) and possibility of some scarring.

Wash contaminated clothing before reusing. While the patient is being transported to a medical facility, continue the application of cold, wet compresses. If medical treatment must be delayed, repeat the flushing with cold water or soak the affected area with cold water to help remove the last traces of sulfuric acid. *Creams or ointments **SHOULD NOT** be applied before or during the washing phase of treatment.*

Inhalation Take precautions to avoid secondary contamination by residual acids. Remove the person to fresh air. If not breathing, give artificial respiration. Difficult breathing : Give oxygen. Get immediate medical attention. Possibility of damage to the upper respiratory tract and lung tissues. Maintain observation of the patient for delayed onset of pulmonary oedema. May cause irritation to the upper respiratory tract : Coughing, sore throat, shortness of breath.

Ingestion **DO NOT** INDUCE VOMITING. Conscious and alert person : Rinse mouth with water and give ½ to 1 cup of water or milk to dilute material. **Spontaneous vomiting :** Keep head below hips to prevent aspiration ; Rinse mouth and give ½ to 1 cup of water or milk. **UNCONSCIOUS** person : **DO NOT** induce vomiting or give any liquid. **Immediately** obtain medical attention.

Notes to Physicians
Continued washing of the affected area with cold or iced water will be helpful in removing the last traces of sulfuric acid. Creams or ointments should not be applied before or during the washing phase of the treatment.

SECTION 5. FIRE-FIGHTING MEASURES

Flash Point	Not available
Flammable Limits	Not available
Auto-Ignition Temperature	Not available
Products of Combustion	Releases of sulfur dioxide at extremely high temperatures.
Fire Hazard	Not flammable
Explosion Hazard	Reacts with most metals, especially when dilute : Hydrogen gas release (**Extremely** flammable, explosive). Risk of explosion if acid combined with water, organic materials or base solutions in enclosed spaces (Vaccum trucks, tanks). Mixing acids of different strengths/concentrations can also pose an explosive risk in an enclosed space/container.
Extinguishing media	ERG (Emergency Response Guidebook) : Guide 137 When material is not involved in fire, do not use water on material itself. **Small fire :** Dry chemical or CO_2. Move containers from fire area if you can do it without risk. **Large fire:** Flood fire area with large quantities of water, while knocking down vapors with water fog. If insufficient water supply: knock down vapors only. **Fire involving Tanks or Car/Trailer Loads :** Cool containers with flooding quantities of water until well after fire is out. Do not get water inside containers. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire.
Protective equipment	Evacuate personnel to a safe area. Keep personnel removed and upwind of fire. Generates heat upon addition of water, with possibility of spattering. Wear full protective clothing. Runoff from fire control may cause pollution. Neutralize run-off with lime, soda ash, etc., to prevent corrosion of metals and formation of hydrogen gas. Wear self-contained breathing apparatus if fumes or mists are present.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Spill	Review **Fire and Explosion Hazards** and **Safety Precautions** before proceeding with clean up. Stop flow if possible. Soak up small spills with dry sand, clay or diatomaceous earth.
Methods	Dike large spills, and cautiously dilute and neutralize with lime or soda ash, and transfer to waste water treatment system. Prevent liquid from entering sewers, waterways, or low areas. If this product is spilled and not recovered, or is recovered as a waste for treatment or disposal, the Reportable Quantity (U.S. DOT) is 1 000 lbs (Based on the sulfuric acid content of the solution spilled). Comply with Federal, State, and local regulations on reporting releases.
Protective equipment	Review Fire Fighting Measures and Handling (Personnel Protection) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

SECTION 7. HANDLING AND STORAGE

Handling	Do not get in eyes, on skin, or on clothing. Avoid breathing vapours or mist. Wear approved respirators if adequate ventilation cannot be provided. Wash thoroughly after handling. Ingestion or inhalation : Seek medical advice **immediately** and provide medical personnel with a copy of this MSDS.
Conditions for storage	Sulfuric acid must be stored in containers or tanks that have been specially designed for use with sulfuric acid. **DO NOT** add water or other products to contents in containers as violent reactions will result with resulting high heat, pressure and/or generation of hazardous acid mists. Keep containers away from heat, sparks, and flame. All closed containers must be safely vented before each opening. For more information on sulfuric acid tanks, truck tanks and tank cars including safe unloading information go to www.norfalco.com.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

		Control parameters	
		ACGIH (U.S.A.) 2008	OSHA (U.S.A.)
Name	**# CAS**	**TLV-TWA (mg/m³)**	**PEL - TWA (mg/m³)**
Sulfuric (Acid)	7664-93-9	0.2 (thoracic fr.)	1
60 Deg Technical	7664-93-9	0.2 (thoracic fr.)	1
66 Deg Technical	7664-93-9	0.2 (thoracic fr.)	1
1.835 Electrolyte	7664-93-9	0.2 (thoracic fr.)	1
98 % Technical	7664-93-9	0.2 (thoracic fr.)	1
99 % Technical	7664-93-9	0.2 (thoracic fr.)	1
100 % Technical	7664-93-9	0.2 (thoracic fr.)	1
Water	7732-18-5	Not established	Not established

ACGIH : American Conference of Governmental Industrial Hygienists. OSHA : Occupational Safety and Health Administration.

Note : **Sulfuric (Acid) :** Exposure limits may be different in other jurisdictions. NIOSH REL-TWA (≤10 hours) : 1 mg/m³ ; IDLH : 15 mg/m³. *Consult local authorities for acceptable exposure limits.*

Engineering Controls Good general ventilation should be provided to keep vapour and mist concentrations below the exposure limits.

Individual protection Chemical splash goggles ; Full-length face shield/chemical splash goggles combination ; Acid-proof gauntlet gloves, apron, and boots ; Long sleeve wool, acrylic, or polyester clothing ; Acid proof suit and hood ; Appropriate NIOSH respiratory protection.

In case of emergency or where there is a strong possibility of considerable exposure, wear a complete acid suit with hood, boots, and gloves. If acid vapour or mist are present and exposure limits may be exceeded, wear appropriate NIOSH respiratory protection.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance	Liquid (Oily ; Clear to turbid)	**Odour**	Odourless
Molecular Weight	98.08	**Colour**	Colourless to light grey
pH (1% soln/water)	< 1	**Volatility**	< 1 (Butyl Acetate = 1.0)
Boiling Point	193°C to 327 °C (379°F to 621°F) @ 760 mm Hg	**Vapour Density**	3.4
Melting Point	-35°C to 11°C (-31°F to 52°F)	**Dispersion**	Yes (Water)
Vapour Pressure	< 0.3 mm Hg @ 25°C (77 °F) < 0.6 mm Hg @ 38°C (100 °F)	**Solubility**	Yes (Water)

GRADE	Boiling Point		Freezing Point		Specific Gravity
	DEG °C	DEG °F	DEG °C	DEG °F	
60 DEG TECHNICAL	193	380	- 12	10	1.706
66 DEG TECHNICAL	279	535	- 35	- 31	1.835
1.835 ELECTROLYTE	279	535	- 35	- 31	1.835
98 % TECHNICAL	327	621	- 2	29	1.844
99 % TECHNICAL	310	590	4	40	1.842
100 % TECHNICAL	274	526	11	51	1.839

SECTION 10. STABILITY AND REACTIVITY

Stability Yes (Under normal conditions of ambiant temperature)

Reactivity Reacts violently with water, organic substances and base solutions with evolution of heat and hazardous mists.

Conditions to avoid Heat : Possibility of decomposition. Release of dangerous gases (Sulfur oxides SO_2, SO_3)

Polymerization Polymerization will not occur.

Incompatibilities Vigorous reactions with : Water; alkaline solutions ; Metals, metal powder ; Carbides ; Chlorates ; Fulminates ; nitrates ; Picrates ; Strong oxidizing, reducing, or combustible organic materials. Hazardous gases are evolved on contact with chemicals such as cyanides, sulfides, and carbides.

Corrosivity Yes

SECTION 11. TOXICOLOGICAL INFORMATION

Routes of Entry Ingestion. Inhalation. Skin and eye contacts.

Carcinogenicity **Strong inorganic acid mists containing sulfuric acid (Occupational exposures) :** PROVEN (Human, Group 1, IARC) ; SUSPECTED (Human, Group A2, ACGIH) ; Group X (NTP) ; Classification not applicable to sulfuric acid and sulfuric acid solutions.

Mutagenicity Not applicable.

Teratogenicity Not applicable.

Acute toxicity ORAL (LD50) : 2 140 mg/kg (Rat) ; INHALATION (LC50, 2 hours) : 510 mg/m³ (Rat) ; 320 mg/m³ (Mouse). (RTECS).

Acute Effects May be **fatal** if inhaled or ingested in large quantity. Liquids or acid mists : May produce tissue damage : Mucous membranes (Eyes, mouth, respiratory tract). **Extremely** dangerous by eyes and skin contact **(Corrosive)**. Severe irritant for eyes : Inflammation (Redness, watering, itching). Very dangerous in case of inhalation (Mists) at high concentrations : May produce severe irritation of respiratory tract (Coughing, shortness of breath, choking).

Chronic Effects Target organs for acute and chronic overexposure (NIOSH 90-117) : Respiratory system, eyes, skin, teeth.

Acid mists : Overexposure to strong inorganic mists containing sulfuric acid : Possibility of laryngeal cancer (HSBD, IARC). Possibility of irritation of the nose and throat with sneezing, sore throat or runny nose. Headache, nausea and weakness. Gross overexposure : Possibility of irritation of nose, throat, and lungs with cough, difficulty breathing or shortness of breath. Pulmonary edema with cough, wheezing, abnormal lung sounds, possibly progressing to severe shortness of breath and bluish discoloration of the skin. Symptoms may be delayed. Repeated or prolonged exposure to mists may cause : Corrosion of teeth.

Contact (Skin) : Possibility of corrosion, burns or ulcers. Contact with a 1 % solution : Possibility of slight irritation with itching, redness or swelling. Repeated or prolonged exposure (Mist) : Possibility of irritation with itching, burning, redness, swelling or rash.

Contact (Eye) : Possibility of corrosion or ulceration (Blindness may result). Repeated or prolonged exposure (Mist) : Possibility of eye irritation with tearing, pain or blurred vision.

Ingestion : Immediate effects of overexposure : Burns of the mouth, throat, esophagus and stomach, with severe pain, bleeding, vomiting, diarrhea and collapse of blood pressure. Damage may appear days after exposure.

Toxicity

Persons with the following pre-existing conditions warrant particular attention :
Sulfuric (Acid) : Laryngeal irritation.

Eating, drinking and smoking must be prohibited in areas where this material is handled and processed. Wash hands and face before eating, drinking and smoking.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Aquatic toxicity : Slightly to moderately toxic.
Bluegill Sunfish (LC50 ; 48 hours) : 49 mg/l (Tap water, 20 °C, conditions of bioessay not specified). (HSBD).
Flounder (LC50 ; 48 hours) : 100-330 mg/l (Aerated water, conditions of bioessay not specified). (HSBD).

Toxicity to Animals

EYE : Concentrated compound is corrosive. 10 % solution : Moderate eye irritant.
SKIN : Concentrated compound is corrosive. 10 % solution : Slight skin irritant.
Single and repeated exposure : Irritation of the respiratory tract ; Corrosion of the respiratory tract ; Lung damage ; Labored breathing ; Altered respiratory rate ; Pulmonary oedema. Repeated exposure : Altered red blood cell count.

Mobility (Soil)

Easy soil seeping under rain action

Persistence and degradability

Sulfate ion : Ubiquitous in the environment. Metabolized by micro-organisms and plants.

Bioaccumulation

Sulfate ion : Ubiquitous in the environment. Metabolized by micro-organisms and plants whitout bioaccumulation.

Biodegradation Products

Not available

Biodegradation Products (Toxicity)

Not applicable

Remarks on Environment

Due to the product's composition, particular attention must be taken for transportation and storage. Protect from rain because the run-off water will become acidic and may be harmful to flora and fauna.

BOD5 and COD

Not available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Cleaned-up material may be an hazardous waste on *Resource Conservation and Recovery Act* (RCRA) on disposal due to the corrosivity characteristic. **DO NOT** flush to surface water or sanitary sewer system. Comply with Federal, State, and local regulations. If approved, neutralize and transfer to waste treatment system.

SECTION 14. TRANSPORT INFORMATION

TDG (Canada)

CLASS 8 Corrosives

PIN

UN1830 SULFURIC ACID PG II

Special Provisions (Transport)

None

DOT (U.S.A.)/IMO (Maritime)

Proper Shipping Name	SULFURIC ACID
Hazard Class	8
UN N°	1830
DOT/IMO Label	CORROSIVE
Packing Group	II
Reportable Quantity	1000 lbs (454 kg)
Shipping Containers	Tank Cars, Tank Trucks, Vessel

ERG

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SECTION 15 REGULATORY INFORMATION

Labeling (EEC)

EU (Directive 67/548/EEC) :
Sulfuric (Acid) : C Corrosive (Pictogram)
Annex I Index number : 016-020-00-8 ; EU Consolidated Inventories : EC Number 231-639-5
C ≥ 15 % C ; R35 ; S2, 26, 30, 45.

Risk Phrases (EEC)

R35- Causes severe burns

Safety Phrases (EEC)

S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S30- Nerver add water to this product
S36/37/39- Wear suitable protective clothing, gloves and eye/face protection
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

CEPA DSL (CANADA)	CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) : On the Domestic Substances List (DSL) ; Acceptable for use under the provisions of CEPA. Sulfuric Acid is a Class B Drug Precursor under *Health Canada's Controlled Drugs and Substances Act* and *Precursor Control Regulations*.
Regulations (U.S.A.)	CERCLA Section 103 Hazardous substances (40 CFR 302.4) ; SARA Section 302 Extremely Hazardous Substances (40 CFR 355) : Yes ; SARA Section 313, Toxic Chemicals (40 CFR 372.65) ; US: TSCA Inventory : Listed : **Sulfuric (Acid)** (Final RQ) : 1 000 pounds (454 kg) Sulfuric Acid is subject to reporting requirements of Section 313, *Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA)*, 40 CFR Part 372. Certain companies must report emissions of Sulfuric Acid as required under *The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)*, 40 CFR Part 302 For more information call the *SARA Hotline* 800-424-9346. Strong Inorganic Acid Mists Containing Sulfuric Acid : Chemical listed effective March 14, 2003 to the *State of California, Proposal 65.* *U.S. FDA Food Bioterrorism Regulations* : These regulations apply to Sulfuric Acid when being distributed, stored or used for Food or Food Processing.
Classifications HCS (U.S.A.)	Corrosive liquid

NFPA (National Fire Protection Association) (U.S.A.)

Fire Hazard	**0**	**Reactivity**	**2**	**Health**	**3**	**Special Hazard**	**ACID**

NPCA- HMIS Rating

Fire Hazard	**0**	**Reactivity**	**2**	**Health**	**3**

SECTION 16. OTHER INFORMATION

References

- TLVs and BEIs (2008). Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices. ACGIH, Cincinnati, OH – http://www.acgih.org
- CCOHS (2008) - Canadian Centre for Occupational Health and Safety - http://www.ccohs.ca/
- CSST (2008) - Commission de la Santé et de la Sécurité du Travail (Québec). Service du répertoire toxicologique - http://www.reptox.csst.qc.ca/
- ERG (2008). Emergency Response Guidebook, Developed by the U.S. Department of Transportation, Transport Canada, and the Secretariat of Communications and Transportation of Mexico
- HSDB (2008) - Hazardous Substances Data Bank. TOXNET® Network of databases on toxicology, hazardous chemicals, and environmental health. NLM Databases & Electronic Resources, U.S. National Library of Medicine, NHI, 8600 Rockville Pike, Bethesda, MD 20894 - http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
- IARC - Monographs on the Evaluation of Carcinogenic Risks to Humans (collection) - http://www-cie.iarc.fr/
- Merck Index (1999). Merck & CO., Inc, 12th edition
- NIOSH U.S. (2008) - Pocket Guide to Chemical Hazards - http://www.cdc.gov/niosh/npg/
- Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition
- Règlement sur les produits contrôlés (Canada)
- RTECS (2008). Registry of Toxic Effects of Chemical Substances, NIOSH, CDC
- Toxicologie industrielle & intoxication professionnelle, 3e édition, Lauwerys

Glossary

CSST	: Commission de la Santé et de la Sécurité du Travail (Québec).
HSDB	: Hazardous Substances Data Bank.
IARC	: International Agency for Research on Cancer.
NIOSH	: National Institute of Occupational Safety and Health.
NTP	: U.S. National Toxicology Program.
RTECS	: Registry of Toxic Effects of Chemical Substances

Note

For further information, see NorFalco Inc. Sulfuric Acid « Storage and Handling Bulletin ».

Because of its corrosive characteristics and inherent hazards, Sulfuric Acid should not be used in sewer or drain cleaners or any similar application; regardless of whether they are formulated for residential, commercial or industrial use. NorFalco will not knowingly sell sulfuric acid to individuals or companies who repackage the product for sale as sewer or drain cleaners, or any other similar use.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

For additional information, please visited our website : www.norfalco.com

Written by : Groupe STEM Consultants / NorFalco Sales Inc.
Complete revision : 2009-01-24 **Partial review :** None **Previous complete revision :** 2008-01-24

Verified by : Guy Desgagnés and Eric Kuraitis, Technical Representative - Sulfuric Acid
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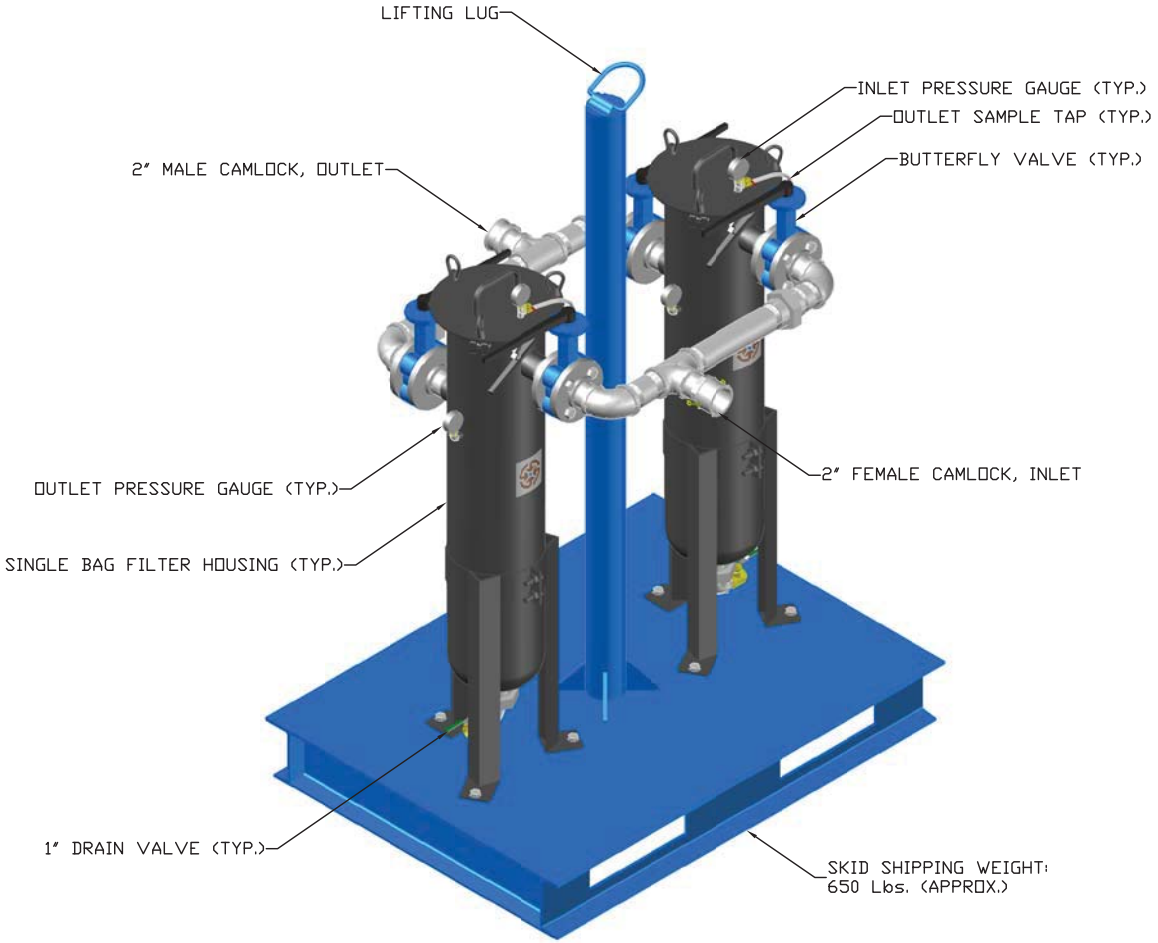
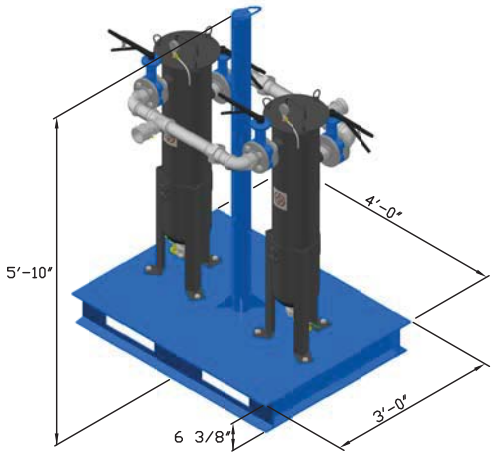
NorFalco Sales Inc., 6755 Mississauga Road, Suite 304, Mississauga, Ontario L5N 7Y2

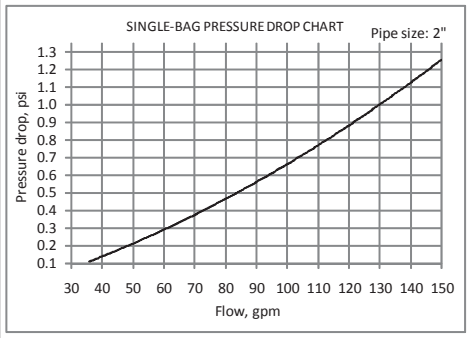
Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. NorFalco Sales Inc.extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations, therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.





NOTE: THIS DRAWING DEPICTS A "TYPICAL" SKID.
ACTUAL DETAILS AND DIMENSIONS MAY VARY.

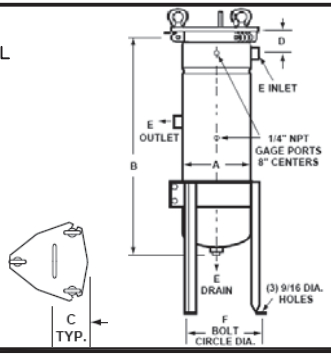


SINGLE BAG FILTER SPECIFICATIONS

- CONSTRUCTION:	CARBON STEEL
- HOUSING STYLE:	STANDARD
- NUMBER OF BASKETS:	1
- STRAINING FILTERING AREA:	26.4 SQR. FT.
- INLET/OUTLET SIZE:	2"
- DRAIN SIZE (1x):	2"
- NOMINAL FLOW RATE:	100 GPM
- STANDARD PRESSURE:	125 PSI
- WEIGHT (PER DRY UNIT):	70 Lbs.

BASIC DIMENSIONS

MODEL NUMBER & A: 8 (8.6")
LEG BOLT CIRCLE F: ø12.0"
B: 35.9" C: 6.0"
D: 3.5" E: 2.0"



NO.	REVISIONS	DATE
C	ADDED SKID WEIGHT	02/18/09

DUPLEX SINGLE BAG FILTER SKID STANDARD EQUIPMENT SPECIFICATION

SCALE: NTS	APPROVED BY: JB	DRAWN BY: AAV	
DATE: 02/18/09			

GROUND/WATER TREATMENT & TECHNOLOGY
P.O. BOX 1174
DENVILLE, NJ 07834

DWG SIZE: A	SHEET: 1 OF 1	DRAWING NUMBER: ST-0002-SPC	C

TENCATE Mirafi®

Mirafi® 140N

Mirafi® 140N is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi® 140N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids. Mirafi® 140N meets Aashto M288-06 Class 3 for elongation > 50%.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	120 (534)	120 (534)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	50 (223)	50 (223)
CBR Puncture Strength	ASTM D6241	lbs (N)	310 (1380)	
Apparent Opening Size (AOS)[1]	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
Permittivity	ASTM D4491	sec^{-1}	1.7	
Flow Rate	ASTM D4491	$gal/min/ft^2$ ($l/min/m^2$)	135 (5500)	
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70	

[1] ASTM D4751: AOS is a Maximum Opening Diameter Value

Physical Properties	Unit	Typical Value	
Roll Dimensions (width x length)	ft (m)	12.5 x 360 (3.8 x 110)	15 x 360 (4.5 x 110)
Roll Area	yd^2 (m^2)	500 (418)	600 (502)
Estimated Roll Weight	lb (kg)	133 (60)	160 (72)

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