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

July 29, 2021

U.S. Environmental Protection Agency
Office of Ecosystem Protection
EPA/OEP RGP Applications Coordinator
5 Post Office Square, Suite 100 (OEP06-4)
Boston, Massachusetts 02109-3912

Reference: **Notice of Intent (NOI) - Remediation General Permit (RGP)**
MBTA Silverline Head House
Seaport Boulevard
Boston, Massachusetts

Dear Sir/Madam:

On behalf of McCourt Construction (McCourt), Lockwood Remediation Technologies, LLC (LRT) has prepared this Notice of Intent (NOI) requesting a determination of coverage under the United States Environmental Protection Agency's (EPA's) Remediation General Permit (RGP), pursuant EPA's National Pollutant Discharge Elimination System (NPDES) program. This NOI was prepared in accordance with the general requirements of the NPDES RGP and related guidance documentation provided by EPA. The completed NOI Form is provided in **Appendix A**.

Site Information

This NOI has been prepared for the management groundwater that will be generated during dewatering activities associated with the construction of the new MBTA Head House for the Silverline Courthouse Station, specifically the excavation for the new foundation. The project is to take place on Seaport Boulevard east of Pier Street and south of District Hall in Boston, Massachusetts (the Site). The work is anticipated to be completed within twelve months. A Site Locus is provided as **Figure 1** and a Site Plan satisfying the requirements of RGP Appendix IV Part I.B and I.D is provided as **Figure 2**.

Work Summary

The Head House construction includes the at grade building and below grade work including an elevator, stairway, and escalator. To complete the foundation excavation in the dry, dewatering will be required to lower the groundwater table as work is being performed. To do this, filtered sumps will be placed in low spots within the excavation. The water generated during dewatering (source water) will be pumped to a treatment system prior to discharge to a stormwater catch basin with an outfall within a Boston Inner Harbor. To characterize groundwater from the proposed excavation area, LRT collected representative groundwater samples from a test pit on June 18, 2021 (**Figure 2).** Groundwater was extracted from the test pit utilizing a low flow sample pump. A sample of the receiving water (Boston Inner Harbor) was

also collected on the same day. The samples were analyzed for various parameters in accordance with the NPDES RGP Activity Category III-G.

Discharge and Receiving Surface Water Information

A summary of the analytical results is provided in **Tables 1 and 2** included within **Appendix A**, and copies of the laboratory data reports are provided in **Appendix D**. Concentrations of polycyclic aromatic hydrocarbons (PAHs) and metals including copper, iron, lead and nickel were detected in groundwater at concentrations above the respective NPDES RGP Effluent Limitations. To meet these standards, source water will undergo treatment that includes bag filtration and carbon treatment prior to discharge. It is assumed that metal concentrations will be handled by settling and bag filtration. pH adjustment, chemical aided settling, zeolite filtration, cation and anion ion exchange and cartridge filtration have been included as contingency treatment options if additional analytes are encountered that would require further treatment beyond the base water treatment system. Details of the water treatment system are provided below.

Water Treatment System

A water treatment system schematic is provided as **Figure 3**. Cutsheets of the system components, product information and Safety Data Sheets (SDS) are included in **Appendix G**.

Source water will be pumped to a treatment system with a design flow rate of up to 100 gallons per minute (gpm); the average effluent flow of the system is estimated to be 75 gpm, and the maximum flow will not exceed 100 gpm. Source water will enter one weir tank at the head of the system. From the weir tank will be pumped to a bag filter skid followed by two reactivated liquid phase carbon carbon vessels plumbed in series. If required, contingency treatment will include pH adjustment, chemical aided settling, zeolite media, cation and/or anion ion exchange media treatment, bone char carbon treatment and cartridge filtration.

Discharge from the water treatment system will pass through a flow/totalizer meter prior to discharge into a stormwater catch basin that discharges to Boston Inner Harbor, as depicted on **Figure 2**. Effluent sampling will correspond with this discharge location.

Chemical and Additive Information

Based on groundwater samples collected from the site and in efforts to meet the expected effluent limitations, the following chemicals and additives have been proposed as contingency items for the treatment system: pH adjustment (sulfuric acid or sodium hydroxide), chemical aided settling system through coagulants/flocculants. Product names, chemical formulas, manufacturer information and Chemical Abstract Services (CAS) registry numbers have been provided on the SDSs included in **Appendix G**.

The pH adjustment system includes an automated feed system with a mix tank, chemical feed pumps and setpoint controls that maintain the pH to within discharge permit parameters. The maximum application

concentration for sulfuric acid or sodium hydroxide would be 333 mg/L. The chemical aided settling system will be added in two parts, the coagulant (LRT-E-50) will be injected into the influent stream prior to entering the frac tanks while the flocculant (LRT-823) will be added directly into the frac tanks. The coagulant and flocculant continually dose as dewatering activities occur at the maximum dosage rate of 25 parts per million (ppm). Although dosage rate for the coagulant and flocculant will be 25ppm, the detected concentration in the post bag filter (carryover) has been recorded in the parts per trillion (ppt) range, (about 6 order of magnitude less than the dosing concentration). This is because nearly all the chemical becomes incorporated in the sludge and removed from the waste stream as solids from the frac and weir tanks.

The addition of pH conditioners and chemical aided settling system chemicals will 1) Not add any pollutant in concentrations which exceed permit effluent limitations; 2) Not result in the exceedance of any applicable water quality standard; and 3) Not add any pollutants that would justify the application of permit conditions that different from or absent in this permit. The addition of sulfuric acid or sodium hydroxide to control pH is a standard treatment for temporary construction dewatering and is not expected to exceed applicable permit limitations and water quality standards or alter conditions in the receiving water. No additional testing is considered necessary for use of this product or to demonstrate that use of this product will not adversely affect the receiving water.

Consultation with Federal Services

LRT reviewed online electronic data viewers and databases from the Massachusetts Geographical Information System (MassGIS), the Massachusetts Division of Fisheries and Wildlife (MassWildlife; Natural Heritage and Endangered Species Program), and the U.S. National Parks Service Natural Historic Places (NPS). Based on this review, the Site and the point where the proposed discharge reaches the receiving surface water body are not located within an Area of Critical Environmental Concern (ACEC). The Site and the proposed discharge point are not located within Habitats of Rare Wetland Wildlife, Habitats of Rare Species, Estimated Habitats of Rare Wildlife, or listed as a National Historic Place. Documentation is included in **Appendix E**.

Coverage under NPDES RGP

It is our opinion that the proposed discharge is eligible for coverage under the NPDES RGP. On behalf of McCourt Construction, LRT is requesting coverage under the NPDES RGP for the discharge of treated wastewater to Boston Inner Harbor in support of construction dewatering activities that are to take place at the Site.

The enclosed NOI form provides required information on the general site conditions, discharge, treatment system, receiving water, and consultation with federal services. For this project, McCourt Construction is considered the Operator and will have operational control over the dewatering and water treatment systems.

Please feel free to contact us at 774-450-7177 if you have any questions or if you require additional information.

Sincerely,
Lockwood Remediation Technologies, LLC

Jacob Jennings

Jacob Jennings
Staff Scientist

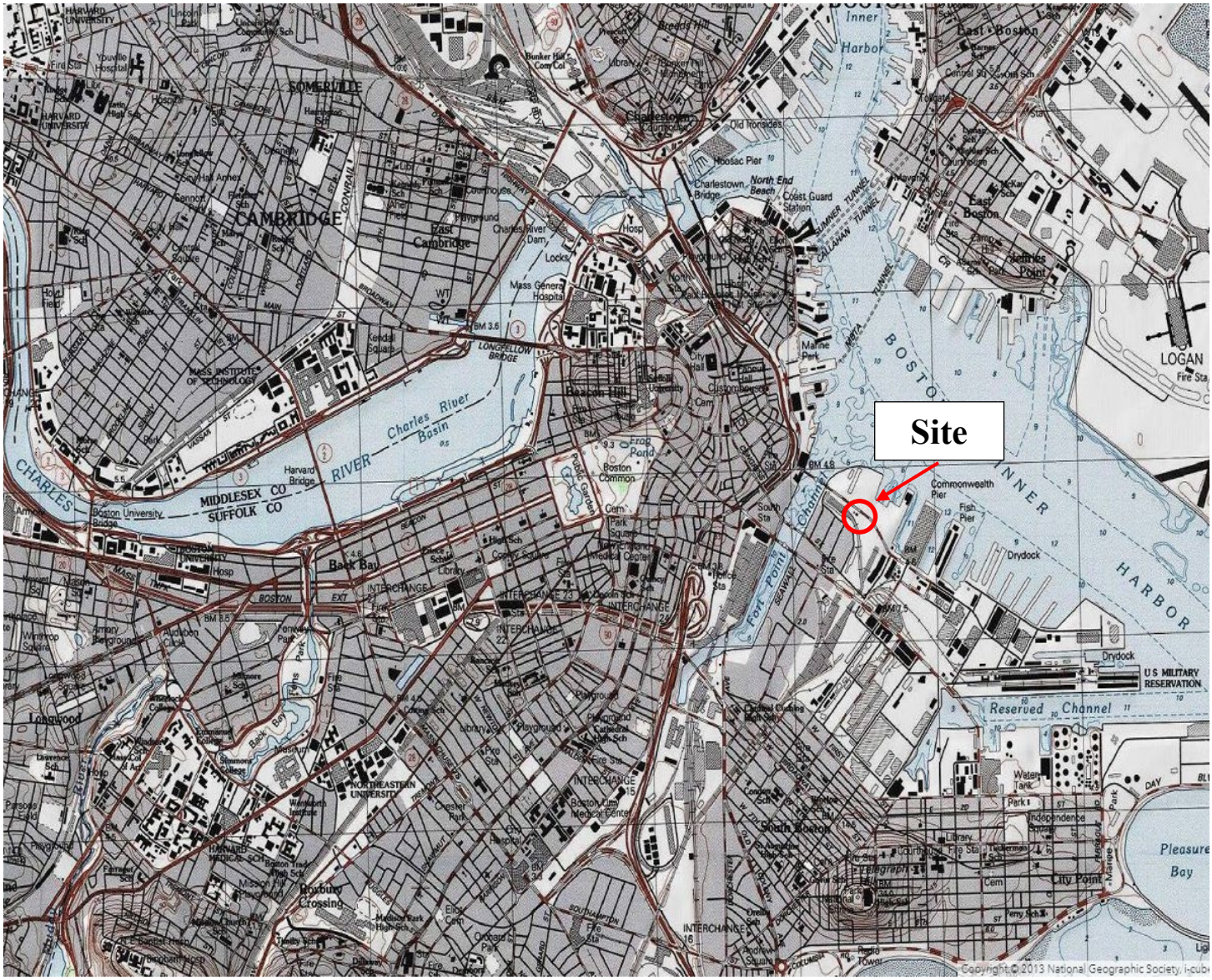
Brian Caccavale

Brian Caccavale
Project Manager

Encl: Figure 1 - Locus Plan
Figure 2 - Site Plan
Figure 3 - Water Treatment System Schematic
Appendix A - NOI Form
Appendix B – Laboratory Data
Appendix C – Water Treatment System Cutsheets and SDSs
Appendix D – Supplementary information
Appendix E – Boston Water and Sewer Commission (BWSC) Discharge Permit

cc: Ms. Catherine Vakalopoulos – MassDEP (via email)
Mr. Steve Winn – McCourt Construction (via email)
Mr. Tom Rovero – MBTA (via email)

Figures



Source: ArcGIS Map Viewer

N

Notes

1. Figure is not to scale.

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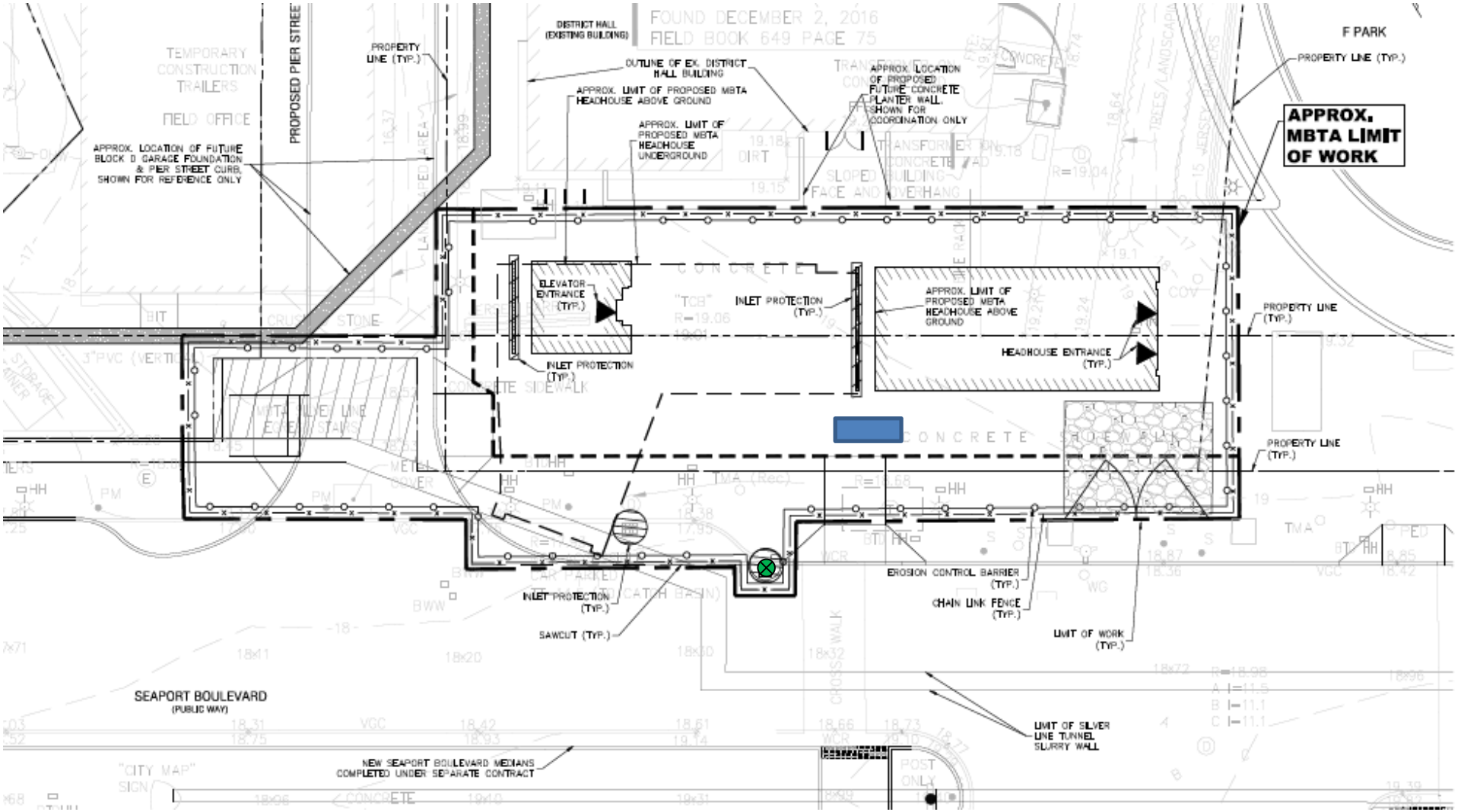
Figure 1 – Locus Plan
Seaport Blvd.
Boston, MA



Source:

Notes

1. Figure is not to scale.

Key

Discharge location

Sample Location (Test Pit)

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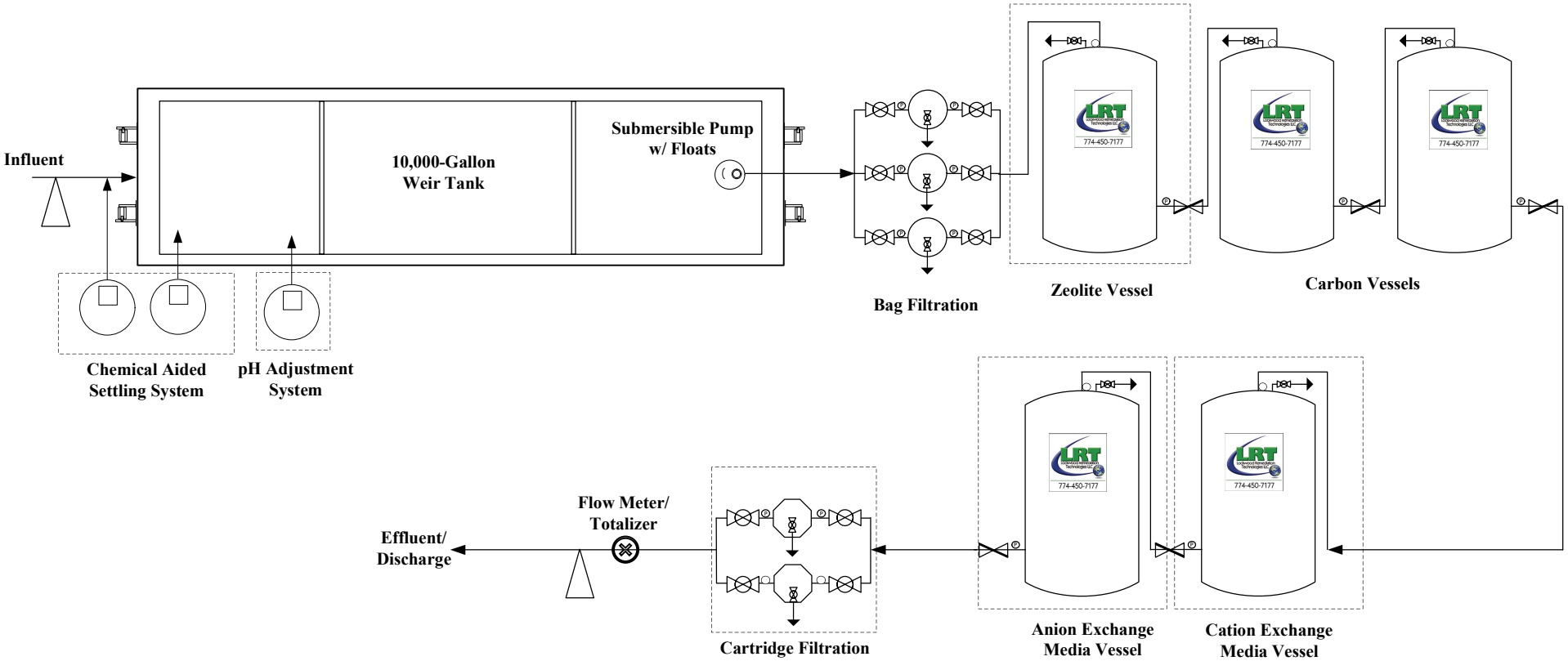
Figure 2 – Site Plan
MBTA Silverline Headhouse
Seaport Boulevard
Boston, Massachusetts



Key:

- Piping/Hose
- Sample Port
- Ball Valve
- Butterfly Valve
- Pressure Gauge (P)
- Contingency

Notes:

1.) Figure is not to scale
2.) System rated for 100 GPM

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

DESIGNED BY: LRT **DRAWN BY:** JHJ

CHECKED BY: **DATE:**

Water Treatment System Schematic

MBTA Silver Line Head House
Seaport Boulevard
Boston, MA

PROJECT No. 2-2223

FIGURE No. 3

Appendix A

NOI Form

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

A. General site information:

<table>
<tr><td rowspan="2">1. Name of site:
MBTA Head House</td><td colspan="3">Site address: Seaport Blvd East of Pier Street and south of District Hall
Street:</td></tr>
<tr><td>City: Boston</td><td>State: MA</td><td>Zip: 02210</td></tr>
<tr><td rowspan="4">2. Site owner
Massachusetts Bay Transportation Authority

Owner is (check one): ☐ Federal ■ State/Tribal ☐ Private
☐ Other; if so, specify:</td><td colspan="3">Contact Person: Tom Rovero</td></tr>
<tr><td colspan="2">Telephone: 617-780-8136</td><td>Email: troverp@mbta.com</td></tr>
<tr><td colspan="3">Mailing address: 10 Park Plaza Suite 5170
Street:</td></tr>
<tr><td>City: Boston</td><td>State: MA</td><td>Zip: 02116</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
McCourt Construction</td><td colspan="3">Contact Person: Steve Winn</td></tr>
<tr><td colspan="2">Telephone: 617-735-7413</td><td>Email: swinn@mccourtconstruction.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 60 K Street</td></tr>
<tr><td>City: Boston</td><td>State: MA</td><td>Zip: 02127</td></tr>
<tr><td>4. NPDES permit number assigned by EPA:

NPDES permit is (check all that apply: ☐ RGP ☐ DGP ☐ CGP
☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:</td><td colspan="3">5. Other regulatory program(s) that apply to the site (check all that apply):
■ MA Chapter 21e; list RTN(s): 3-00013624
☐ NH Groundwater Management Permit or Groundwater Release Detection Permit:
☐ CERCLA
☐ UIC Program
☐ POTW Pretreatment
☐ CWA Section 404</td></tr>
</table>

B. Receiving water information:

1. Name of receiving water(s):	Waterbody identification of receiving water(s):	Classification of receiving water(s):
Boston Inner Harbor	MA-70-02	SB(CSO)

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. Enterococcus, Fecal Coliform, Contaminants in fish and shellfish, oxygen dissolved, PCB in fish tissue

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

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

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

C. Source water information:

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

■ Contaminated groundwater Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No	☐ Contaminated surface water Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No	☐ The receiving water ☐ A surface water other than the receiving water; if so, indicate waterbody:	☐ Potable water; if so, indicate municipality or origin: ☐ Other; if so, specify:

2. Source water contaminants: Inorganics, Non-Halogenated Volatile Organic Compounds, Non-Halogenated Semi-Volatile Organic Compounds	
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): SDO195	Outfall location(s): (Latitude, Longitude) 42.350723, -71.042665
Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ■ Indirect discharge, if so, specify: Effluent will be discharged to BWSC storm water catch basin 241 located on the north side of seaport Blvd (see attached storm water map) ☐ A private storm sewer system ■ A municipal storm sewer system If the discharge enters the receiving water via a private or municipal storm sewer system: Has notification been provided to the owner of this system? (check one): ■ Yes ☐ No Has the operator has received permission from the owner to use such system for discharges? (check one): ☐ Yes ■ No, if so, explain, with an estimated timeframe for obtaining permission: Authorization will be granted upon approval of this application Has the operator attached a summary of any additional requirements the owner of this system has specified? (check one): ☐ Yes ■ No	
Provide the expected start and end dates of discharge(s) (month/year): 8/1/2021 - 7/31/2022 Indicate if the discharge is expected to occur over a duration of: ■ less than 12 months ☐ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No	

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

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

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

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		✔	1	SM19-22	220	1100	1100	Report mg/L	---
Chloride		✔	1	EPA 300	100000	2000000	2000000	Report µg/l	---
Total Residual Chlorine	✔		1	SM21-22	20	<20	<20	0.2 mg/L	7.5 ug/L
Total Suspended Solids		✔	1	SM21-22	2400	110000	110000	30 mg/L	---
Antimony		✔	1	200.8	1.0	9.7	9.7	206 µg/L	
Arsenic		✔	1	200.8	0.80	17	17	104 µg/L	
Cadmium		✔	1	200.8	0.20	0.32	0.32	10.2 µg/L	
Chromium III		✔	1	200.8	1.0	12	12	323 µg/L	
Chromium VI	✔		1	SM21-22	4	<4	<4	323 µg/L	
Copper		✔	1	200.8	1.0	65	65	242 µg/L	3.7
Iron		✔	1	200.7	50	16000	16000	5,000 µg/L	
Lead		✔	1	200.8	0.50	45	45	160 µg/L	8.5
Mercury	✔		1	245.1	0.1	<0.1	<0.1	0.739 µg/L	
Nickel		✔	1	200.8	5.0	18	18	1,450 µg/L	8.3
Selenium		✔	1	200.8	5.0	25	25	235.8 µg/L	
Silver	✔		1	200.8	0.20	<0.20	<0.20	35.1 µg/L	
Zinc		✔	1	200.8	10	71	71	420 µg/L	
Cyanide	✔		1	SM4500	1	<1	<1	178 mg/L	
B. Non-Halogenated VOCs									
Total BTEX		✔	1	624.1		0.150	0.150	100 µg/L	---
Benzene	✔		1	624.1	0.130	<0.130	<0.130	5.0 µg/L	---
1,4 Dioxane	✔		1	624.1	21.5	<21.5	<21.5	200 µg/L	---
Acetone		✔	1	624.1	2.35	4.68	4.68	7.97 mg/L	---
Phenol	✔		1	625.1	9.66	<9.66	<9.66	1,080 µg/L	

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
C. Halogenated VOCs									
Carbon Tetrachloride	✔		1	624.1	0.170	<0.170	<0.170	4.4 µg/L	
1,2 Dichlorobenzene	✔		1	624.1	0.100	<0.100	<0.100	600 µg/L	---
1,3 Dichlorobenzene	✔		1	624.1	0.090	<0.090	<0.090	320 µg/L	---
1,4 Dichlorobenzene	✔		1	624.1	0.110	<0.110	<0.110	5.0 µg/L	---
Total dichlorobenzene								763 µg/L in NH	---
1,1 Dichloroethane	✔		1	624.1	0.160	<0.160	<0.160	70 µg/L	---
1,2 Dichloroethane	✔		1	624.1	0.320	<0.320	<0.320	5.0 µg/L	---
1,1 Dichloroethylene	✔		1	624.1	0.160	<0.160	<0.160	3.2 µg/L	---
Ethylene Dibromide	✔		1	504.1	0.0079	<0.0079	<0.0079	0.05 µg/L	---
Methylene Chloride	✔		1	624.1	0.300	<0.300	<0.300	4.6 µg/L	---
1,1,1 Trichloroethane	✔		1	624.1	0.170	<0.170	<0.170	200 µg/L	---
1,1,2 Trichloroethane	✔		1	624.1	0.150	<0.150	<0.150	5.0 µg/L	---
Trichloroethylene	✔		1	624.1	0.180	<0.180	<0.180	5.0 µg/L	---
Tetrachloroethylene	✔		1	624.1	0.200	<0.200	<0.200	5.0 µg/L	
cis-1,2 Dichloroethylene	✔		1	624.1	0.120	<0.120	<0.120	70 µg/L	---
Vinyl Chloride	✔		1	624.1	0.200	<0.200	<0.200	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✔		1	625.1		ND	ND	190 µg/L	
Diethylhexyl phthalate	✔		1	625.1	9.66	<9.66	<9.66	101 µg/L	
Total Group I PAHs		✔	1	625.1		0.772	0.772	1.0 µg/L	---
Benzo(a)anthracene		✔	1	625.1	0.034	0.16	0.16	As Total PAHs	0.0038
Benzo(a)pyrene		✔	1	625.1	0.021	0.13	0.13		0.0038
Benzo(b)fluoranthene		✔	1	625.1	0.027	0.17	0.17		0.0038
Benzo(k)fluoranthene		✔	1	625.1	0.017	0.058	0.058		0.0038
Chrysene		✔	1	625.1	0.021	0.16	0.16		0.0038
Dibenzo(a,h)anthracene			1	625.1	0.028	<0.028	<0.028		
Indeno(1,2,3-cd)pyrene		✔	1	625.1	0.027	0.094	0.094		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	✔		1	625.1		ND	ND	100 µg/L	---
Naphthalene	✔		1	625.1	4.83	<4.83	<4.83	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs	✔		1	608.3		ND	ND	0.000064 µg/L	---
Pentachlorophenol	✔		1	625.1	0.38	<0.38	<0.38	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons	✔		1	1664B	2.8	<2.8	<2.8	5.0 mg/L	---
Ethanol	✔		1	624.1	34.2	<34.2	<34.2	Report mg/L	---
Methyl-tert-Butyl Ether	✔		1	624.1	0.170	<0.170	<0.170	70 µg/L	
tert-Butyl Alcohol	✔		1	624.1	5.34	<5.34	<5.34	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		1	624.1	0.150	<0.150	<0.150	90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
Hardness		✔	1	200.7		1300000	1300000		
Salinity		✔	1			3.6ppt	3.6ppt		
pH		✔	1	Field		7.7	7.7		
Receiving Water									
Arsenic		✔	1	200.8		44	44		
Copper		✔	1	200.8		110	110		
Selenium		✔	1	200.8		140	140		
Hardness		✔	1	200.7		4400000	4400000		
Salinity		✔	1			26.1 ppt	26.1 ppt		
pH		✔	1	Field		7.8	7.8		
Ammonia		✔	1	SM19-22		0.27	0.27		

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:

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

Source water will be pumped to a treatment system with a designed flow of up to 100 gallons per minute (gpm); the average effluent flow of the system is estimated to be 75 gpm, and the maximum flow will not exceed 100 gpm. Source water will enter one weir tank at the head of the system. From the weir tank, water will be pumped to a triple-bag filter skid (with three single bag filters) discharge from the bag filter will be pumped through two liquid reactivated carbon vessels plumbed in series. Water will pass through a flow/totalizer meter prior to discharge to a catch basin that has a final outfall in Boston Inner Harbor. If required, contingency treatment will include pH adjustment, chemical aided settling, zeolite media, cation

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

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

☐ Chemical feed tank ☐ Air stripping unit ■ Bag filter ■ Other; if so, specify: activated carbon, ion exchange media, zeolite, pH adjustment, chemical aided settling via flocculant/coagulant and bone char carbon

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: Media Vessels Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	100
Provide the proposed maximum effluent flow in gpm.	100
Provide the average effluent flow in gpm.	75
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:	

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:
Contingency treatment items include pH adjustment, chemical aided settling, zeolite media, cation and/or anion ion exchange media, bone char carbon treatment and cartridge filtration.

2. Provide the following information for each chemical/additive, using attachments, if necessary:
Sulfuric acid/sodium hydroxide, LRT E-50 coagulant/LRT 823 flocculant. See cover letter and attachments for further information.
a. Product name, chemical formula, and manufacturer of the chemical/additive;
b. Purpose or use of the chemical/additive or remedial agent;
c. Material Safety Data Sheet (MSDS) and Chemical Abstracts Service (CAS) Registry number for each chemical/additive;
d. The frequency (hourly, daily, etc.), duration (hours, days), quantity (maximum and average), and method of application for the chemical/additive;
e. Any material compatibility risks for storage and/or use including the control measures used to minimize such risks; and
f. If available, the vendor's reported aquatic toxicity (NOAEL and/or LC50 in percent for aquatic organism(s)).

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

G. Endangered Species Act eligibility determination

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

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

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

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

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

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

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

H. National Historic Preservation Act eligibility determination

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

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

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

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

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

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

I. Supplemental information

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

Please see attached appendices and supplemental information.

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 will be developed and maintained to meet the requirements of this permit. This BMPP will be implemented on-site prior to the initiation of discharge.
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ■ No ☐
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐ NA ☐
Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission.	Check one: Yes ■ No ☐ NA ☐
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	Check one: Yes ☐ No ■ NA ☐
Signature: *Thomas Rovero, RA*	Date: 7/29/2021
Print Name and Title: Thomas Rovero, RA - Project Manager, MBTA	

MA Limits

WQBEL

Enter number values in green boxes below

Enter values in the units specified

↓

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

Enter a dilution factor, if other than zero

↓

0

Enter values in the units specified

↓

1400	C_d = Enter influent hardness in **mg/L** $CaCO_3$
4400	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

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

↓

7.8	pH in **Standard Units**
25	Temperature in **°C**
0.27	Ammonia in **mg/L**
4400	Hardness in **mg/L** $CaCO_3$
26.1	Salinity in **ppt**
0	Antimony in **µg/L**
44	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
110	Copper in **µg/L**
0	Iron in **µg/L**
0	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
140	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**

Enter **influent** concentrations in the units specified

↓

0	TRC in **µg/L**
1.1	Ammonia in **mg/L**
9.7	Antimony in **µg/L**
17	Arsenic in **µg/L**
0.32	Cadmium in **µg/L**
12	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
65	Copper in **µg/L**
16000	Iron in **µg/L**
45	Lead in **µg/L**
0	Mercury in **µg/L**
18	Nickel in **µg/L**
25	Selenium in **µg/L**
0	Silver in **µg/L**
71	Zinc in **µg/L**
0	Cyanide in **µg/L**
0	Phenol in **µg/L**
0	Carbon Tetrachloride in **µg/L**
0	Tetrachloroethylene in **µg/L**
0	Total Phthalates in **µg/L**
0	Diethylhexylphthalate in **µg/L**
0.16	Benzo(a)anthracene in **µg/L**
0.13	Benzo(a)pyrene in **µg/L**
0.17	Benzo(b)fluoranthene in **µg/L**
0.058	Benzo(k)fluoranthene in **µg/L**
0.16	Chrysene in **µg/L**
0	Dibenzo(a,h)anthracene in **µg/L**
0.094	Indeno(1,2,3-cd)pyrene in **µg/L**
0	Methyl-tert butyl ether in **µg/L**

Dilution Factor	0.0			
	TBEL applies if bolded		WQBEL applies if bolded	
A. Inorganics				
Ammonia	**Report**	mg/L	---	
Chloride	**Report**	µg/L	---	
Total Residual Chlorine	0.2	mg/L	**7.5**	µg/L
Total Suspended Solids	**30**	mg/L	---	
Antimony	**206**	µg/L	640	µg/L
Arsenic	**104**	µg/L	36	µg/L
Cadmium	**10.2**	µg/L	8.9	µg/L
Chromium III	**323**	µg/L	100.0	µg/L
Chromium VI	**323**	µg/L	50	µg/L
Copper	242	µg/L	**3.7**	µg/L
Iron	**5000**	µg/L	---	µg/L
Lead	160	µg/L	**8.5**	µg/L
Mercury	**0.739**	µg/L	1.11	µg/L
Nickel	1450	µg/L	**8.3**	µg/L
Selenium	**235.8**	µg/L	71	µg/L
Silver	**35.1**	µg/L	2.2	µg/L
Zinc	**420**	µg/L	86	µg/L
Cyanide	**178**	mg/L	1.0	µg/L
B. Non-Halogenated VOCs				
Total BTEX	**100**	µg/L	---	
Benzene	**5.0**	µg/L	---	
1,4 Dioxane	**200**	µg/L	---	
Acetone	**7.97**	mg/L	---	
Phenol	**1,080**	µg/L	300	µg/L
C. Halogenated VOCs				
Carbon Tetrachloride	**4.4**		1.6	µg/L
1,2 Dichlorobenzene	**600**	µg/L	---	
1,3 Dichlorobenzene	**320**	µg/L	---	
1,4 Dichlorobenzene	**5.0**	µg/L	---	
Total dichlorobenzene	**---**	µg/L	---	
1,1 Dichloroethane	**70**	µg/L	---	
1,2 Dichloroethane	**5.0**	µg/L	---	
1,1 Dichloroethylene	**3.2**	µg/L	---	
Ethylene Dibromide	**0.05**	µg/L	---	
Methylene Chloride	**4.6**	µg/L	---	
1,1,1 Trichloroethane	**200**	µg/L	---	
1,1,2 Trichloroethane	**5.0**	µg/L	---	
Trichloroethylene	**5.0**	µg/L	---	
Tetrachloroethylene	**5.0**	µg/L	3.3	µg/L
cis-1,2 Dichloroethylene	**70**	µg/L	---	

Vinyl Chloride	**2.0**	µg/L	---	
D. Non-Halogenated SVOCs				
Total Phthalates	**190**	µg/L	---	µg/L
Diethylhexyl phthalate	**101**	µg/L	2.2	µg/L
Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---	
Benzo(a)anthracene	1.0	µg/L	**0.0038**	µg/L
Benzo(a)pyrene	1.0	µg/L	**0.0038**	µg/L
Benzo(b)fluoranthene	1.0	µg/L	**0.0038**	µg/L
Benzo(k)fluoranthene	1.0	µg/L	**0.0038**	µg/L
Chrysene	1.0	µg/L	**0.0038**	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.0038	µg/L
Indeno(1,2,3-cd)pyrene	1.0	µg/L	**0.0038**	µg/L
Total Group II Polycyclic Aromatic Hydrocarbons	**100**	µg/L	---	
Naphthalene	**20**	µg/L	---	
E. Halogenated SVOCs				
Total Polychlorinated Biphenyls	**0.000064**	µg/L	---	
Pentachlorophenol	**1.0**	µg/L	---	
F. Fuels Parameters				
Total Petroleum Hydrocarbons	**5.0**	mg/L	---	
Ethanol	**Report**	mg/L	---	
Methyl-tert-Butyl Ether	**70**	µg/L	20	µg/L
tert-Butyl Alcohol	**120**	µg/L	---	
tert-Amyl Methyl Ether	**90**	µg/L	---	

Discharge Path and Outfall

N
W E
S

0 50 100 200
Feet

S

Appendix B

Laboratory Data

con-test®
A Pace Analytical® Laboratory

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

June 29, 2021

Brian Caccavale
Lockwood Remediation Technologies, LLC
89 Crawford Street
Leominster, MA 01453

Project Location: MBTA Headhouse
Client Job Number:
Project Number: 2-2223
Laboratory Work Order Number: 21F1162

Enclosed are results of analyses for samples received by the laboratory on June 18, 2021. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kerry K. McGee
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Lockwood Remediation Technologies, LLC
89 Crawford Street
Leominster, MA 01453
ATTN: Brian Caccavale

REPORT DATE: 6/29/2021

PURCHASE ORDER NUMBER: 2-2223

PROJECT NUMBER: 2-2223

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 21F1162

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: MBTA Headhouse

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Influent	21F1162-01	Ground Water		-	MA M-MA-086/CT PH-0574/NY11148
				608.3	
				624.1	
				625.1	
				EPA 1664B	
				EPA 200.7	
				EPA 200.8	
				EPA 245.1	
				EPA 300.0	
				EPA 504.1	
				SM19-22 4500 NH3 C	
				SM21-22 2540D	
				SM21-22 3500 Cr B	
				SM21-22 4500 CL G	
				SM2510B	MA M-RI010/CT PH-0740/NY11673/+ Additional
				SM2520B	MA M-RI010/CT PH-0740/NY11673/+ Additional
				SM4500	MA M-MA-086/CT PH-0574/NY11148
				Tri Chrome Calc.	
Receiving Water	21F1162-02	Ground Water		EPA 200.7	
				EPA 200.8	
				EPA 245.1	
				SM19-22 4500 NH3 C	
				SM21-22 3500 Cr B	
				SM2510B	MA M-RI010/CT PH-0740/NY11673/+ Additional
				SM2520B	MA M-RI010/CT PH-0740/NY11673/+ Additional
				Tri Chrome Calc.	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

625.1

Qualifications:

L-04

Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

2-Chloronaphthalene
21F1162-01[Influent], B284382-BLK1, B284382-BS1, B284382-BSD1

Hexachlorocyclopentadiene
21F1162-01[Influent], B284382-BLK1, B284382-BS1, B284382-BSD1

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

Hexachloroethane
B284382-BS1

V-04

Initial calibration did not meet method specifications. Compound was calibrated using a response factor where %RSD is outside of method specified criteria. Reported result is estimated.

Analyte & Samples(s) Qualified:

Benzidine
21F1162-01[Influent], B284382-BLK1, B284382-BS1, B284382-BSD1, S060850-CCV1

V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Benzidine
21F1162-01[Influent], B284382-BLK1, B284382-BS1, B284382-BSD1, S060850-CCV1

Hexachlorocyclopentadiene
21F1162-01[Influent], B284382-BLK1, B284382-BS1, B284382-BSD1, S060850-CCV1

V-06

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side for this compound.

Analyte & Samples(s) Qualified:

Bis(2-ethylhexyl)phthalate (SIM)
B284516-BS1, B284516-BSD1, S060834-CCV1

V-20

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

Bis(2-ethylhexyl)phthalate (SIM)
21F1162-01[Influent], B284516-BLK1

EPA 200.7

Qualifications:

DL-04

Elevated reporting limit due to high concentration of an interfering analyte(s).

Analyte & Samples(s) Qualified:

Iron
21F1162-02[Receiving Water]

MS-19

Sample to spike ratio is greater than or equal to 4:1. Spiked amount is not representative of the native amount in the sample. Appropriate or meaningful recoveries cannot be calculated.

Analyte & Samples(s) Qualified:

Hardness
21F1162-02[Receiving Water], B284438-MS1

EPA 200.8

Qualifications:

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

DL-15

Sample required a dilution due to low internal standard recovery of the lesser diluted digestion, reporting limit is elevated.

Analyte & Samples(s) Qualified:

B284439-DUP1

Antimony
21F1162-02[Receiving Water]

Arsenic
21F1162-02[Receiving Water]

Cadmium
21F1162-02[Receiving Water]

Chromium
21F1162-02[Receiving Water]

Copper
21F1162-02[Receiving Water]

Lead
21F1162-02[Receiving Water]

Nickel
21F1162-02[Receiving Water]

Selenium
21F1162-02[Receiving Water]

Silver
21F1162-02[Receiving Water]

Zinc
21F1162-02[Receiving Water]

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

con-test®
A Pace Analytical® Laboratory

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	4.68	50.0	2.35	µg/L	1	J	624.1	6/21/21	6/22/21 1:43	LBD
tert-Amyl Methyl Ether (TAME)	<0.150	0.500	0.150	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Benzene	<0.130	1.00	0.130	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Bromodichloromethane	<0.140	2.00	0.140	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Bromoform	<0.290	2.00	0.290	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Bromomethane	<1.07	2.00	1.07	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
tert-Butyl Alcohol (TBA)	<5.34	20.0	5.34	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Carbon Tetrachloride	<0.170	2.00	0.170	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Chlorobenzene	<0.0800	2.00	0.0800	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Chlorodibromomethane	<0.160	2.00	0.160	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Chloroethane	<0.370	2.00	0.370	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Chloroform	<0.190	2.00	0.190	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Chloromethane	<0.380	2.00	0.380	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,2-Dichlorobenzene	<0.100	2.00	0.100	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,3-Dichlorobenzene	<0.0900	2.00	0.0900	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,4-Dichlorobenzene	<0.110	2.00	0.110	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,2-Dichloroethane	<0.320	2.00	0.320	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,1-Dichloroethane	<0.160	2.00	0.160	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,1-Dichloroethylene	<0.160	2.00	0.160	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
trans-1,2-Dichloroethylene	<0.170	2.00	0.170	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,2-Dichloropropane	<0.180	2.00	0.180	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
cis-1,3-Dichloropropene	<0.120	2.00	0.120	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,4-Dioxane	<21.5	50.0	21.5	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
trans-1,3-Dichloropropene	<0.150	2.00	0.150	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Ethanol	<34.2	50.0	34.2	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Ethylbenzene	<0.0900	2.00	0.0900	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Methyl tert-Butyl Ether (MTBE)	<0.170	2.00	0.170	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Methylene Chloride	<0.300	5.00	0.300	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,1,2,2-Tetrachloroethane	<0.0900	2.00	0.0900	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Tetrachloroethylene	<0.200	2.00	0.200	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Toluene	0.150	1.00	0.110	µg/L	1	J	624.1	6/21/21	6/22/21 1:43	LBD
1,1,1-Trichloroethane	<0.170	2.00	0.170	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
1,1,2-Trichloroethane	<0.150	2.00	0.150	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Trichloroethylene	<0.180	2.00	0.180	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Trichlorofluoromethane (Freon 11)	<0.190	2.00	0.190	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
Vinyl Chloride	<0.200	2.00	0.200	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
m+p Xylene	<0.180	2.00	0.180	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD
o-Xylene	<0.0900	1.00	0.0900	µg/L	1		624.1	6/21/21	6/22/21 1:43	LBD

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	113	70-130		6/22/21 1:43
Toluene-d8	100	70-130		6/22/21 1:43
4-Bromofluorobenzene	94.2	70-130		6/22/21 1:43

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Benzo(a)anthracene (SIM)	0.16	0.048	0.034	µg/L	1		625.1	6/21/21	6/22/21 15:54	IMR
Benzo(a)pyrene (SIM)	0.13	0.097	0.021	µg/L	1		625.1	6/21/21	6/22/21 15:54	IMR
Benzo(b)fluoranthene (SIM)	0.17	0.048	0.027	µg/L	1		625.1	6/21/21	6/22/21 15:54	IMR
Benzo(k)fluoranthene (SIM)	0.058	0.19	0.017	µg/L	1	J	625.1	6/21/21	6/22/21 15:54	IMR
Bis(2-ethylhexyl)phthalate (SIM)	<0.45	0.97	0.45	µg/L	1	V-20	625.1	6/21/21	6/22/21 15:54	IMR
Chrysene (SIM)	0.16	0.19	0.021	µg/L	1	J	625.1	6/21/21	6/22/21 15:54	IMR
Dibenz(a,h)anthracene (SIM)	<0.028	0.097	0.028	µg/L	1		625.1	6/21/21	6/22/21 15:54	IMR
Indeno(1,2,3-cd)pyrene (SIM)	0.094	0.097	0.027	µg/L	1	J	625.1	6/21/21	6/22/21 15:54	IMR
Pentachlorophenol (SIM)	<0.38	0.97	0.38	µg/L	1		625.1	6/21/21	6/22/21 15:54	IMR

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol (SIM)	39.6	15-110		6/22/21 15:54
Phenol-d6 (SIM)	35.5	15-110		6/22/21 15:54
Nitrobenzene-d5	75.7	30-130		6/22/21 15:54
2-Fluorobiphenyl	68.3	30-130		6/22/21 15:54
2,4,6-Tribromophenol (SIM)	92.2	15-110		6/22/21 15:54
p-Terphenyl-d14	77.2	30-130		6/22/21 15:54

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Acenaphthylene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Anthracene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Benzidine	<19.3	19.3	µg/L	1	V-04, V-05	625.1	6/21/21	6/22/21 18:20	BGL
Benzo(g,h,i)perylene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
4-Bromophenylphenylether	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Butylbenzylphthalate	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
4-Chloro-3-methylphenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Bis(2-chloroethyl)ether	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Bis(2-chloroisopropyl)ether	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2-Chloronaphthalene	<9.66	9.66	µg/L	1	L-04	625.1	6/21/21	6/22/21 18:20	BGL
2-Chlorophenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
4-Chlorophenylphenylether	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Di-n-butylphthalate	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
1,3-Dichlorobenzene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
1,4-Dichlorobenzene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
1,2-Dichlorobenzene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
3,3-Dichlorobenzidine	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2,4-Dichlorophenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Diethylphthalate	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2,4-Dimethylphenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Dimethylphthalate	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
4,6-Dinitro-2-methylphenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2,4-Dinitrophenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2,4-Dinitrotoluene	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2,6-Dinitrotoluene	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Di-n-octylphthalate	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
1,2-Diphenylhydrazine/Azobenzene	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Bis(2-Ethylhexyl)phthalate	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Fluoranthene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Fluorene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Hexachlorobenzene	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Hexachlorobutadiene	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Hexachlorocyclopentadiene	<9.66	9.66	µg/L	1	V-05, L-04	625.1	6/21/21	6/22/21 18:20	BGL
Hexachloroethane	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Isophorone	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Naphthalene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Nitrobenzene	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2-Nitrophenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
4-Nitrophenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
N-Nitrosodimethylamine	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
N-Nitrosodi-n-propylamine	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2-Methylnaphthalene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Phenanthrene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Phenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
3/4-Methylphenol	<19.3	19.3	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
Pyrene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
1,2,4-Trichlorobenzene	<4.83	4.83	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL
2,4,6-Trichlorophenol	<9.66	9.66	µg/L	1		625.1	6/21/21	6/22/21 18:20	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
2-Fluorophenol	39.6	15-110		6/22/21	18:20
Phenol-d6	37.9	15-110		6/22/21	18:20
Nitrobenzene-d5	80.1	30-130		6/22/21	18:20
2-Fluorobiphenyl	74.8	30-130		6/22/21	18:20
2,4,6-Tribromophenol	75.5	15-110		6/22/21	18:20
p-Terphenyl-d14	107	30-130		6/22/21	18:20

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	<0.0873	0.0980	0.0873	µg/L	1		608.3	6/19/21	6/23/21 13:59	TG
Aroclor-1221 [1]	<0.0809	0.0980	0.0809	µg/L	1		608.3	6/19/21	6/23/21 13:59	TG
Aroclor-1232 [1]	<0.0824	0.0980	0.0824	µg/L	1		608.3	6/19/21	6/23/21 13:59	TG
Aroclor-1242 [1]	<0.0863	0.0980	0.0863	µg/L	1		608.3	6/19/21	6/23/21 13:59	TG
Aroclor-1248 [1]	<0.0819	0.0980	0.0819	µg/L	1		608.3	6/19/21	6/23/21 13:59	TG
Aroclor-1254 [1]	<0.0922	0.0980	0.0922	µg/L	1		608.3	6/19/21	6/23/21 13:59	TG
Aroclor-1260 [1]	<0.0804	0.0980	0.0804	µg/L	1		608.3	6/19/21	6/23/21 13:59	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	44.0	30-150		6/23/21 13:59
Decachlorobiphenyl [2]	39.6	30-150		6/23/21 13:59
Tetrachloro-m-xylene [1]	77.4	30-150		6/23/21 13:59
Tetrachloro-m-xylene [2]	73.6	30-150		6/23/21 13:59

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	9.7	1.0		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Arsenic	17	0.80		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Cadmium	0.32	0.20		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Chromium	12	1.0		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Chromium, Trivalent	0.012			mg/L	1		Tri Chrome Calc.	6/21/21	6/22/21 13:36	QNW
Copper	65	1.0		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Iron	16	0.050		mg/L	1		EPA 200.7	6/21/21	6/22/21 18:56	AJL
Lead	45	0.50		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Mercury	ND	0.00010		mg/L	1		EPA 245.1	6/22/21	6/22/21 14:30	CJV
Nickel	18	5.0		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Selenium	25	5.0	0.78	µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Silver	ND	0.20		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Zinc	71	10		µg/L	1		EPA 200.8	6/21/21	6/22/21 13:36	QNW
Hardness	1300	1.4		mg/L	1		EPA 200.7	6/21/21	6/22/21 18:56	AJL

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ammonia as N	1.1	0.30	0.22	mg/L	1		SM19-22 4500 NH3 C	6/23/21	6/24/21 10:00	IS
Chloride	2000	100		mg/L	100		EPA 300.0	6/21/21	6/21/21 19:11	EC
Chlorine, Residual	ND	0.020		mg/L	1		SM21-22 4500 CL G	6/18/21	6/18/21 22:30	DJM
Hexavalent Chromium	ND	0.0040		mg/L	1		SM21-22 3500 Cr B	6/18/21	6/18/21 20:00	CB2 KAA
Total Suspended Solids	110	2.4		mg/L	1		SM21-22 2540D	6/21/21	6/21/21 11:30	LL
Silica Gel Treated HEM (SGT-HEM)	ND	2.8		mg/L	1		EPA 1664B	6/21/21	6/21/21 10:15	LL

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Drinking Water Organics EPA 504.1

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,2-Dibromoethane (EDB) (1)	ND	0.020	0.0079	µg/L	1		EPA 504.1	6/23/21	6/23/21 18:24	SFM

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,3-Dibromopropane (1)	111	70-130		6/23/21 18:24

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Salinity	3.6	1		ppt	1		SM2510B		6/23/21 0:00	NET

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Influent | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-01

Sample Matrix: Ground Water

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Cyanide	ND	0.005	0.001	mg/L	1		SM4500	6/23/21	6/24/21 11:39	AAL

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Receiving Water | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-02

Sample Matrix: Ground Water

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	10		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Arsenic	44	8.0		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Cadmium	ND	2.0		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Chromium	ND	10		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Chromium, Trivalent	0.0			mg/L	1		Tri Chrome Calc.	6/21/21	6/22/21 13:58	QNW
Copper	110	10		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Iron	ND	0.25		mg/L	5	DL-04	EPA 200.7	6/21/21	6/22/21 17:54	AJL
Lead	ND	5.0		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Mercury	ND	0.00010		mg/L	1		EPA 245.1	6/22/21	6/22/21 14:25	CJV
Nickel	ND	50		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Selenium	140	50	7.8	µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Silver	ND	2.0		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Zinc	ND	100		µg/L	10	DL-15	EPA 200.8	6/21/21	6/22/21 13:58	QNW
Hardness	4400	7.2		mg/L	5	MS-19	EPA 200.7	6/21/21	6/22/21 17:54	AJL

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Receiving Water | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-02

Sample Matrix: Ground Water

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ammonia as N	0.27	0.30	0.22	mg/L	1	J	SM19-22 4500 NH3 C	6/23/21	6/24/21 10:00	IS
Hexavalent Chromium	ND	0.0040		mg/L	1		SM21-22 3500 Cr B	6/18/21	6/18/21 20:00	CB2 KAA

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Project Location: MBTA Headhouse | Sample Description: | Work Order: 21F1162

Date Received: 6/18/2021

Field Sample #: Receiving Water | Sampled: 6/18/2021 11:00

Sample ID: 21F1162-02

Sample Matrix: Ground Water

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Salinity	26.1	1		ppt	1		SM2510B		6/23/21 0:00	NET

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Sample Extraction Data

Prep Method: SW-846 3510C **Analytical Method: 608.3**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284363	1020	5.00	06/19/21

Prep Method: SW-846 5030B **Analytical Method: 624.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284408	5	5.00	06/21/21

Prep Method: SW-846 3510C **Analytical Method: 625.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284382	1040	1.00	06/21/21

Prep Method: SW-846 3510C **Analytical Method: 625.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284516	1040	1.00	06/21/21

EPA 1664B

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284371	500		06/21/21

Prep Method: EPA 200.7 **Analytical Method: EPA 200.7**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284438	50.0	50.0	06/21/21
21F1162-01 [Influent]	B284438	50.0		06/21/21
21F1162-02 [Receiving Water]	B284438	50.0	50.0	06/21/21
21F1162-02 [Receiving Water]	B284438	50.0		06/21/21

Prep Method: EPA 200.8 **Analytical Method: EPA 200.8**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284439	50.0	50.0	06/21/21
21F1162-02 [Receiving Water]	B284439	50.0	50.0	06/21/21

Prep Method: EPA 245.1 **Analytical Method: EPA 245.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284490	6.00	6.00	06/22/21
21F1162-02 [Receiving Water]	B284490	6.00	6.00	06/22/21

Prep Method: EPA 300.0 **Analytical Method: EPA 300.0**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date

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Sample Extraction Data

Prep Method: EPA 300.0 **Analytical Method: EPA 300.0**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284417	10.0	10.0	06/21/21

Prep Method: EPA 504 water **Analytical Method: EPA 504.1**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284596	35.6	35.0	06/23/21

SM19-22 4500 NH3 C

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284590	100	100	06/23/21
21F1162-02 [Receiving Water]	B284590	100	100	06/23/21

SM21-22 2540D

Lab Number [Field ID]	Batch	Initial [mL]	Date
21F1162-01 [Influent]	B284379	210	06/21/21

SM21-22 3500 Cr B

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284343	50.0	50.0	06/18/21
21F1162-02 [Receiving Water]	B284343	50.0	50.0	06/18/21

SM21-22 4500 CL G

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
21F1162-01 [Influent]	B284339	100	100	06/18/21

Prep Method: EPA 200.8 **Analytical Method: Tri Chrome Calc.**

Lab Number [Field ID]	Batch	Initial [mL]	Date
21F1162-01 [Influent]	B284439	50.0	06/21/21
21F1162-02 [Receiving Water]	B284439	50.0	06/21/21

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284408 - SW-846 5030B										
Blank (B284408-BLK1)				Prepared: 06/21/21 Analyzed: 06/22/21						
Acetone	ND	50.0	µg/L							
tert-Amyl Methyl Ether (TAME)	ND	0.500	µg/L							
Benzene	ND	1.00	µg/L							
Bromodichloromethane	ND	2.00	µg/L							
Bromoform	ND	2.00	µg/L							
Bromomethane	ND	2.00	µg/L							
tert-Butyl Alcohol (TBA)	ND	20.0	µg/L							
Carbon Tetrachloride	ND	2.00	µg/L							
Chlorobenzene	ND	2.00	µg/L							
Chlorodibromomethane	ND	2.00	µg/L							
Chloroethane	ND	2.00	µg/L							
Chloroform	ND	2.00	µg/L							
Chloromethane	ND	2.00	µg/L							
1,2-Dichlorobenzene	ND	2.00	µg/L							
1,3-Dichlorobenzene	ND	2.00	µg/L							
1,4-Dichlorobenzene	ND	2.00	µg/L							
1,2-Dichloroethane	ND	2.00	µg/L							
1,1-Dichloroethane	ND	2.00	µg/L							
1,1-Dichloroethylene	ND	2.00	µg/L							
trans-1,2-Dichloroethylene	ND	2.00	µg/L							
1,2-Dichloropropane	ND	2.00	µg/L							
cis-1,3-Dichloropropene	ND	2.00	µg/L							
1,4-Dioxane	ND	50.0	µg/L							
trans-1,3-Dichloropropene	ND	2.00	µg/L							
Ethanol	ND	50.0	µg/L							
Ethylbenzene	ND	2.00	µg/L							
Methyl tert-Butyl Ether (MTBE)	ND	2.00	µg/L							
Methylene Chloride	ND	5.00	µg/L							
1,1,2,2-Tetrachloroethane	ND	2.00	µg/L							
Tetrachloroethylene	ND	2.00	µg/L							
Toluene	ND	1.00	µg/L							
1,1,1-Trichloroethane	ND	2.00	µg/L							
1,1,2-Trichloroethane	ND	2.00	µg/L							
Trichloroethylene	ND	2.00	µg/L							
Trichlorofluoromethane (Freon 11)	ND	2.00	µg/L							
Vinyl Chloride	ND	2.00	µg/L							
m+p Xylene	ND	2.00	µg/L							
o-Xylene	ND	1.00	µg/L							
Surrogate: 1,2-Dichloroethane-d4	*27.1*		µg/L	25.0		108	70-130			
Surrogate: Toluene-d8	*24.8*		µg/L	25.0		99.0	70-130			
Surrogate: 4-Bromofluorobenzene	*24.5*		µg/L	25.0		97.8	70-130			
LCS (B284408-BS1)				Prepared & Analyzed: 06/21/21						
Acetone	210	50.0	µg/L	200		106	70-160			†
tert-Amyl Methyl Ether (TAME)	18	0.500	µg/L	20.0		92.0	70-130			
Benzene	21	1.00	µg/L	20.0		107	65-135			
Bromodichloromethane	23	2.00	µg/L	20.0		113	65-135			
Bromoform	20	2.00	µg/L	20.0		102	70-130			
Bromomethane	16	2.00	µg/L	20.0		82.0	15-185			
tert-Butyl Alcohol (TBA)	200	20.0	µg/L	200		99.1	40-160			†
Carbon Tetrachloride	22	2.00	µg/L	20.0		111	70-130			
Chlorobenzene	21	2.00	µg/L	20.0		107	65-135			

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284408 - SW-846 5030B										
LCS (B284408-BS1)				Prepared & Analyzed: 06/21/21						
Chlorodibromomethane	21	2.00	µg/L	20.0		105	70-135			
Chloroethane	23	2.00	µg/L	20.0		115	40-160			
Chloroform	22	2.00	µg/L	20.0		112	70-135			
Chloromethane	18	2.00	µg/L	20.0		92.2	20-205			
1,2-Dichlorobenzene	21	2.00	µg/L	20.0		106	65-135			
1,3-Dichlorobenzene	22	2.00	µg/L	20.0		109	70-130			
1,4-Dichlorobenzene	21	2.00	µg/L	20.0		104	65-135			
1,2-Dichloroethane	22	2.00	µg/L	20.0		109	70-130			
1,1-Dichloroethane	22	2.00	µg/L	20.0		111	70-130			
1,1-Dichloroethylene	23	2.00	µg/L	20.0		117	50-150			
trans-1,2-Dichloroethylene	22	2.00	µg/L	20.0		109	70-130			
1,2-Dichloropropane	22	2.00	µg/L	20.0		110	35-165			
cis-1,3-Dichloropropene	21	2.00	µg/L	20.0		105	25-175			
1,4-Dioxane	180	50.0	µg/L	200		89.2	40-130			†
trans-1,3-Dichloropropene	21	2.00	µg/L	20.0		104	50-150			
Ethanol	240	50.0	µg/L	200		121	40-160			
Ethylbenzene	21	2.00	µg/L	20.0		104	60-140			
Methyl tert-Butyl Ether (MTBE)	22	2.00	µg/L	20.0		108	70-130			
Methylene Chloride	23	5.00	µg/L	20.0		116	60-140			
1,1,2,2-Tetrachloroethane	21	2.00	µg/L	20.0		105	60-140			
Tetrachloroethylene	22	2.00	µg/L	20.0		108	70-130			
Toluene	21	1.00	µg/L	20.0		106	70-130			
1,1,1-Trichloroethane	23	2.00	µg/L	20.0		114	70-130			
1,1,2-Trichloroethane	22	2.00	µg/L	20.0		111	70-130			
Trichloroethylene	22	2.00	µg/L	20.0		110	65-135			
Trichlorofluoromethane (Freon 11)	23	2.00	µg/L	20.0		114	50-150			
Vinyl Chloride	20	2.00	µg/L	20.0		101	5-195			
m+p Xylene	42	2.00	µg/L	40.0		105	70-130			
o-Xylene	21	1.00	µg/L	20.0		106	70-130			
Surrogate: 1,2-Dichloroethane-d4	*26.7*		µg/L	25.0		107	70-130			
Surrogate: Toluene-d8	*25.8*		µg/L	25.0		103	70-130			
Surrogate: 4-Bromofluorobenzene	*25.4*		µg/L	25.0		102	70-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284516 - SW-846 3510C										
Blank (B284516-BLK1)				Prepared: 06/21/21 Analyzed: 06/22/21						
Benzo(a)anthracene (SIM)	ND	0.050	µg/L							
Benzo(a)pyrene (SIM)	ND	0.10	µg/L							
Benzo(b)fluoranthene (SIM)	ND	0.050	µg/L							
Benzo(k)fluoranthene (SIM)	ND	0.20	µg/L							
Bis(2-ethylhexyl)phthalate (SIM)	ND	1.0	µg/L							V-20
Chrysene (SIM)	ND	0.20	µg/L							
Dibenz(a,h)anthracene (SIM)	ND	0.10	µg/L							
Indeno(1,2,3-cd)pyrene (SIM)	ND	0.10	µg/L							
Pentachlorophenol (SIM)	ND	1.0	µg/L							
Surrogate: 2-Fluorophenol (SIM)	*84.3*		µg/L	200		42.2	15-110			
Surrogate: Phenol-d6 (SIM)	*74.7*		µg/L	200		37.4	15-110			
Surrogate: Nitrobenzene-d5	*76.5*		µg/L	100		76.5	30-130			
Surrogate: 2-Fluorobiphenyl	*68.7*		µg/L	100		68.7	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*209*		µg/L	200		104	15-110			
Surrogate: p-Terphenyl-d14	*98.9*		µg/L	100		98.9	30-130			
LCS (B284516-BS1)				Prepared: 06/21/21 Analyzed: 06/22/21						
Benzo(a)anthracene (SIM)	42.8	1.0	µg/L	50.0		85.6	33-143			
Benzo(a)pyrene (SIM)	37.8	2.0	µg/L	50.0		75.6	17-163			
Benzo(b)fluoranthene (SIM)	43.9	1.0	µg/L	50.0		87.8	24-159			
Benzo(k)fluoranthene (SIM)	43.8	4.0	µg/L	50.0		87.5	11-162			
Bis(2-ethylhexyl)phthalate (SIM)	56.2	20	µg/L	50.0		112	8-158			V-06
Chrysene (SIM)	42.0	4.0	µg/L	50.0		83.9	17-168			
Dibenz(a,h)anthracene (SIM)	38.6	2.0	µg/L	50.0		77.2	10-227			
Indeno(1,2,3-cd)pyrene (SIM)	40.3	2.0	µg/L	50.0		80.6	10-171			
Pentachlorophenol (SIM)	40.2	20	µg/L	50.0		80.3	14-176			
Surrogate: 2-Fluorophenol (SIM)	*69.2*		µg/L	200		34.6	15-110			
Surrogate: Phenol-d6 (SIM)	*67.3*		µg/L	200		33.7	15-110			
Surrogate: Nitrobenzene-d5	*64.3*		µg/L	100		64.3	30-130			
Surrogate: 2-Fluorobiphenyl	*62.9*		µg/L	100		62.9	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*162*		µg/L	200		81.0	15-110			
Surrogate: p-Terphenyl-d14	*73.5*		µg/L	100		73.5	30-130			
LCS Dup (B284516-BSD1)				Prepared: 06/21/21 Analyzed: 06/22/21						
Benzo(a)anthracene (SIM)	45.3	1.0	µg/L	50.0		90.5	33-143	5.54	53	
Benzo(a)pyrene (SIM)	40.0	2.0	µg/L	50.0		80.1	17-163	5.70	72	
Benzo(b)fluoranthene (SIM)	46.6	1.0	µg/L	50.0		93.1	24-159	5.93	71	
Benzo(k)fluoranthene (SIM)	46.5	4.0	µg/L	50.0		92.9	11-162	5.99	63	
Bis(2-ethylhexyl)phthalate (SIM)	59.0	20	µg/L	50.0		118	8-158	5.00	82	V-06
Chrysene (SIM)	44.3	4.0	µg/L	50.0		88.7	17-168	5.52	87	
Dibenz(a,h)anthracene (SIM)	41.0	2.0	µg/L	50.0		82.0	10-227	6.08	126	
Indeno(1,2,3-cd)pyrene (SIM)	42.6	2.0	µg/L	50.0		85.3	10-171	5.69	99	
Pentachlorophenol (SIM)	43.2	20	µg/L	50.0		86.3	14-176	7.20	86	
Surrogate: 2-Fluorophenol (SIM)	*74.6*		µg/L	200		37.3	15-110			
Surrogate: Phenol-d6 (SIM)	*71.5*		µg/L	200		35.8	15-110			
Surrogate: Nitrobenzene-d5	*68.7*		µg/L	100		68.7	30-130			
Surrogate: 2-Fluorobiphenyl	*69.0*		µg/L	100		69.0	30-130			
Surrogate: 2,4,6-Tribromophenol (SIM)	*175*		µg/L	200		87.3	15-110			
Surrogate: p-Terphenyl-d14	*80.9*		µg/L	100		80.9	30-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by - GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284382 - SW-846 3510C										
Blank (B284382-BLK1)				Prepared: 06/21/21 Analyzed: 06/22/21						
Acenaphthene	ND	5.00	µg/L							
Acenaphthylene	ND	5.00	µg/L							
Anthracene	ND	5.00	µg/L							
Benzidine	ND	20.0	µg/L							V-04, V-05
Benzo(g,h,i)perylene	ND	5.00	µg/L							
4-Bromophenylphenylether	ND	10.0	µg/L							
Butylbenzylphthalate	ND	10.0	µg/L							
4-Chloro-3-methylphenol	ND	10.0	µg/L							
Bis(2-chloroethyl)ether	ND	10.0	µg/L							
Bis(2-chloroisopropyl)ether	ND	10.0	µg/L							
2-Chloronaphthalene	ND	10.0	µg/L							L-04
2-Chlorophenol	ND	10.0	µg/L							
4-Chlorophenylphenylether	ND	10.0	µg/L							
Di-n-butylphthalate	ND	10.0	µg/L							
1,3-Dichlorobenzene	ND	5.00	µg/L							
1,4-Dichlorobenzene	ND	5.00	µg/L							
1,2-Dichlorobenzene	ND	5.00	µg/L							
3,3-Dichlorobenzidine	ND	10.0	µg/L							
2,4-Dichlorophenol	ND	10.0	µg/L							
Diethylphthalate	ND	10.0	µg/L							
2,4-Dimethylphenol	ND	10.0	µg/L							
Dimethylphthalate	ND	10.0	µg/L							
4,6-Dinitro-2-methylphenol	ND	10.0	µg/L							
2,4-Dinitrophenol	ND	10.0	µg/L							
2,4-Dinitrotoluene	ND	10.0	µg/L							
2,6-Dinitrotoluene	ND	10.0	µg/L							
Di-n-octylphthalate	ND	10.0	µg/L							
1,2-Diphenylhydrazine/Azobenzene	ND	10.0	µg/L							
Bis(2-Ethylhexyl)phthalate	ND	10.0	µg/L							
Fluoranthene	ND	5.00	µg/L							
Fluorene	ND	5.00	µg/L							
Hexachlorobenzene	ND	10.0	µg/L							
Hexachlorobutadiene	ND	10.0	µg/L							
Hexachlorocyclopentadiene	ND	10.0	µg/L							L-04, V-05
Hexachloroethane	ND	10.0	µg/L							
Isophorone	ND	10.0	µg/L							
Naphthalene	ND	5.00	µg/L							
Nitrobenzene	ND	10.0	µg/L							
2-Nitrophenol	ND	10.0	µg/L							
4-Nitrophenol	ND	10.0	µg/L							
N-Nitrosodimethylamine	ND	10.0	µg/L							
N-Nitrosodi-n-propylamine	ND	10.0	µg/L							
2-Methylnaphthalene	ND	5.00	µg/L							
Phenanthrene	ND	5.00	µg/L							
2-Methylphenol	ND	10.0	µg/L							
Phenol	ND	10.0	µg/L							
3/4-Methylphenol	ND	20.0	µg/L							
Pyrene	ND	5.00	µg/L							
1,2,4-Trichlorobenzene	ND	5.00	µg/L							
2,4,6-Trichlorophenol	ND	10.0	µg/L							
Surrogate: 2-Fluorophenol	*92.5*		µg/L	200		46.2	15-110			
Surrogate: Phenol-d6	*87.6*		µg/L	200		43.8	15-110			

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QUALITY CONTROL

Semivolatile Organic Compounds by - GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B284382 - SW-846 3510C											
Blank (B284382-BLK1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Surrogate: Nitrobenzene-d5	*91.2*		µg/L	100		91.2		30-130			
Surrogate: 2-Fluorobiphenyl	*82.2*		µg/L	100		82.2		30-130			
Surrogate: 2,4,6-Tribromophenol	*163*		µg/L	200		81.4		15-110			
Surrogate: p-Terphenyl-d14	*128*		µg/L	100		128		30-130			
LCS (B284382-BS1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Acenaphthene	30.4	5.00	µg/L	50.0		60.9		47-145			
Acenaphthylene	32.3	5.00	µg/L	50.0		64.7		33-145			
Anthracene	35.1	5.00	µg/L	50.0		70.1		27-133			
Benzidine	22.8	20.0	µg/L	50.0		45.6		40-140			V-04, V-05
Benzo(g,h,i)perylene	30.2	5.00	µg/L	50.0		60.4		10-219			
4-Bromophenylphenylether	29.4	10.0	µg/L	50.0		58.9		53-127			
Butylbenzylphthalate	35.9	10.0	µg/L	50.0		71.7		10-152			
4-Chloro-3-methylphenol	40.1	10.0	µg/L	50.0		80.1		22-147			
Bis(2-chloroethyl)ether	30.8	10.0	µg/L	50.0		61.7		12-158			
Bis(2-chloroisopropyl)ether	31.6	10.0	µg/L	50.0		63.2		36-166			
2-Chloronaphthalene	28.6	10.0	µg/L	50.0		**57.1**	*	60-120			L-04
2-Chlorophenol	30.0	10.0	µg/L	50.0		60.1		23-134			
4-Chlorophenylphenylether	31.9	10.0	µg/L	50.0		63.8		25-158			
Di-n-butylphthalate	34.5	10.0	µg/L	50.0		68.9		10-120			
1,3-Dichlorobenzene	21.3	5.00	µg/L	50.0		42.6		10-172			
1,4-Dichlorobenzene	21.9	5.00	µg/L	50.0		43.8		20-124			
1,2-Dichlorobenzene	23.8	5.00	µg/L	50.0		47.5		32-129			
3,3-Dichlorobenzidine	42.0	10.0	µg/L	50.0		84.0		10-262			
2,4-Dichlorophenol	34.6	10.0	µg/L	50.0		69.2		39-135			
Diethylphthalate	34.0	10.0	µg/L	50.0		68.0		10-120			
2,4-Dimethylphenol	35.3	10.0	µg/L	50.0		70.5		32-120			
Dimethylphthalate	35.3	10.0	µg/L	50.0		70.6		10-120			
4,6-Dinitro-2-methylphenol	42.5	10.0	µg/L	50.0		85.0		10-181			
2,4-Dinitrophenol	35.7	10.0	µg/L	50.0		71.3		10-191			
2,4-Dinitrotoluene	39.1	10.0	µg/L	50.0		78.1		39-139			
2,6-Dinitrotoluene	38.9	10.0	µg/L	50.0		77.8		50-158			
Di-n-octylphthalate	31.4	10.0	µg/L	50.0		62.8		4-146			
1,2-Diphenylhydrazine/Azobenzene	34.8	10.0	µg/L	50.0		69.6		40-140			
Bis(2-Ethylhexyl)phthalate	32.2	10.0	µg/L	50.0		64.3		8-158			
Fluoranthene	36.9	5.00	µg/L	50.0		73.9		26-137			
Fluorene	33.4	5.00	µg/L	50.0		66.8		59-121			
Hexachlorobenzene	30.3	10.0	µg/L	50.0		60.6		10-152			
Hexachlorobutadiene	18.8	10.0	µg/L	50.0		37.5		24-120			
Hexachlorocyclopentadiene	13.8	10.0	µg/L	50.0		**27.6**	*	40-140			V-05, L-04
Hexachloroethane	18.6	10.0	µg/L	50.0		**37.2**	*	40-120			L-07
Isophorone	39.6	10.0	µg/L	50.0		79.1		21-196			
Naphthalene	28.6	5.00	µg/L	50.0		57.1		21-133			
Nitrobenzene	35.4	10.0	µg/L	50.0		70.7		35-180			
2-Nitrophenol	34.9	10.0	µg/L	50.0		69.8		29-182			
4-Nitrophenol	29.9	10.0	µg/L	50.0		59.9		10-132			
N-Nitrosodimethylamine	22.1	10.0	µg/L	50.0		44.3		40-140			
N-Nitrosodi-n-propylamine	36.5	10.0	µg/L	50.0		73.0		10-230			
2-Methylnaphthalene	32.5	5.00	µg/L	50.0		64.9		40-140			
Phenanthrene	34.5	5.00	µg/L	50.0		69.0		54-120			
2-Methylphenol	30.5	10.0	µg/L	50.0		61.0		40-140			
Phenol	16.9	10.0	µg/L	50.0		33.7		5-120			

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QUALITY CONTROL

Semivolatile Organic Compounds by - GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B284382 - SW-846 3510C											
LCS (B284382-BS1)				Prepared: 06/21/21 Analyzed: 06/22/21							
3/4-Methylphenol	31.0	20.0	µg/L	50.0		61.9		40-140			
Pyrene	39.5	5.00	µg/L	50.0		79.1		52-120			
1,2,4-Trichlorobenzene	24.6	5.00	µg/L	50.0		49.1		44-142			
2,4,6-Trichlorophenol	37.0	10.0	µg/L	50.0		74.0		37-144			
Surrogate: 2-Fluorophenol	*73.1*		µg/L	200		36.5		15-110			
Surrogate: Phenol-d6	*75.1*		µg/L	200		37.6		15-110			
Surrogate: Nitrobenzene-d5	*74.6*		µg/L	100		74.6		30-130			
Surrogate: 2-Fluorobiphenyl	*64.8*		µg/L	100		64.8		30-130			
Surrogate: 2,4,6-Tribromophenol	*126*		µg/L	200		63.0		15-110			
Surrogate: p-Terphenyl-d14	*93.6*		µg/L	100		93.6		30-130			
LCS Dup (B284382-BSD1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Acenaphthene	32.3	5.00	µg/L	50.0		64.7		47-145	6.02	48	
Acenaphthylene	34.3	5.00	µg/L	50.0		68.7		33-145	6.00	74	
Anthracene	37.2	5.00	µg/L	50.0		74.5		27-133	6.03	66	
Benzidine	26.6	20.0	µg/L	50.0		53.3		40-140	15.4	30	V-04, V-05
Benzo(g,h,i)perylene	33.6	5.00	µg/L	50.0		67.3		10-219	10.9	97	
4-Bromophenylphenylether	32.3	10.0	µg/L	50.0		64.6		53-127	9.23	43	
Butylbenzylphthalate	37.7	10.0	µg/L	50.0		75.4		10-152	5.00	60	
4-Chloro-3-methylphenol	40.7	10.0	µg/L	50.0		81.5		22-147	1.66	73	
Bis(2-chloroethyl)ether	33.7	10.0	µg/L	50.0		67.4		12-158	8.95	108	
Bis(2-chloroisopropyl)ether	32.8	10.0	µg/L	50.0		65.6		36-166	3.66	76	
2-Chloronaphthalene	28.9	10.0	µg/L	50.0		**57.9**	*	60-120	1.32	24	L-04
2-Chlorophenol	32.3	10.0	µg/L	50.0		64.7		23-134	7.37	61	
4-Chlorophenylphenylether	34.5	10.0	µg/L	50.0		69.0		25-158	7.89	61	
Di-n-butylphthalate	35.8	10.0	µg/L	50.0		71.6		10-120	3.79	47	
1,3-Dichlorobenzene	22.3	5.00	µg/L	50.0		44.6		10-172	4.68	30	
1,4-Dichlorobenzene	24.1	5.00	µg/L	50.0		48.3		20-124	9.64	30	
1,2-Dichlorobenzene	25.6	5.00	µg/L	50.0		51.1		32-129	7.30	30	
3,3-Dichlorobenzidine	45.1	10.0	µg/L	50.0		90.2		10-262	7.14	108	
2,4-Dichlorophenol	37.0	10.0	µg/L	50.0		74.1		39-135	6.84	50	
Diethylphthalate	35.4	10.0	µg/L	50.0		70.8		10-120	4.01	100	
2,4-Dimethylphenol	36.8	10.0	µg/L	50.0		73.6		32-120	4.27	58	
Dimethylphthalate	36.8	10.0	µg/L	50.0		73.6		10-120	4.22	183	
4,6-Dinitro-2-methylphenol	44.1	10.0	µg/L	50.0		88.2		10-181	3.70	203	
2,4-Dinitrophenol	37.6	10.0	µg/L	50.0		75.3		10-191	5.38	132	
2,4-Dinitrotoluene	40.4	10.0	µg/L	50.0		80.8		39-139	3.32	42	
2,6-Dinitrotoluene	40.7	10.0	µg/L	50.0		81.4		50-158	4.47	48	
Di-n-octylphthalate	34.1	10.0	µg/L	50.0		68.2		4-146	8.21	69	
1,2-Diphenylhydrazine/Azobenzene	35.3	10.0	µg/L	50.0		70.6		40-140	1.43	30	
Bis(2-Ethylhexyl)phthalate	33.9	10.0	µg/L	50.0		67.9		8-158	5.36	82	
Fluoranthene	39.6	5.00	µg/L	50.0		79.2		26-137	7.00	66	
Fluorene	35.4	5.00	µg/L	50.0		70.9		59-121	5.84	38	
Hexachlorobenzene	32.6	10.0	µg/L	50.0		65.3		10-152	7.50	55	
Hexachlorobutadiene	21.6	10.0	µg/L	50.0		43.1		24-120	13.9	62	
Hexachlorocyclopentadiene	15.3	10.0	µg/L	50.0		**30.6**	*	40-140	10.2	30	L-04, V-05
Hexachloroethane	20.2	10.0	µg/L	50.0		40.5		40-120	8.34	52	
Isophorone	41.9	10.0	µg/L	50.0		83.7		21-196	5.65	93	
Naphthalene	31.1	5.00	µg/L	50.0		62.2		21-133	8.49	65	
Nitrobenzene	36.7	10.0	µg/L	50.0		73.4		35-180	3.77	62	
2-Nitrophenol	38.0	10.0	µg/L	50.0		76.0		29-182	8.56	55	
4-Nitrophenol	30.6	10.0	µg/L	50.0		61.3		10-132	2.34	131	

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QUALITY CONTROL

Semivolatile Organic Compounds by - GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284382 - SW-846 3510C										
LCS Dup (B284382-BSD1)				Prepared: 06/21/21 Analyzed: 06/22/21						
N-Nitrosodimethylamine	20.6	10.0	µg/L	50.0		41.3	40-140	6.97	30	
N-Nitrosodi-n-propylamine	38.1	10.0	µg/L	50.0		76.1	10-230	4.18	87	
2-Methylnaphthalene	35.0	5.00	µg/L	50.0		69.9	40-140	7.44	30	
Phenanthrene	36.4	5.00	µg/L	50.0		72.8	54-120	5.42	39	
2-Methylphenol	32.3	10.0	µg/L	50.0		64.5	40-140	5.67	30	
Phenol	17.5	10.0	µg/L	50.0		35.1	5-120	3.89	64	
3/4-Methylphenol	31.8	20.0	µg/L	50.0		63.7	40-140	2.87	30	
Pyrene	41.2	5.00	µg/L	50.0		82.4	52-120	4.09	49	
1,2,4-Trichlorobenzene	27.3	5.00	µg/L	50.0		54.5	44-142	10.5	50	
2,4,6-Trichlorophenol	39.1	10.0	µg/L	50.0		78.2	37-144	5.55	58	
Surrogate: 2-Fluorophenol	*78.5*		µg/L	200		39.2	15-110			
Surrogate: Phenol-d6	*79.3*		µg/L	200		39.7	15-110			
Surrogate: Nitrobenzene-d5	*78.5*		µg/L	100		78.5	30-130			
Surrogate: 2-Fluorobiphenyl	*70.9*		µg/L	100		70.9	30-130			
Surrogate: 2,4,6-Tribromophenol	*137*		µg/L	200		68.4	15-110			
Surrogate: p-Terphenyl-d14	*101*		µg/L	100		101	30-130			

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QUALITY CONTROL

Polychlorinated Biphenyls By GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284363 - SW-846 3510C										
Blank (B284363-BLK1)				Prepared: 06/19/21 Analyzed: 06/22/21						
Aroclor-1016	ND	0.100	µg/L							
Aroclor-1016 [2C]	ND	0.100	µg/L							
Aroclor-1221	ND	0.100	µg/L							
Aroclor-1221 [2C]	ND	0.100	µg/L							
Aroclor-1232	ND	0.100	µg/L							
Aroclor-1232 [2C]	ND	0.100	µg/L							
Aroclor-1242	ND	0.100	µg/L							
Aroclor-1242 [2C]	ND	0.100	µg/L							
Aroclor-1248	ND	0.100	µg/L							
Aroclor-1248 [2C]	ND	0.100	µg/L							
Aroclor-1254	ND	0.100	µg/L							
Aroclor-1254 [2C]	ND	0.100	µg/L							
Aroclor-1260	ND	0.100	µg/L							
Aroclor-1260 [2C]	ND	0.100	µg/L							
Surrogate: Decachlorobiphenyl	*0.435*		µg/L	1.00		43.5	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.387*		µg/L	1.00		38.7	30-150			
Surrogate: Tetrachloro-m-xylene	*0.680*		µg/L	1.00		68.0	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.648*		µg/L	1.00		64.8	30-150			
LCS (B284363-BS1)				Prepared: 06/19/21 Analyzed: 06/22/21						
Aroclor-1016	0.445	0.200	µg/L	0.500		89.1	50-140			
Aroclor-1016 [2C]	0.363	0.200	µg/L	0.500		72.6	50-140			
Aroclor-1260	0.447	0.200	µg/L	0.500		89.4	8-140			
Aroclor-1260 [2C]	0.397	0.200	µg/L	0.500		79.4	8-140			
Surrogate: Decachlorobiphenyl	*1.41*		µg/L	2.00		70.3	30-150			
Surrogate: Decachlorobiphenyl [2C]	*1.26*		µg/L	2.00		63.0	30-150			
Surrogate: Tetrachloro-m-xylene	*1.30*		µg/L	2.00		65.2	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*1.27*		µg/L	2.00		63.6	30-150			
LCS Dup (B284363-BSD1)				Prepared: 06/19/21 Analyzed: 06/22/21						
Aroclor-1016	0.406	0.200	µg/L	0.500		81.3	50-140	9.17		
Aroclor-1016 [2C]	0.419	0.200	µg/L	0.500		83.8	50-140	14.4		
Aroclor-1260	0.439	0.200	µg/L	0.500		87.7	8-140	1.92		
Aroclor-1260 [2C]	0.416	0.200	µg/L	0.500		83.3	8-140	4.81		
Surrogate: Decachlorobiphenyl	*3.93*		µg/L	4.00		98.2	30-150			
Surrogate: Decachlorobiphenyl [2C]	*3.56*		µg/L	4.00		88.9	30-150			
Surrogate: Tetrachloro-m-xylene	*2.85*		µg/L	4.00		71.3	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*2.72*		µg/L	4.00		68.0	30-150			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B284438 - EPA 200.7											
Blank (B284438-BLK1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Iron	ND	0.050	mg/L								
Hardness	ND	1.4	mg/L								
LCS (B284438-BS1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Iron	4.01	0.050	mg/L	4.00		100		85-115			
Hardness	26	1.4	mg/L	26.4		98.9		85-115			
LCS Dup (B284438-BSD1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Iron	3.83	0.050	mg/L	4.00		95.8		85-115	4.47	20	
Hardness	25	1.4	mg/L	26.4		94.6		85-115	4.40	20	
Duplicate (B284438-DUP1)	**Source: 21F1162-02**			Prepared: 06/21/21 Analyzed: 06/22/21							
Iron	ND	0.25	mg/L		ND				NC	20	
Hardness	4300	7.2	mg/L		4400				2.73		
Matrix Spike (B284438-MS1)	**Source: 21F1162-02**			Prepared: 06/21/21 Analyzed: 06/22/21							
Iron	4.03	0.25	mg/L	4.00	0.168	96.6		70-130			
Hardness	4500	7.2	mg/L	26.4	4400	**274**	*	70-130			MS-19
Batch B284439 - EPA 200.8											
Blank (B284439-BLK1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Antimony	ND	1.0	µg/L								
Arsenic	ND	0.80	µg/L								
Cadmium	ND	0.20	µg/L								
Chromium	ND	1.0	µg/L								
Copper	ND	1.0	µg/L								
Lead	ND	0.50	µg/L								
Nickel	ND	5.0	µg/L								
Selenium	ND	5.0	µg/L								
Silver	ND	0.20	µg/L								
Zinc	ND	10	µg/L								
LCS (B284439-BS1)				Prepared: 06/21/21 Analyzed: 06/22/21							
Antimony	525	10	µg/L	500		105		85-115			
Arsenic	492	8.0	µg/L	500		98.3		85-115			
Cadmium	485	2.0	µg/L	500		97.0		85-115			
Chromium	477	10	µg/L	500		95.4		85-115			
Copper	961	10	µg/L	1000		96.1		85-115			
Lead	490	5.0	µg/L	500		98.0		85-115			
Nickel	472	50	µg/L	500		94.4		85-115			
Selenium	489	50	µg/L	500		97.8		85-115			
Silver	466	2.0	µg/L	500		93.2		85-115			
Zinc	965	100	µg/L	1000		96.5		85-115			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284439 - EPA 200.8										
LCS Dup (B284439-BSD1)				Prepared: 06/21/21 Analyzed: 06/22/21						
Antimony	543	10	µg/L	500		109	85-115	3.42	20	
Arsenic	515	8.0	µg/L	500		103	85-115	4.59	20	
Cadmium	511	2.0	µg/L	500		102	85-115	5.29	20	
Chromium	500	10	µg/L	500		100	85-115	4.80	20	
Copper	996	10	µg/L	1000		99.6	85-115	3.52	20	
Lead	510	5.0	µg/L	500		102	85-115	4.07	20	
Nickel	492	50	µg/L	500		98.4	85-115	4.17	20	
Selenium	503	50	µg/L	500		101	85-115	2.90	20	
Silver	490	2.0	µg/L	500		97.9	85-115	4.94	20	
Zinc	1010	100	µg/L	1000		101	85-115	4.29	20	
Duplicate (B284439-DUP1)	**Source: 21F1162-02**			Prepared: 06/21/21 Analyzed: 06/22/21						**DL-15**
Antimony	ND	10	µg/L		ND			NC	20	
Arsenic	42.7	8.0	µg/L		43.8			2.42	20	
Cadmium	ND	2.0	µg/L		ND			NC	20	
Chromium	ND	10	µg/L		ND			NC	20	
Copper	101	10	µg/L		108			6.40	20	
Lead	ND	5.0	µg/L		ND			NC	20	
Nickel	ND	50	µg/L		ND			NC	20	
Selenium	131	50	µg/L		138			4.93	20	
Silver	ND	2.0	µg/L		ND			NC	20	
Zinc	ND	100	µg/L		ND			NC	20	
Matrix Spike (B284439-MS1)	**Source: 21F1162-02**			Prepared: 06/21/21 Analyzed: 06/22/21						
Antimony	558	10	µg/L	500	ND	112	70-130			
Arsenic	559	8.0	µg/L	500	43.8	103	70-130			
Cadmium	459	2.0	µg/L	500	ND	91.9	70-130			
Chromium	524	10	µg/L	500	ND	105	70-130			
Copper	965	10	µg/L	1000	108	85.7	70-130			
Lead	555	5.0	µg/L	500	ND	111	70-130			
Nickel	468	50	µg/L	500	11.9	91.2	70-130			
Selenium	638	50	µg/L	500	138	100	70-130			
Silver	424	2.0	µg/L	500	ND	84.8	70-130			
Zinc	907	100	µg/L	1000	ND	90.7	70-130			
Batch B284490 - EPA 245.1										
Blank (B284490-BLK1)				Prepared & Analyzed: 06/22/21						
Mercury	ND	0.00010	mg/L							
LCS (B284490-BS1)				Prepared & Analyzed: 06/22/21						
Mercury	0.00395	0.00010	mg/L	0.00400		98.7	85-115			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284490 - EPA 245.1										
LCS Dup (B284490-BSD1)				Prepared & Analyzed: 06/22/21						
Mercury	0.00392	0.00010	mg/L	0.00400		98.1	85-115	0.566	20	
Duplicate (B284490-DUP1)		**Source: 21F1162-02**		Prepared & Analyzed: 06/22/21						
Mercury	ND	0.00010	mg/L		ND			NC	30	
Matrix Spike (B284490-MS1)		**Source: 21F1162-02**		Prepared & Analyzed: 06/22/21						
Mercury	0.00380	0.00010	mg/L	0.00400	ND	95.0	75-125			

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284339 - SM21-22 4500 CL G										
Blank (B284339-BLK1)				Prepared & Analyzed: 06/18/21						
Chlorine, Residual	ND	0.020	mg/L							
LCS (B284339-BS1)				Prepared & Analyzed: 06/18/21						
Chlorine, Residual	0.72	0.020	mg/L	0.641		112	80.3-122			
LCS Dup (B284339-BSD1)				Prepared & Analyzed: 06/18/21						
Chlorine, Residual	0.71	0.020	mg/L	0.641		111	80.3-122	1.56	10.7	
Duplicate (B284339-DUP1)		**Source: 21F1162-01**		Prepared & Analyzed: 06/18/21						
Chlorine, Residual	ND	0.020	mg/L		ND			NC	27.6	
Matrix Spike (B284339-MS1)		**Source: 21F1162-01**		Prepared & Analyzed: 06/18/21						
Chlorine, Residual	0.34	0.020	mg/L	0.300	ND	113	10-169			
Batch B284343 - SM21-22 3500 Cr B										
Blank (B284343-BLK1)				Prepared & Analyzed: 06/18/21						
Hexavalent Chromium	ND	0.0040	mg/L							
LCS (B284343-BS1)				Prepared & Analyzed: 06/18/21						
Hexavalent Chromium	0.10	0.0040	mg/L	0.100		103	90-114			
LCS Dup (B284343-BSD1)				Prepared & Analyzed: 06/18/21						
Hexavalent Chromium	0.10	0.0040	mg/L	0.100		101	90-114	2.64	5	
Matrix Spike (B284343-MS1)		**Source: 21F1162-02**		Prepared & Analyzed: 06/18/21						
Hexavalent Chromium	0.095	0.0040	mg/L	0.100	ND	95.1	60.5-130			
Matrix Spike Dup (B284343-MSD1)		**Source: 21F1162-02**		Prepared & Analyzed: 06/18/21						
Hexavalent Chromium	0.099	0.0040	mg/L	0.100	ND	99.2	60.5-130	4.15	7.53	
Batch B284371 - EPA 1664B										
Blank (B284371-BLK1)				Prepared & Analyzed: 06/21/21						
Silica Gel Treated HEM (SGT-HEM)	ND	1.4	mg/L							
LCS (B284371-BS1)				Prepared & Analyzed: 06/21/21						
Silica Gel Treated HEM (SGT-HEM)	9.1		mg/L	10.0		91.0	64-132			
Batch B284379 - SM21-22 2540D										
Blank (B284379-BLK1)				Prepared & Analyzed: 06/21/21						
Total Suspended Solids	ND	2.5	mg/L							

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284379 - SM21-22 2540D										
LCS (B284379-BS1)				Prepared & Analyzed: 06/21/21						
Total Suspended Solids	218	10	mg/L	200		109	53.8-124			
Batch B284417 - EPA 300.0										
Blank (B284417-BLK1)				Prepared & Analyzed: 06/21/21						
Chloride	ND	1.0	mg/L							
LCS (B284417-BS1)				Prepared & Analyzed: 06/21/21						
Chloride	9.4	1.0	mg/L	10.0		94.0	90-110			
LCS Dup (B284417-BSD1)				Prepared & Analyzed: 06/21/21						
Chloride	9.4	1.0	mg/L	10.0		93.6	90-110	0.454	20	
Batch B284590 - SM19-22 4500 NH3 C										
Blank (B284590-BLK1)				Prepared: 06/23/21 Analyzed: 06/24/21						
Ammonia as N	ND	0.30	mg/L							
LCS (B284590-BS1)				Prepared: 06/23/21 Analyzed: 06/24/21						
Ammonia as N	4.9	0.30	mg/L	5.00		98.4	86.2-110			
LCS Dup (B284590-BSD1)				Prepared: 06/23/21 Analyzed: 06/24/21						
Ammonia as N	5.0	0.30	mg/L	5.00		101	86.2-110	2.61	10	

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QUALITY CONTROL

Drinking Water Organics EPA 504.1 - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B284596 - EPA 504 water										
Blank (B284596-BLK1)				Prepared & Analyzed: 06/23/21						
1,2-Dibromoethane (EDB)	ND	0.021	µg/L							
Surrogate: 1,3-Dibromopropane	*1.10*		µg/L	1.05		105	70-130			
LCS (B284596-BS1)				Prepared & Analyzed: 06/23/21						
1,2-Dibromoethane (EDB)	0.283	0.021	µg/L	0.258		110	70-130			
Surrogate: 1,3-Dibromopropane	*1.17*		µg/L	1.03		113	70-130			
LCS Dup (B284596-BSD1)				Prepared & Analyzed: 06/23/21						
1,2-Dibromoethane (EDB)	0.316	0.020	µg/L	0.256		124	70-130	10.9		
Surrogate: 1,3-Dibromopropane	*1.19*		µg/L	1.02		117	70-130			
Matrix Spike (B284596-MS1)	**Source: 21F1162-01**			Prepared & Analyzed: 06/23/21						
1,2-Dibromoethane (EDB)	0.274	0.020	µg/L	0.245	ND	112	65-135			
Surrogate: 1,3-Dibromopropane	*1.04*		µg/L	0.980		106	70-130			

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

608.3

LCS

Lab Sample ID: B284363-BS1

Date(s) Analyzed: 06/22/2021 06/22/2021

Instrument ID (1): ECD5

Instrument ID (2): ECD5

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	0.445	
	2	0.000	0.000	0.000	0.363	21.4
Aroclor-1260	1	0.000	0.000	0.000	0.447	
	2	0.000	0.000	0.000	0.397	12.5

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

608.3

LCS Dup

Lab Sample ID: B284363-BSD1 Date(s) Analyzed: 06/22/2021 06/22/2021

Instrument ID (1): ECD5 Instrument ID (2): ECD5

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	0.406	
	2	0.000	0.000	0.000	0.419	2.2
Aroclor-1260	1	0.000	0.000	0.000	0.439	
	2	0.000	0.000	0.000	0.416	5.6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

EPA 504.1

LCS

Lab Sample ID: B284596-BS1

Date(s) Analyzed: 06/23/2021 06/23/2021

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
1,2-Dibromoethane (EDB)	1	2.723	0.000	0.000	0.283	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

EPA 504.1

LCS Dup

Lab Sample ID: B284596-BSD1 Date(s) Analyzed: 06/23/2021 06/23/2021

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
1,2-Dibromoethane (EDB)	1	2.723	0.000	0.000	0.316	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

EPA 504.1

Matrix Spike

Lab Sample ID: B284596-MS1 Date(s) Analyzed: 06/23/2021 06/23/2021

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
1,2-Dibromoethane (EDB)	1	2.721	0.000	0.000	0.274	

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
DL-04	Elevated reporting limit due to high concentration of an interfering analyte(s).
DL-15	Sample required a dilution due to low internal standard recovery of the lesser diluted digestion, reporting limit is elevated.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
L-04	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
MS-19	Sample to spike ratio is greater than or equal to 4:1. Spiked amount is not representative of the native amount in the sample. Appropriate or meaningful recoveries cannot be calculated.
V-04	Initial calibration did not meet method specifications. Compound was calibrated using a response factor where %RSD is outside of method specified criteria. Reported result is estimated.
V-05	Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.
V-06	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side for this compound.
V-20	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
- in Water	
Cyanide	CT,MA,NH,NY,RI,NC,ME,VA
608.3 in Water	
Aroclor-1016	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1016 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1221	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1221 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1232	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1232 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1242	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1242 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1248	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1248 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1254	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1254 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1260	CT,MA,NH,NY,RI,NC,ME,VA
Aroclor-1260 [2C]	CT,MA,NH,NY,RI,NC,ME,VA
624.1 in Water	
Acetone	CT,NY,MA,NH
tert-Amyl Methyl Ether (TAME)	MA
Benzene	CT,NY,MA,NH,RI,NC,ME,VA
Bromodichloromethane	CT,NY,MA,NH,RI,NC,ME,VA
Bromoform	CT,NY,MA,NH,RI,NC,ME,VA
Bromomethane	CT,NY,MA,NH,RI,NC,ME,VA
tert-Butyl Alcohol (TBA)	NY,MA
Carbon Tetrachloride	CT,NY,MA,NH,RI,NC,ME,VA
Chlorobenzene	CT,NY,MA,NH,RI,NC,ME,VA
Chlorodibromomethane	CT,NY,MA,NH,RI,NC,ME,VA
Chloroethane	CT,NY,MA,NH,RI,NC,ME,VA
Chloroform	CT,NY,MA,NH,RI,NC,ME,VA
Chloromethane	CT,NY,MA,NH,RI,NC,ME,VA
1,2-Dichlorobenzene	CT,NY,MA,NH,RI,NC,ME,VA
1,3-Dichlorobenzene	CT,NY,MA,NH,RI,NC,ME,VA
1,4-Dichlorobenzene	CT,NY,MA,NH,RI,NC,ME,VA
1,2-Dichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
1,1-Dichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
1,1-Dichloroethylene	CT,NY,MA,NH,RI,NC,ME,VA
trans-1,2-Dichloroethylene	CT,NY,MA,NH,RI,NC,ME,VA
1,2-Dichloropropane	CT,NY,MA,NH,RI,NC,ME,VA
cis-1,3-Dichloropropene	CT,NY,MA,NH,RI,NC,ME,VA
1,4-Dioxane	MA
trans-1,3-Dichloropropene	CT,NY,MA,NH,RI,NC,ME,VA
Ethanol	NY,MA,NH
Ethylbenzene	CT,NY,MA,NH,RI,NC,ME,VA
Methyl tert-Butyl Ether (MTBE)	NY,MA,NH,NC
Methylene Chloride	CT,NY,MA,NH,RI,NC,ME,VA
Naphthalene	NY,MA,NC

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
624.1 in Water	
1,1,2,2-Tetrachloroethane	CT,NY,MA,NH,RI,NC,ME,VA
Tetrachloroethylene	CT,NY,MA,NH,RI,NC,ME,VA
Toluene	CT,NY,MA,NH,RI,NC,ME,VA
1,2,4-Trichlorobenzene	MA,NC
1,1,1-Trichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
1,1,2-Trichloroethane	CT,NY,MA,NH,RI,NC,ME,VA
Trichloroethylene	CT,NY,MA,NH,RI,NC,ME,VA
Trichlorofluoromethane (Freon 11)	CT,NY,MA,NH,RI,NC,ME,VA
Vinyl Chloride	CT,NY,MA,NH,RI,NC,ME,VA
m+p Xylene	CT,NY,MA,NH,RI,NC
o-Xylene	CT,NY,MA,NH,RI,NC
625.1 in Water	
Acenaphthene	CT,MA,NH,NY,NC,RI,ME,VA
Acenaphthylene	CT,MA,NH,NY,NC,RI,ME,VA
Anthracene	CT,MA,NH,NY,NC,RI,ME,VA
Benzidine	CT,MA,NH,NY,NC,RI,ME,VA
Benzo(g,h,i)perylene	CT,MA,NH,NY,NC,RI,ME,VA
4-Bromophenylphenylether	CT,MA,NH,NY,NC,RI,ME,VA
Butylbenzylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
4-Chloro-3-methylphenol	CT,MA,NH,NY,NC,RI,VA
Bis(2-chloroethyl)ether	CT,MA,NH,NY,NC,RI,ME,VA
Bis(2-chloroisopropyl)ether	CT,MA,NH,NY,NC,RI,ME,VA
2-Chloronaphthalene	CT,MA,NH,NY,NC,RI,ME,VA
2-Chlorophenol	CT,MA,NH,NY,NC,RI,ME,VA
4-Chlorophenylphenylether	CT,MA,NH,NY,NC,RI,ME,VA
Di-n-butylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
1,3-Dichlorobenzene	MA,NC
1,4-Dichlorobenzene	MA,NC
1,2-Dichlorobenzene	MA,NC
3,3-Dichlorobenzidine	CT,MA,NH,NY,NC,RI,ME,VA
2,4-Dichlorophenol	CT,MA,NH,NY,NC,RI,ME,VA
Diethylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
2,4-Dimethylphenol	CT,MA,NH,NY,NC,RI,ME,VA
Dimethylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
4,6-Dinitro-2-methylphenol	CT,MA,NH,NY,NC,RI,ME,VA
2,4-Dinitrophenol	CT,MA,NH,NY,NC,RI,ME,VA
2,4-Dinitrotoluene	CT,MA,NH,NY,NC,RI,ME,VA
2,6-Dinitrotoluene	CT,MA,NH,NY,NC,RI,ME,VA
Di-n-octylphthalate	CT,MA,NH,NY,NC,RI,ME,VA
1,2-Diphenylhydrazine/Azobenzene	NC
Bis(2-Ethylhexyl)phthalate	CT,MA,NH,NY,NC,RI,ME,VA
Fluoranthene	CT,MA,NH,NY,NC,RI,ME,VA
Fluorene	CT,MA,NH,NY,NC,RI,ME,VA
Hexachlorobenzene	CT,MA,NH,NY,NC,RI,ME,VA
Hexachlorobutadiene	CT,MA,NH,NY,NC,RI,ME,VA
Hexachlorocyclopentadiene	CT,MA,NH,NY,NC,RI,ME,VA

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
625.1 in Water	
Hexachloroethane	CT,MA,NH,NY,NC,RI,ME,VA
Isophorone	CT,MA,NH,NY,NC,RI,ME,VA
Naphthalene	CT,MA,NH,NY,NC,RI,ME,VA
Nitrobenzene	CT,MA,NH,NY,NC,RI,ME,VA
2-Nitrophenol	CT,MA,NH,NY,NC,RI,ME,VA
4-Nitrophenol	CT,MA,NH,NY,NC,RI,ME,VA
N-Nitrosodimethylamine	CT,MA,NH,NY,NC,RI,ME,VA
N-Nitrosodi-n-propylamine	CT,MA,NH,NY,NC,RI,ME,VA
2-Methylnaphthalene	NC
Phenanthrene	CT,MA,NH,NY,NC,RI,ME,VA
2-Methylphenol	NY,NC
Phenol	CT,MA,NH,NY,NC,RI,ME,VA
3/4-Methylphenol	NY,NC
Pyrene	CT,MA,NH,NY,NC,RI,ME,VA
1,2,4-Trichlorobenzene	CT,MA,NH,NY,NC,RI,ME,VA
2,4,6-Trichlorophenol	CT,MA,NH,NY,NC,RI,ME,VA
2-Fluorophenol	NC
2-Fluorophenol	NC,VA
Phenol-d6	VA
Nitrobenzene-d5	VA
EPA 200.7 in Water	
Iron	CT,MA,NH,NY,RI,NC,ME,VA
Hardness	CT,MA,NH,NY,RI,VA
EPA 200.8 in Water	
Antimony	CT,MA,NH,NY,RI,NC,ME,VA
Arsenic	CT,MA,NH,NY,RI,NC,ME,VA
Cadmium	CT,MA,NH,NY,RI,NC,ME,VA
Chromium	CT,MA,NH,NY,RI,NC,ME,VA
Copper	CT,MA,NH,NY,RI,NC,ME,VA
Lead	CT,MA,NH,NY,RI,NC,ME,VA
Nickel	CT,MA,NH,NY,RI,NC,ME,VA
Selenium	CT,MA,NH,NY,RI,NC,ME,VA
Silver	CT,MA,NH,NY,RI,NC,ME,VA
Zinc	CT,MA,NH,NY,RI,NC,ME,VA
EPA 245.1 in Water	
Mercury	CT,MA,NH,RI,NY,NC,ME,VA
EPA 300.0 in Water	
Chloride	NC,NY,MA,VA,ME,NH,CT,RI
SM19-22 4500 NH3 C in Water	
Ammonia as N	NY,MA,CT,RI,VA,NC,ME
SM21-22 2540D in Water	
Total Suspended Solids	CT,MA,NH,NY,RI,NC,ME,VA
SM21-22 3500 Cr B in Water	
Hexavalent Chromium	NY,CT,NH,RI,ME,VA,NC

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SM21-22 4500 CL G in Water	
Chlorine, Residual	CT,MA,RI,ME

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2022
CT	Connecticut Department of Publilc Health	PH-0165	12/31/2022
NY	New York State Department of Health	10899 NELAP	04/1/2022
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2022
RI	Rhode Island Department of Health	LAO00112	12/30/2021
NC	North Carolina Div. of Water Quality	652	12/31/2021
NJ	New Jersey DEP	MA007 NELAP	06/30/2022
FL	Florida Department of Health	E871027 NELAP	06/30/2022
VT	Vermont Department of Health Lead Laboratory	LL720741	07/30/2022
ME	State of Maine	MA00100	06/9/2023
VA	Commonwealth of Virginia	460217	12/14/2021
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2021
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2022
NC-DW	North Carolina Department of Health	25703	07/31/2021
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2022
MI	Dept. of Env, Great Lakes, and Energy	9100	09/6/2021

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Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

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CHAIN OF CUSTODY RECORD

Doc # 381 Rev 1_03242017

39 Spruce Street
East Longmeadow, MA 01028

Page 1 of 1

Company Name: Lockwood Remediation Technologies
Address: 89 Crawford Street, Leominster, MA 01453
Phone: (774) 450-7177
Project Name: MBTA Headhouse
Project Location:
Project Number: 2-2223
Project Manager: Brian Caccavale
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By:

Requested Turnaround Time
7-Day ☐ 10-Day ☐
Due Date: 5-day

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☑ EXCEL ☐
Other:
CLP Like Data Pkg Required: ☐
Email To: jennings@lrt-llc.net
CC: bcaccavale@lrt-llc.net

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	[1] Matrix Code	Conc Code	Ammonia	Chloride	TRC	Total Metals (Sb,As,Cd, Cr III, Cu, Fe, Pb, Hg, Ni, Se, Ag, Zn)	Cyanide	Voc's	Semi-Voc's	PCB's	TPH	TSS	EDB	Hardness	Salinity	Chromium VI
1	Influent	6/18	11:00		x	GW	U	x	x	x	x	x	x	x	x	x	x		x	X	x
2	Receiving Water	6/18	11:00		x	GW	U	x			x								x	X	x

# of Containers	2	1	1	2	1	3	2	2	2	1	3	2	2	2
[2] Preservation Code	S P	I P	I p	N P	X P	H V	I A	I A	S A	I P	T V	N P	I P	I P
[3] Container Code														

ANALYSIS REQUESTED

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

Comments: pH In: 7.7 pH RW 7.0

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

[3] Container Codes:
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define)

Samples are for NPDES RGP Parameters.

Relinquished by: (signature)	Date/Time: 6/18/21 02:36PM	
Received by: (signature)	Date/Time: 6/18/21 1545	
Relinquished by: (signature)	Date/Time: 6/18/21 1810	
Received by: (signature)	Date/Time: 6/19/21 1910	
Relinquished by: (signature)	Date/Time:	
Received by: (signature)	Date/Time:	

Detection Limit Requirements
MA
CT
Other:

Special Requirements
☐ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

con-test ANALYTICAL LABORATORY
www.contestlabs.com
NELAC and AIHA-LAP, LLC Accredited

Project Entity
☐ Government ☐ Municipality ☐ MWRA ☐ WRTA
☐ Federal ☐ 21 J ☐ School
☐ City ☐ Brownfield ☐ MBTA

Other
☐ Chromatogram
☐ *AIHA-LAP,LLC*

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Table of Contents

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client LRT

Received By CB Date 6/18/21 Time 1910

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____ Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 2 Actual Temp - 2.2 By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? NA Were Samples Tampered with? NA

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Analysis T Sampler Name T Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? T Who was notified? Cassie

Is there enough Volume? T

Is there Headspace where applicable? F MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? Acid T Base T

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.	6	1 Liter Plastic	1	16 oz Amb.	
HCL-	6	500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	13	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

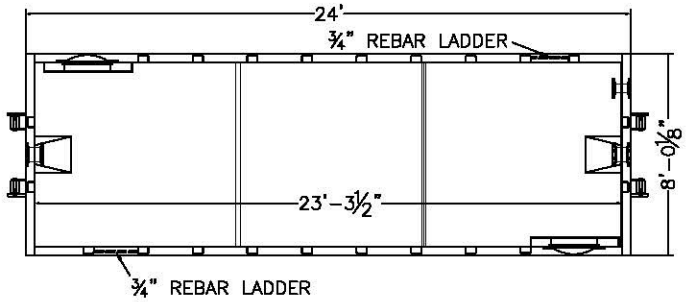
Comments:

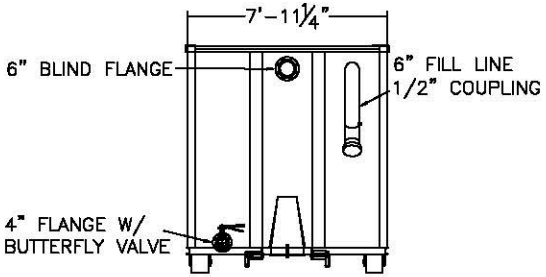
Appendix C

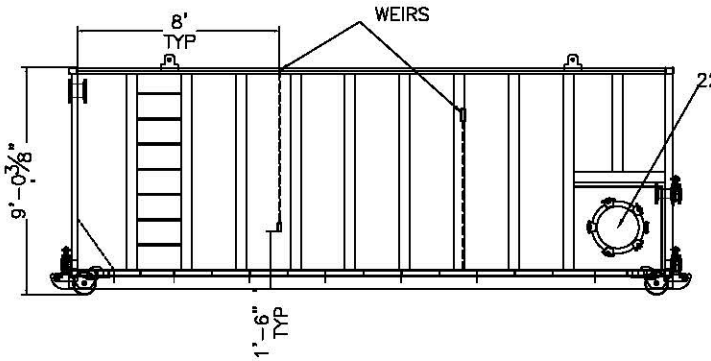
Cutsheets

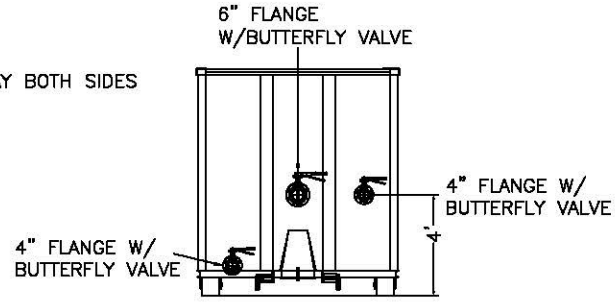
SPECIFICATION

CAPACITY: 50 CUBIC YARD (10K GAL)
¼" A36 PLATE FLOOR CONSTRUCTION
3/16" A36 PLATE WALL CONSTRUCTION
4" X 3" X 11GA. TOP CAP TUBE
6" X 2" X ¼" FLOOR RAILS
PORTS: (3) 4" FLANGE W/BUTTERFLY VALVE (1) FLANGED INTERNAL
(2) 6" FLANGE W/BUTTERFLY VALVE FLANGED INTERNAL
(1) 6" FILL LINE W/ ½" COUPLER
MANWAY: (2) ONE EACH SIDE
OVER UNDER WEIRS
WHEELS: 10" STEEL
BLAST: SSPC-SP-6 (COMMERCIAL BLAST)
PAINT: POLYURETHANE 3.0-4.0 MILS D.F.T.





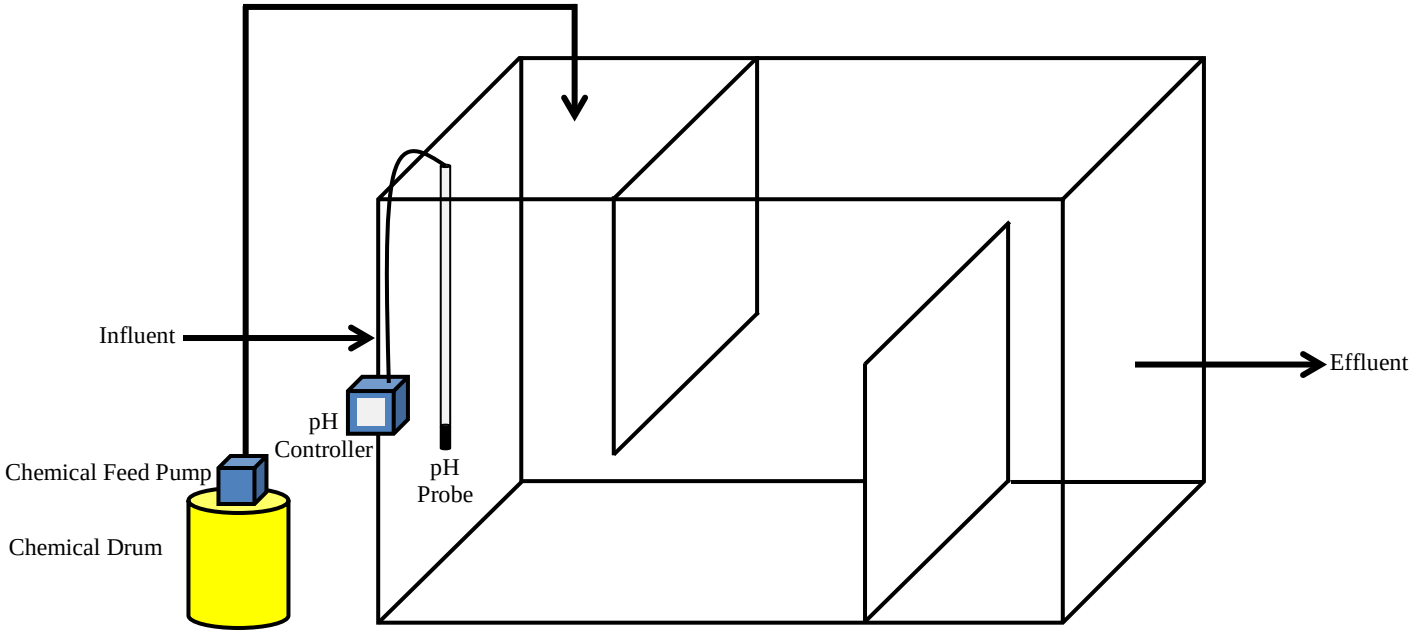




10,000 gal. Weir Tank

Lockwood Remediation Technologies, LLC

89 Crawford Street
Leominster, Massachusetts 01453
O: 774-450-7177
F: 888-835-0617



Notes:

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

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

Configuration of pH Adjustment System

Lockwood Remediation Technologies, LLC

One Controller for the Broadest Range of Sensors.

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

Maximum Versatility

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

Ease of Use and Confidence in Results

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

Wide Variety of Communication Options

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

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

Controller Comparison

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

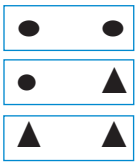
Choose from Hach's Broad Range of Digital and Analog Sensors

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

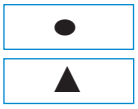
● = Digital ▲ = Analog

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

2 Channel Configurations



1 Channel Configurations



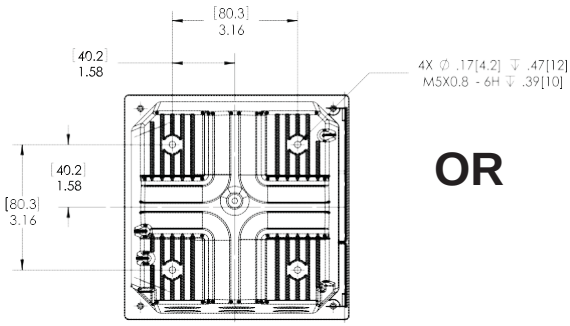
Specifications*

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

**Subject to change without notice.*

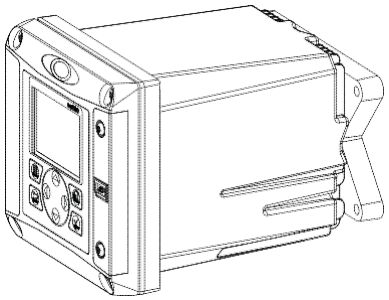
Dimensions

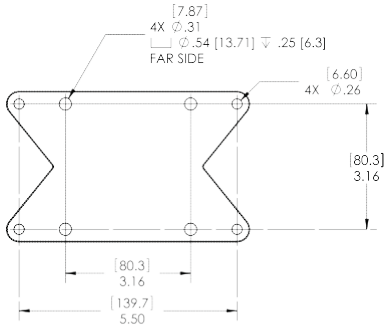
Surface Mounting Dimensions



Mounting Dimensions
(Rear View)

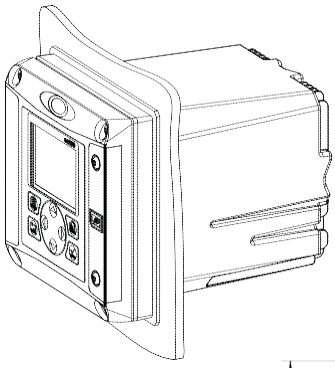
OR

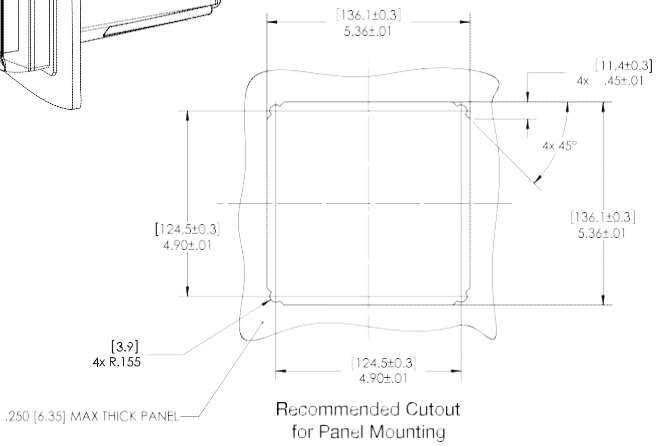




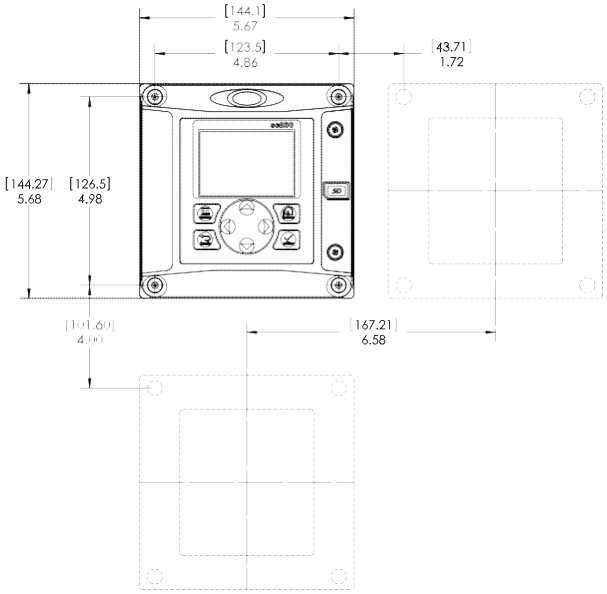
Bracket (supplied) for Surface Mounting
(Not compatible with Weather and Sun Shield p/n 9220600 when surface mounting.)

Panel Mounting Dimensions



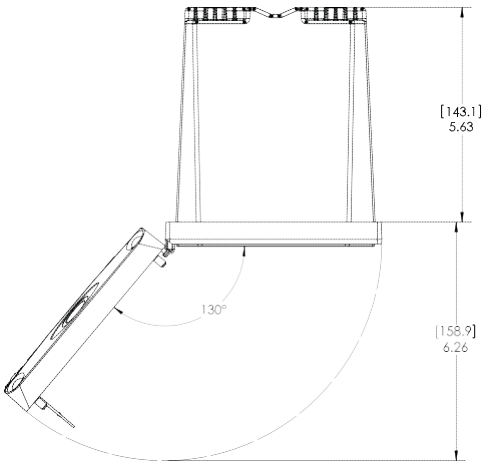


Recommended Cutout
for Panel Mounting

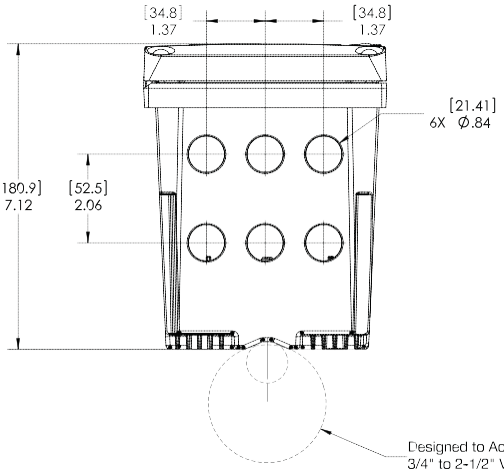


Minimum Spacing Dimensions
for Group Mounting

Top and Bottom Views



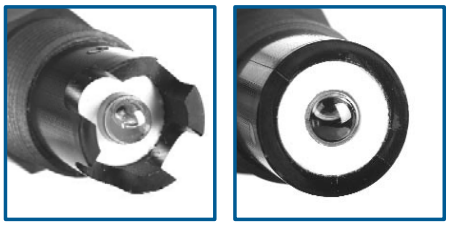
Door Opening Details



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

3/4-inch Combination pH and ORP Sensor Kits

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



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

Features and Benefits

Low Price—High Performance

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

Special Electrode Configurations

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

Temperature Compensation Element Option

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

Versatile Mounting Styles

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

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

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

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

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

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

Specifications*

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

Combination pH Sensors

Measuring Range
0 to 14 pH

Accuracy
Less than 0.1 pH under reference conditions

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

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

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

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

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

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

Wetted Materials

Convertible style: Ryton® body (glass filled)

Insertion style: PVDF body (Kynar®)

Sanitary style: 316 stainless steel sleeved PVDF body

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

Warranty
90 days

Combination ORP Sensors

Measuring Range
-2000 to +2000 millivolts

Accuracy
Limited to calibration solution accuracy (± 20 mV)

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

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

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

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

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

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

Wetted Materials

Convertible style: Ryton® body (glass filled)

Insertion style: PVDF body (Kynar®)

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

Warranty
90 days

**Specifications subject to change without notice.*

Engineering Specifications

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

Dimensions

Convertible Style Sensor

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

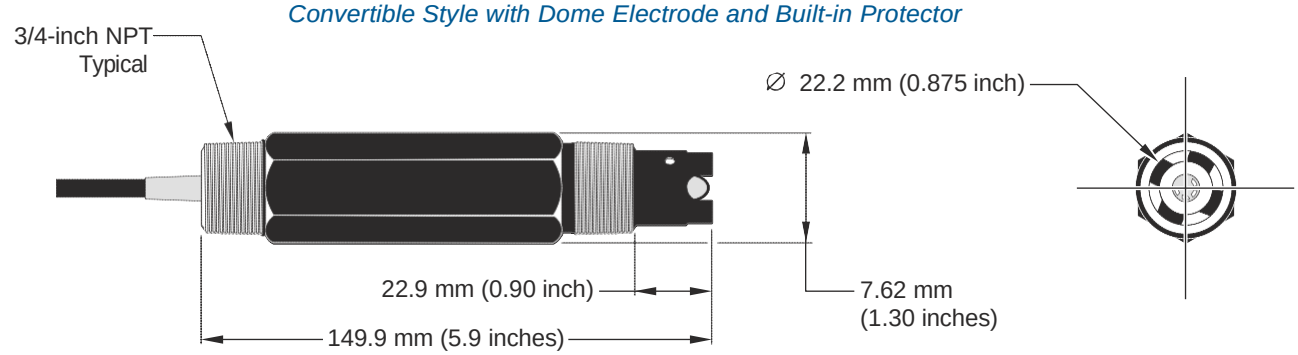
Insertion Style Sensor

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

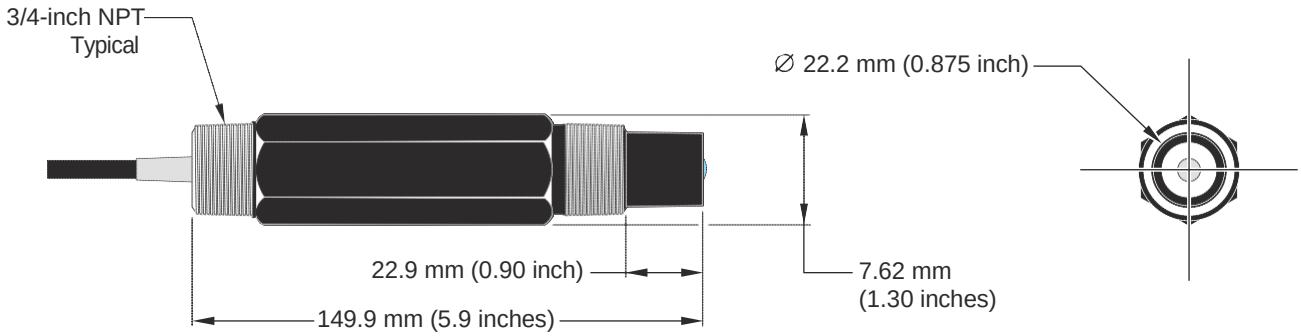
Sanitary Style Sensor

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

Convertible Style with Dome Electrode and Built-in Protector



Convertible Style with Flat Electrode



Lockwood Remediation Technologies, LLC

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

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

Features

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

Controls

Manual Stroke Rate

Manual Stroke Length

External Pacing - Optional

External Pace With Stop - Optional (125 SPM only)

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

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

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

Operating Benefits

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

Aftermarket

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

Series A Plus
Electronic Metering Pumps

Lockwood Remediation Technologies, LLC

Series A Plus

Specifications and Model Selection

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

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

Engineering Data

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

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

Engineering Data

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

Custom Engineered Designs - Pre-Engineered Systems

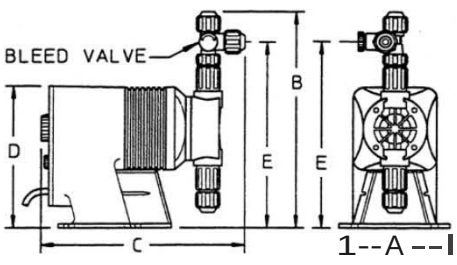
Pre-Engineered Systems

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

Dimensions

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

NOTE: Inches X 2.54 cm



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

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

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

A95OVER Specifications

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

Metric Equivalent Specifications

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

A95OVER Technical Information

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

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

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

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

The Pulsatron Series HV designed for high viscosity applications for precise and accurate metering control. The Series HV 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.

Five distinct models are available, having pressure capabilities to 150 PSIG (10 BAR) @ 12 GPD (1.9 lph), and flow capacities to 240 GPD (37.9 lph) @ 80 PSIG (5.6 BAR), with a turndown ratio of 100:1. Metering performance is reproducible to within ± 2% of maximum capacity.

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.
- Viscosities to 20,000 CPS.

Controls

Manual Stroke Rate

- Turn-Down Ratio 10:1

Manual Stroke Length

- Turn-Down Ratio 10:1

4-20mA or 20-4mA Input

- 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)

Series HV

Specifications and Model Selection

MODEL		LVB3	LVF4	LVG4	LVG5	LVH7
Capacity	GPH	0.50	1.00	2.00	4.00	10.00
nominal	GPD	12	24	48	96	240
(max.)	LPH	1.9	3.8	7.6	15.1	37.9
Pressure	PSIG	150	150	110	110	80
(max.)	BAR	10	10	7	7	5.6
Connections:	Tubing	(S) .50" I.D. X .75" O.D. .38" I.D. X .50" OD (LVB3 & F4 only) (S & D) .50" I.D. X .75" O.D. (LVG4,G5 & H7 only)				

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: 20,000 CPS

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 @ 230 VAC

Peak Input Power: 300 Watts

Average Input Power @ Max SPM: 130 Watts

Custom Engineered Designs – Pre-Engineered Systems

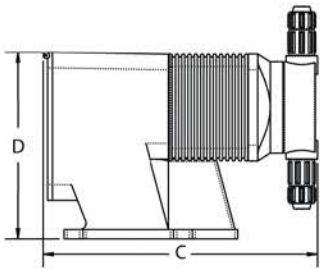
Pre-Engineered Systems

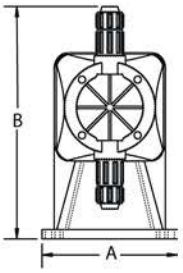
Pulsafeeder's Pre-Engineered Systems are designed to provide complete chemical feed solutions for all electronic metering applications. From stand alone simplex pH control applications to full-featured, redundant sodium hypochlorite disinfection metering, these rugged fabricated assemblies offer turn-key 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

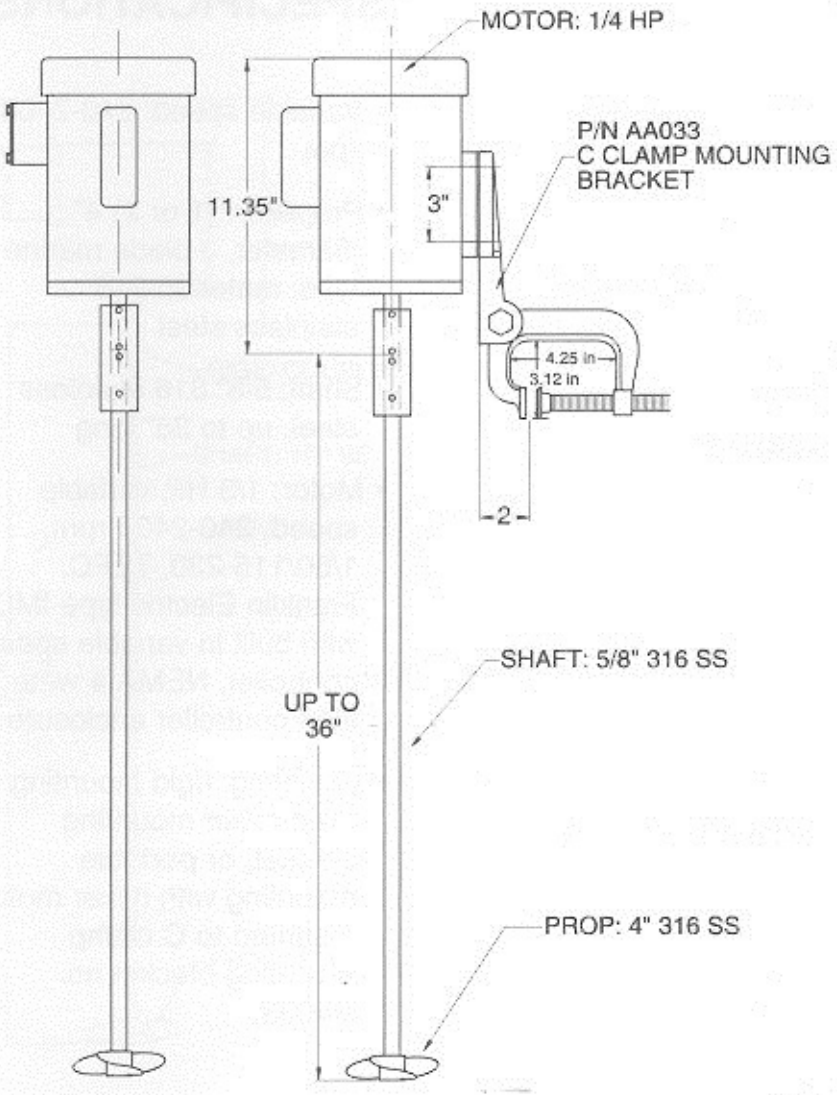
Series HV Dimensions (inches)					
Model No.	A	B	C	D	Shipping Weight
LVB3	5.4	9.3	9.5	7.5	13
LVF4	5.4	10.8	10.8	7.5	18
LVG4	5.4	9.5	10.6	7.5	18
LVG5	5.4	10.8	10.8	7.5	18
LVH7	6.1	11.5	11	8.2	25

NOTE: Inches X 2.54 = cm





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.

SAFETY DATA SHEET

Revision date 2018-06-11 **Revision number** 2

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product name Redux E50

Other means of identification

Product code
Synonyms Water And Wastewater Treatment Coagulant/Flocculant

Recommended use of the chemical and restrictions on use

Recommended use [RU] No information available
Uses advised against No information available

Details of the supplier of the safety data sheet

Supplier

Lockwood Remediation Technologies, LLC
89 Crawford Street
Leominster, Massachusetts 01453
Tel: (774) 450-7177
Hours: Monday-Friday 9:00-5:00 EST

Emergency telephone number

24 Hour Emergency Phone Number CHEMTREC: (800) 424-9300
Outside USA - +1 (703) 527-3887 collect calls accepted

Contact Point info@reduxtech.com

2. HAZARDS IDENTIFICATION

Classification

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

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2
Corrosive to metals	Category 1

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Physical state	Color	Appearance	Odor
liquid	colorless to yellow	clear	no appreciable odor

WARNING

Hazard statements
Causes skin irritation
Causes serious eye irritation
May be corrosive to metals

Precautionary Statements - Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Keep only in original container

Precautionary Statements - Response
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Absorb spillage to prevent material damage

Precautionary Statements - Storage
Store in corrosive resistant container with a resistant inner liner

Other information
• May be harmful in contact with skin

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No	weight-%	TRADE SECRET
Trade Secret Ingredient	PROPRIETARY	45 - 55%	*

*The exact percentage (concentration) of composition has been withheld as a trade secret

4. FIRST AID MEASURES

First Aid Measures

Eye contact
Immediately flush with plenty of water for at least 20 minutes, holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. Seek immediate medical attention.

Skin contact
Immediately wash thoroughly with soap and water, remove contaminated clothing and footwear. Wash clothing before reuse. Get medical attention if irritation should develop.

Ingestion
Seek medical attention immediately. Give large amounts of water to drink. If vomiting should occur spontaneously, keep airway clear. Never give anything by mouth to an unconscious person.

Inhalation
Remove to fresh air.

Most important symptoms and effects, both acute and delayed

Acute effects
Possible eye, skin and respiratory tract irritation.

Chronic effects
May aggravate existing skin, eye, and lung conditions. Persons with kidney disorders have an increased risk from exposure based on general information found on aluminum salts.

Indication of any immediate medical attention and special treatment needed

Note to physicians
Aluminum soluble salts may cause gastroenteritis if ingested. Treatment includes the use of demulcents. Note: Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media
Water Spray, Carbon Dioxide, Foam, Dry Chemical.

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

Special hazards arising from the substance or mixture

Special Hazard
May produce hazardous fumes or hazardous decomposition products.

Advice for firefighters

Firefighting measures
Product is a water solution and nonflammable. In a fire, this product may build up pressure and rupture a sealed container; cool exposed containers with water spray. Use self-contained breathing apparatus in confined areas; avoid breathing mist or spray.

Special protective equipment for firefighters
Not determined

Explosion data

Sensitivity to Mechanical Impact
None.

Sensitivity to Static Discharge
None.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions
Wear suitable protective clothing and gloves.

Environmental precautions

Environmental precautions
Do not permit run-off to get into sewers or surface waterways.

Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike to collect large liquid spills.

Methods for cleaning up
Clear spills immediately. Contain large spill and remove using a vacuum truck. Soak up small spills with inert absorbent material and place in a labeled waste container for disposal. Ventilate area of leak or spill. Spills of solution are extremely slippery so all residue must be removed promptly.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling
Keep container closed when not in use
Keep away from heat and open flame.
Avoid contact with eyes, skin and clothing
Wash thoroughly after handling
Wear chemical splash goggles, gloves, and protective clothing when handling.
Avoid breathing vapor or mist
Use with adequate ventilation and employ respiratory protection where mist or spray may be generated.
FOR INDUSTRIAL USE ONLY.

Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions
Do not store in unlined metal containers.
Product may slowly corrode iron, brass, copper, aluminum, mild steel, and stainless steel.
Store in a cool, dry place away from direct heat.
Keep in tightly closed container.

Incompatible products
Oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines
This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies

Appropriate engineering controls

Engineering controls
Local exhaust ventilation as necessary to maintain exposures to within applicable limits. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details. If there are no applicable or established exposure limit requirements or guidelines, general ventilation should be sufficient.

Individual protection measures, such as personal protective equipment

Eye/face Protection
Wear chemical splash goggles and face shield (when eye and face contact is possible due to splashing or spraying of material).

Hand Protection
Appropriate chemical resistant gloves should be worn.

Skin and body protection
Standard work clothing and work shoes.

Respiratory protection
If exposures exceed the PEL or TLV, use NIOSH/MSHA approved respirator in accordance with OSHA Respiratory Protection Requirements under 29 CFR 1910.134.

Other personal protection data
Eyewash fountains and safety showers must be easily accessible.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	liquid
Color	colorless to yellow
Appearance	clear
Odor	no appreciable odor
Odor threshold	No information available

Property	Values	Remarks / Method
pH	3.5	as is
Melting / freezing point	-7 °C / 19 °F	No information available
Boiling point / boiling range	No information available	No information available
Flash point	Not applicable	No information available
Evaporation rate	No information available	No information available

Flammability (solid, gas)	Not applicable	No information available
Flammability Limit in Air		
Upper flammability limit	Not applicable	No information available
Lower flammability limit	Not applicable	No information available
Vapor pressure	No information available	No information available
Vapor density	No information available	No information available
Specific gravity	1.33 - 1.35	No information available
Solubility (water)	Soluble	No information available
Solubility in other solvents	No information available	No information available
Partition coefficient: n-octanol/water	No information available	No information available
Autoignition temperature	Not applicable	No information available
Decomposition temperature	No information available	No information available
Kinematic viscosity	No information available	No information available
Dynamic viscosity	< 100 cps @ 20 °C	No information available

Other information

Density	11.0 - 11.3 lb/gal
Bulk Density	No information available
Explosive properties	No information available.
Oxidizing properties	No information available
Softening point	No information available
Molecular weight	No information available
Volatile organic compounds (VOCs) content	No information available
Percent Volatile, wt.%	40 - 50%

10. STABILITY AND REACTIVITY

Reactivity

Reactivity
No data available.

Chemical stability

Chemical stability
Stable.

Possibility of hazardous reactions

Possibility of hazardous reactions
None under normal processing.

Hazardous polymerization
No.

Conditions to avoid

Conditions to avoid
None

Incompatible materials

Materials to avoid
Oxidizing agents.

Hazardous decomposition products

Hazardous decomposition products
Thermal decomposition may release toxic and/or hazardous gases such as Cl_2 and HCl.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Eye contact
May cause moderate eye irritation that can become severe with prolonged contact. Prolonged exposure to Aluminum salts may cause conjunctivitis.

Skin contact
May be harmful in contact with skin. Prolonged and/or repeated contact may cause skin irritation.

Ingestion
May cause irritation of the mouth, throat and stomach. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Inhalation
Inhalation of mist or vapor may cause respiratory tract irritation.

Acute toxicity - Product Information

Oral LD50	No information available
Dermal LD50	No information available
Inhalation LC50	No information available

Acute toxicity - Component Information

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

Information on toxicological effects

Symptoms
No information available.

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

Skin corrosion/irritation
Irritating to skin

Serious eye damage/eye irritation
Causes serious eye irritation

Sensitization
No information available

Germ cell mutagenicity
No information available

Carcinogenicity
This product does not contain any components in concentrations greater than or equal to 0.1% that are listed as known or suspected carcinogens by NTP, IARC, ACGIH, or OSHA.

Reproductive toxicity
No information available

Specific target organ toxicity - Single exposure
No information available.

Specific target organ toxicity - Repeated exposure
No information available

Aspiration hazard
No information available.

Numerical measures of toxicity - Product Information

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	18374 mg/kg
ATEmix (dermal)	4004 mg/kg

Other information
Conclusions are drawn from sources other than direct testing.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Aquatic toxicity - Product Information

Fish	LC 50 (96 hour, static) 776.4 mg/L *Pimephales promelas* (Fathead Minnow) [1] EC 50 (96 hour, static) 265.5 mg/L *Pimephales promelas* (Fathead Minnow) [1]
Crustacea	LC 50 (48 hour, static) 803.8 mg/L *Ceriodaphnia dubia* (Water Flea) [1] NOEC (7 day chronic, static) 200 mg/L *Ceriodaphnia dubia* (Water Flea) [1]
Algae/aquatic plants	No information available

Acute aquatic toxicity - Component Information

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

Persistence and degradability

Persistence and degradability
No information available

Bioaccumulative potential

Bioaccumulative potential
No information available.

Mobility

Mobility
No information available

Results of PBT and vPvB assessment

PBT and vPvB assessment
No information available

Other adverse effects

Other information
[1] Generated from tests conducted by ECT-Superior Laboratories May 2010

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes
Do NOT mix with other chemical wastes. Do not put solutions containing this product into sewer systems. Dispose of product in an approved chemical waste landfill or incinerate in accordance with applicable Federal, state and local regulations. Do not re-use empty containers.

Contaminated packaging
Since empty containers retain product residue, follow label warnings even after container is emptied.

14. TRANSPORT INFORMATION

DOT

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

ICAO/IATA

Regulated

UN number	UN3264
Proper shipping name	Corrosive Liquid, Acidic, Inorganic, N.O.S. (Polyaluminum Chloride Solution)
Hazard class	8
Packing group	III
ERG Code	8L

IMDG

Regulated

UN number	UN3264
Proper shipping name	Corrosive Liquid, Acidic, Inorganic, N.O.S. (Polyaluminum Chloride Solution)
Hazard class	8
Packing group	III
EmS	F-A, S-B

Harmonized Tariff Number 2827.32

15. REGULATORY INFORMATION

International Inventories

TSCA (United States)
All ingredients are on the inventory or exempt from listing

Australia (AICS)
All ingredients are on the inventory or exempt from listing

Canada (DSL)
All ingredients are on the inventory or exempt from listing

Canada (NDSL)
None of the ingredients are on the inventory.

China (IECSC)
All ingredients are on the inventory or exempt from listing

EINECS (European Inventory of Existing Chemical Substances)
All ingredients are on the inventory or exempt from listing

ELINCS (European List of Notified Chemical Substances)
None of the ingredients are on the inventory.

ENCS (Japan)
All ingredients are on the inventory or exempt from listing

South Korea (KECL)
All ingredients are on the inventory or exempt from listing

Philippines (PICCS)
All ingredients are on the inventory or exempt from listing

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
AICS - Australian Inventory of Chemical Substances
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
IECSC - China Inventory of Existing Chemical Substances
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances

U.S. Federal Regulations

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic health hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive hazard	No

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

U.S. State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

This product does not contain any substances regulated under applicable state right-to-know regulations

16. OTHER INFORMATION

NFPA Rating	Health - 1	Flammability - 0	Instability - 0	Special Hazard -
HMIS Rating	Health - 1	Flammability - 0	Physical hazard - 0	Personal protection - B

Product code

Revision date 2015-03-12

Revision number 1

Disclaimer

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

End of Safety Data Sheet

SAFETY DATA SHEET

I. Chemical Product and Company Identification

Product Name: Nonionic / Anionic Polymer
Product #s: LRT- 800 Series Polymers

Distributor: Lockwood Remediation Technologies, LLC
89 Crawford Street
Leominster, Massachusetts 01453
Tel: 774-450-7177
Fax: 885-835-0617
Email: plockwood@lrt-llc.net

For Chemical Emergency - Spill, Leak, Fire, Exposure or Accident
Call **CHEMTEL** - Day or Night – 1800-255-3924

II. Composition and Ingredient Information

Components:	CAS #:
Anionic Polyacrylamide	25085-02-3
Permissible Exposure Limit (PEL):	No information available.
Threshold Limit Value (TLV):	Information not available.

III. Hazard Identification

Primary Routes of Exposure: Skin Contact - Eye Contact - Inhalation

Skin Contact: May cause irritation, especially after prolonged or repeated contact.

Eye Contact: Dust contact and solution may cause irritation.

Ingestion: May cause discomfort or gastrointestinal disturbance. Low oral toxicity.

Inhalation: Dust contact and solution may cause irritation.

Unusual Chronic Toxicity: None Known.

IV. First Aid Measures

Skin Contact: Flush with plenty of soap and water for at least 15 minutes. If irritation persists, get medical attention.

Eyes Contact: Immediately flush with water, continuing for 15 minutes. Immediately contact a physician for additional treatment.

Ingestion: If conscious, immediately give 2 to 4 glasses of water, and induce vomiting by touching finger to back of throat or giving syrup of Ipecac.

CAUTION: If unconscious, having breathing or in convulsions, do not induce vomiting or give water.

Inhalation: Remove to fresh air.

V. Fire-Fighting Measures

Flammability Classification: NFPA - Minimal - Will not burn under normal conditions.

Flash Point: Not flammable.

Flammable and Explosive Limits: UEL: ND LEL: ND

Hazardous Combustion Byproducts:

Thermal decomposition expected to produce carbon monoxide, carbon dioxide, and various nitrous oxides and some HCl vapors.

Extinguishing Media: Foam - Carbon Dioxide - Dry Chemical

AVOID USING WATER - MAY CAUSE EXTREMELY SLIPPERY CONDITIONS.

Special Fire-Fighting Procedures: Wear self-contained breathing apparatus.
Solutions of product are extremely slippery.

Unusual Fire and Explosion Hazards: Material and its solutions are extremely slippery.

VI. Accidental Release Measures

Procedures: Sweep up or shovel into metal or plastic container. Do not use water to clean area; product is very slippery when wet.

Waste Disposal: Incineration and/or disposal in a chemical landfill. Disposer must comply with Federal, State, and Local disposal or discharge laws.

VII. Handling and Storage Avoid contact with skin, eyes, or clothing.
Do not inhale mist if formed.
Use normal personal hygiene and housekeeping.
Store in a cool dry place.

VIII. Exposure Controls and Personal Protection

Eye Protection: Safety glasses for normal handling conditions.
Splash-proof goggles when handling solutions.
Do not wear contact lens.

Hand Protection: Rubber gloves.

Ventilation: Local exhaust - if dusting occurs. Natural ventilation adequate in absence of dust.

Respiratory Protection: If dusty conditions are encountered, wear NIOSH approved respirator.

Other Protection: Eye wash recommended, full work clothing, add protective rubber clothing if splashing or repeated contact with solution is likely.

IX. Physical and Chemical Properties

Appearance	White granular
State	Solid
Specific Gravity (Water = 1)	0.8 - 1.0
Solubility in Water	Complete

X. Stability and Reactivity

Stability: Product is stable as supplied.

Incompatibility: Oxidizing Agents may cause exothermic reaction.

Hazardous Decomposition or Byproducts:

Thermal decomposition expected to produce carbon oxides, and various nitrous oxides.

Hazardous Polymerization: Will not occur.

XI. Toxicological Information Not listed as a carcinogen by IARC, NTP, OSHA or ACGIH.

XII. Ecological Information

XIII. Disposal Considerations

Incineration and/or disposal in chemical landfill. Disposer must comply with federal, state, and local disposal or discharge laws.

RCRA Status of Unused Material if Discarded: Not a hazardous waste.

Hazardous Waste Number: N/A

XIV. Transport Information

Not DOT regulated. Not a RCRA hazardous waste.

Label Instructions: Signal Word: **"Caution! Products are extremely slippery! "**

XV. Regulatory Information

Reportable Quantity (EPA 40 CFR 302): N/A

Threshold Planning Quantity (EPA 40 CFR 355): N/A

Toxic Chemical Release Reporting (EPA 40 CFR 372): N/A

SARA TITLE 3: Section 311 Hazard Categorizations (40CFR 370): N/A

SARA TITLE 3: Section 313 Information (40CFR 372): N/A

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Information (40CFR 302.4) N/A

US TSCA: Product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.

XVI. Other Information

		Scale
Health	0	4 = Severe
Flammability	1	3 = Serious
Reactivity	0	2 = Moderate
Personal Protection	**F**	1 = Slight
		0 = Insignificant

Personal Protective Equipment Guide

A = Safety Glasses

B = Safety Glasses, Gloves

C = Safety Glasses, Gloves, Apron

D = Gloves, Apron, Face shield

E = Safety Glasses, Gloves, and Dust Respirator

F = Safety Glasses, Gloves, Apron and Dust Respirator

G = Safety Glasses, Gloves, and Vapor Respirator

H = Splash Goggles, Gloves, Apron, Vapor Respirator

I = Safety Glasses, Gloves, and Dust & Vapor Respirator

J = Splash Goggles, Gloves, Apron, and Dust & Vapor Respirator

K = Air Line Hood/Mask, Gloves, Full Suit, Boots

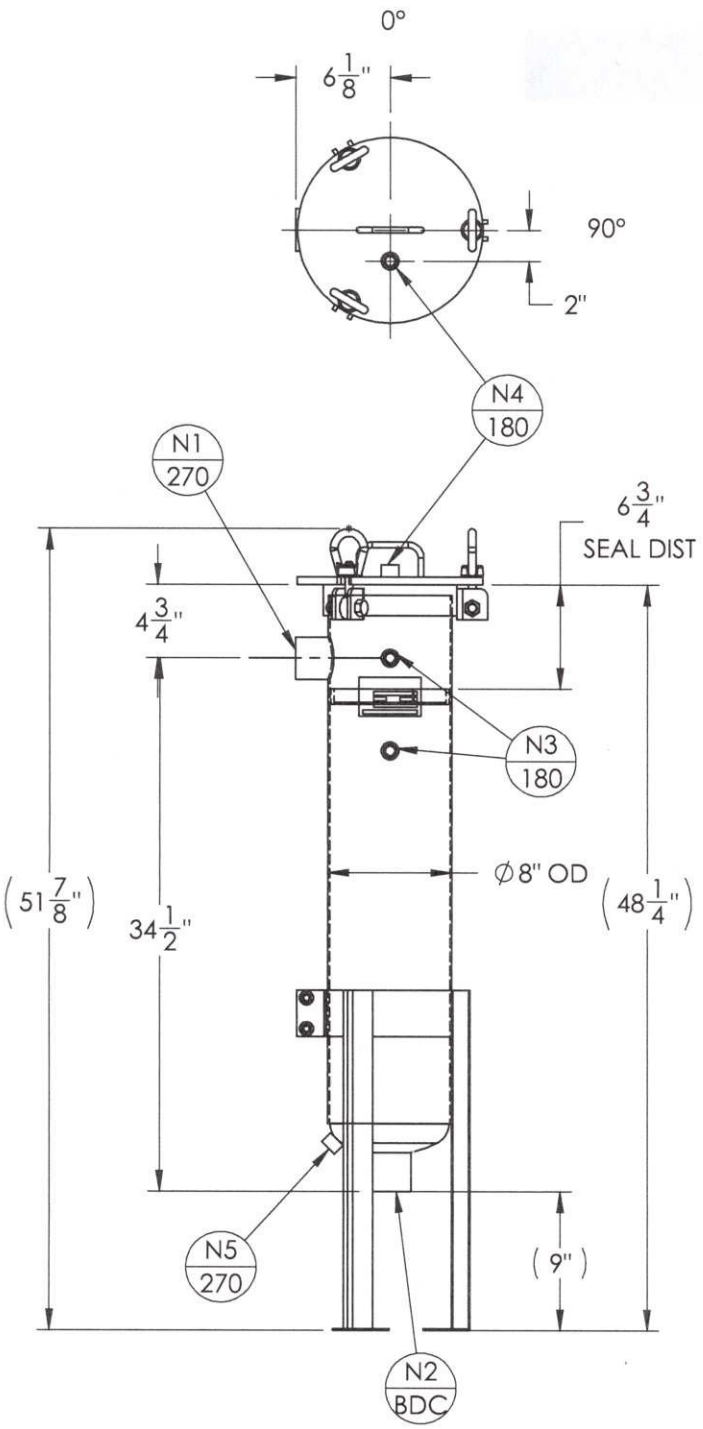
X = Ask supervisor for special handling instructions

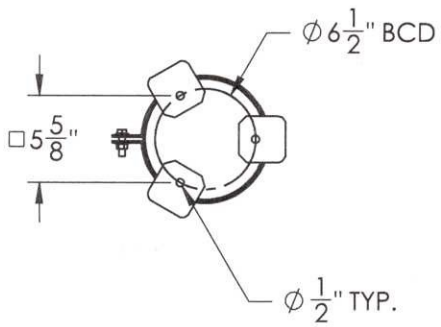
ABBREVIATIONS:

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
TLV - Threshold Limit Value
PEL - Permissible Exposure Limit
TWA - Time Weighted Average
STEL - Short-Term Exposure Limit
ANSI - American National Standard Institute
MSHA - Mine Safety and Health Administration
NIOSH - National Institute for Occupational Safety & Health
NA - Not Applicable
NE - Not Established
NR - Not Required
PPE - Personal Protective Equipment
LEL - Lower Exposure Level
UEL - Upper Exposure Level

NOZZLE SCHEDULE			
MARK	QTY	SIZE / RATING	DESCRIPTION
N1	1	2" 150# NPT	INLET
N2	1	2" 150# NPT	OUTLET
N3	2	1/2" 3000# NPT	PRESS GA
N4	1	1/2" 3000# NPT	VENT
N5	1	1/2" 3000# NPT	CLEAN DRAIN
N6	-	-	DIRTY DRAIN

VESSEL DESIGN CONDITIONS			
CODE:	BEST COMMERCIAL PRACTICE		
M.A.W.P.:	150 PSI @ 250°F	M.D.M.T.:	-20° F @ 150 PSI
M.A.E.P.:	15 PSI @ 250°F		
CORROSION ALLOWANCE:	NONE	HYDROTEST PRESS:	195 PSI
STAMP:	'NC'	SERVICE:	NON LETHAL
PWHT:	N/A	RADIOGRAPHY:	N/A
MATERIAL:	SS 304/L	GASKET:	BUNA-N





DRY WEIGHT: 77.62 #'s
FLOODED WEIGHT: 140 #'s
SHIPPING WEIGHT: 100 #'s
VESSEL VOLUME: 1.0 C.F.

NOTES:
- VESSEL WILL HOUSE (QTY=1) DOUBLE LENGTH BASKET.

1:1

THIRD ANGLE PROJECTION

TOLERANCES-UNLESS OTHERWISE NOTED
DECIMAL .X =±.1" .XX =±.02" .XXX =±.005"
FRACTIONAL ≤24" =±1/16" >24" =±1/8"
ANGULAR =± 1°
MAX. MACHINED SURFACE FINISH 125

REV.	DATE	REVISION	DRAWN	APP'D

89 Crawford Street
Leominster, MA 01453
Tel: 774.450.7177
Fax: 888.835.0617

LRT Provided Bag Filter Housing

EQUIPMENT:	BAG FILTER HOUSING (EB SERIES)
MODEL NO:	S4EB112-2P-SW
CUSTOMER:	-

PARENT: NONE	DRAWN: CR	DATE: JAN 13 2011	JOB No. V-	DWG. No. 001-0123	REV. No. 0
PAGE: 1 OF 4	CHK'D: JM	SCALE: NTS			

Polyester Liquid Filter Bag

Features

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

Applications

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

Sizes

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

Micron Ratings

Available fibers range from 1 to 1500 microns

Options

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

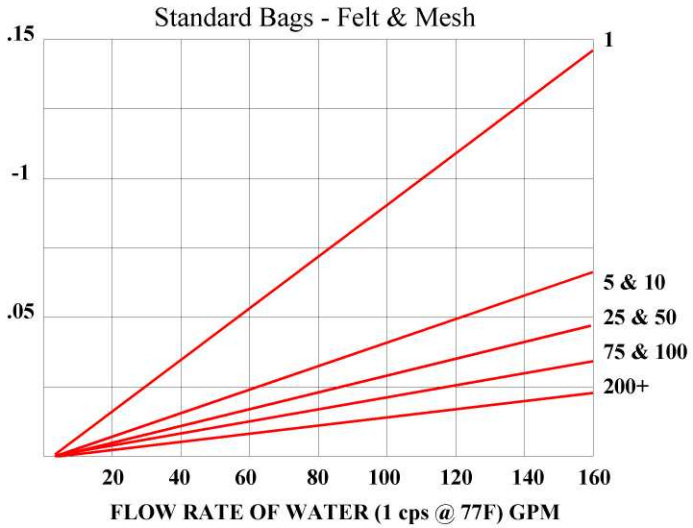
Optional Filter Media

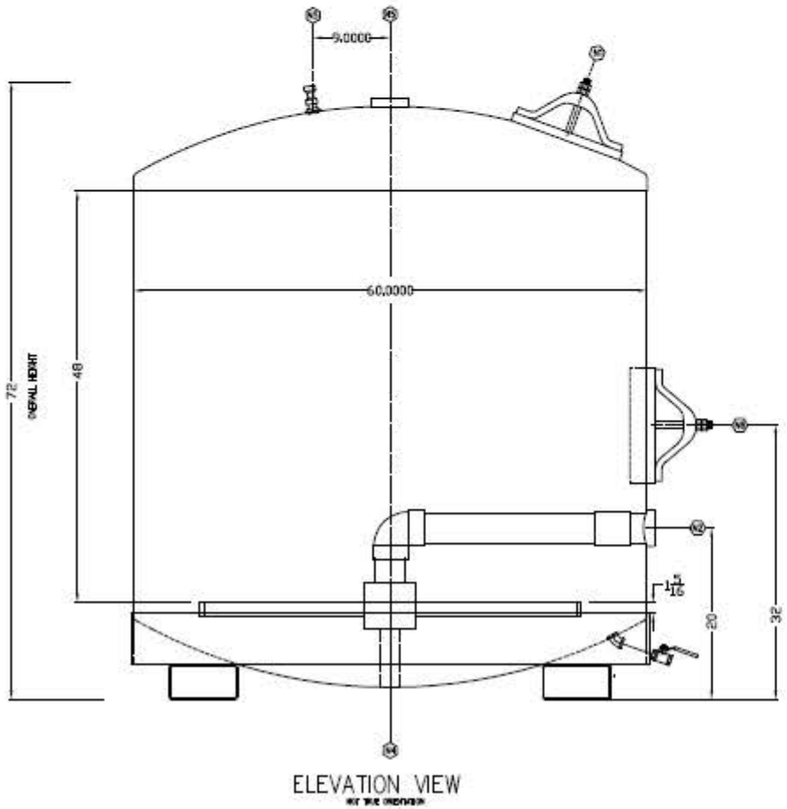
Felt: Nomex, Polyester, Polypropylene

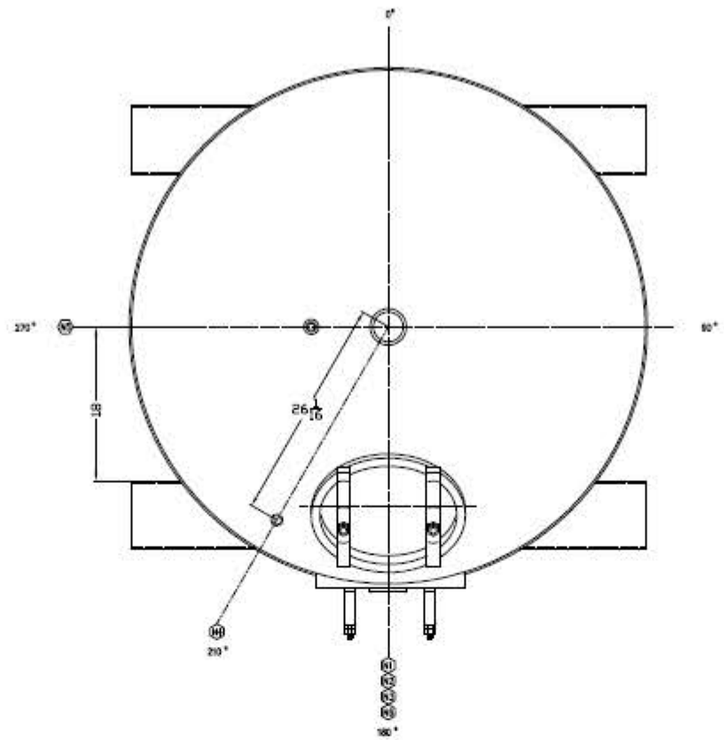
Monofilament: Nylon, Polyester, Polypropylene

Multifilament: Nylon, Polyester

Polypropylene: Oil Removal







ID	Description	Service
N1	12" x 16" ELLIPTICAL MANWAY w/COVER	Upper bed access with Cover (SA-36), Bolts, Neoprene Gasket
N2	3" MNPT 3000# Coupling	Process Inlet
N3	3" MNPT 3000# Coupling	Process Outlet
N4	1/2" MNPT 3000# Coupling	Drain
N5	1/2" MNPT 3000# Coupling	VENT
N6	12" x 16" ELLIPTICAL MANWAY w/COVER	Lower bed access with Cover (SA-36), Bolts, Neoprene Gasket
N7		

COATINGS SCHEDULE

Surface	Surface Preparation	Product Specification
Internal - 1	SSPC-SP6	SW Macropoxy 646 5-10 mils DFT
Internal - 2	Inspect	SW Macropoxy 646 5-10 mils DFT
External - 1	SSPC-SP6	SW Ken Bond Primer 2-4 mils DFT
External - 2	n/a	Carboline Carbothane 8845 (Safety Green) 2-4 mils DFT
External - 3	n/a	n/a

NOTES

Item	Details
Construction	Non-Code Design Pressure: 75 PSIG @ 140 DEG F.
Mtrls Vessel	Shell: SA-36 Heads: SA-36 Pipe: SA-53 (see nozzle detail for others)
Mtrls Interls	Hub, Laterals (.012" Slot), Diffuser, Hose: PVC Gaskets: Neoprene Hardware: Plated
n/a	n/a
n/a	n/a
Media	TBD

LRT
Lockwood Remediation Technologies LLC

HPAF-2000-60 Media Filter

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

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

GENERAL DESCRIPTION

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

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

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

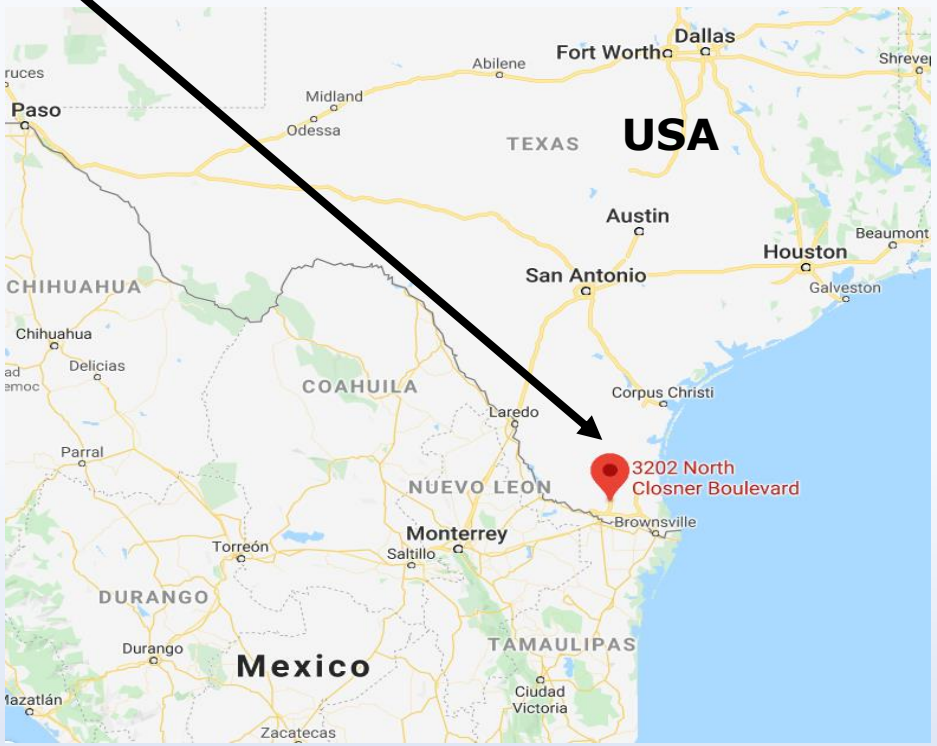
Brimac Char Inc

Innovation in Filtration

- Brimac Char Inc. Scotland-1825.

21 Dellingburn Street, Greenock, Inverclyde, Scotland PA15 4TP, United Kingdom
www.brimacchar.com

- Brimac Char Inc. United State -2017.



3202 North Closner Boulevard, Edinburg, Texas 78541, United States
www.brimacchar.com

Brimac Char Inc

Innovation in Filtration

Filtration Media to Remove

- Arsenic
- Manganese
- Iron
- Lead
- And other Heavy Metals

Filtration Media to Remove

- Fluorine
- Fluoride
- Chlorine
- Color
- Odor

Brimac Char Inc

Innovation in Filtration

Large Stock

- Alamo Texas warehouse

Brimac Char Inc

Innovation in Filtration

Brimac Bone Char?:“A porous black solid, consisting of an amorphous form of carbon, obtained as a residue when wood, bone, or other organic matter is heated in the absence of air.”

Charcoal is mostly pure carbon, it is produced by heating organic material (Wood, Coal, Bone and other fibrous material) in the absence of Oxygen (pyrolysis). This removes water and the volatile chemicals from the material. The resulting product contains carbon and some residual chemicals from the original source material. So depending on the source material each type of charcoal, have different chemical properties.

Bone Char is a unique from of activated carbon, due to the nature of the raw material. The carbonized material possess great mechanical strength and improved adsorption of many chemicals, e.g. Fluorine, Chlorine, Lead and many more.

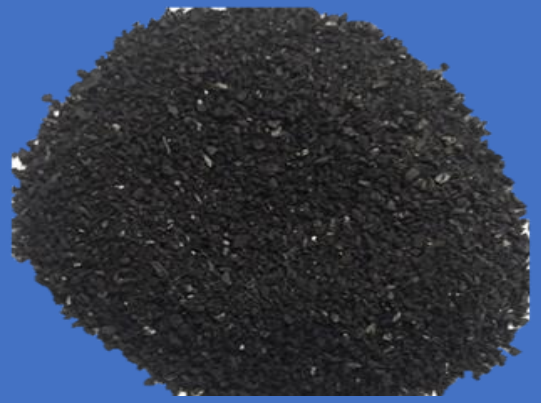
It main use for many years has been in sugar refining, where it has been used to decolorized and remove other mineral impurities.

Bone Char is also an effective water filter media, as it ability to remove many heavy metals is greater than plain activated carbon. Most of these heavy metals are neurotoxins and pose significant hazards to human health.

Brimac Char Inc

Innovation in Filtration

Brimac Bone Char Spec

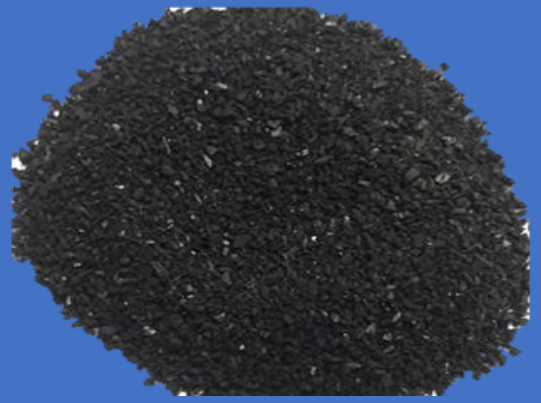


Brimac – Bone Charcoal Product Specifications				
Typical Product Analysis	Values			
	Min	Max	Unit	
Carbon	8	11	%	
Acid Insoluble Ash	---	3	%	
Moisture	----	5	%	
Calcium Carbonate	6	9	%	
Calcium Sulphate	0.1/0.22	0.2	%	
Water Soluble Phosphate	0.003	---	As P205, %	
Phosphate Soluble	16.5	---	As P205, %	
Iron	---	0.1	As Fe203, %	
Hydroxyapatite (Tri-calcium phosphate)	70	76	%	
Total Surface Area	80	120	m2/g	
Carbon Surface Area	40	60	m2/g	
Bulk Density	550/35	700/44	Kg/m3, Lb/ft3	
Particle Size Range				
Grade	5/8	8/24	20/60	Fines
Particle Size Range (mm)	1.70/4.00	0.60/1.00	0.25/1.00	0.075/0.60
Oversize Maximum (%)	10	5	15	5
Undersize Maximum (%)	5	5	2	N/A
Mean Particle Diameter (mm)	2.55	1.73	0.635	0.255

Brimac Char Inc

Innovation in Filtration

Metal Removal



Typical Metals Removal Rates			
Parameter	**% Removal**	**Parameter**	**% Removal**
Aluminum (Al)	> 90%	Manganese (Mn)	> 99%
Antimony (Sb)	> 90%	Nickel (Ni)	> 99%
Arsenic (As)	> 90%	Phosphorus (P)	> 99%
Barium (Ba)	> 91%	Silicon (Si)	> 90%
Beryllium (Be)	> 92%	Silver (Ag)	> 94%
Bismuth (Bi)	> 93%	Strontium (Sr)	> 94%
Boron (B)	> 86%	Thallium (Tl)	> 90%
Cadmium (Cd)	> 92%	Titanium (Ti)	> 68%
Chromium (Cr)	>96%	Tungsten (W)	> 90%
Cobalt (Co)	> 90%	Vanadium (V)	> 92%
Copper (Cu)	> 91%	Zinc (Zn)	> 99%
Iron (Fe)	> 99%	Zirconium (Zr)	> 95%
Lead (Pb)	> 90%		

Typical Other Reduction Property Reductions	
Parameter	**% Reduction**
Chemical Oxygen Demand	> 70%
Biological Oxygen Demand	> 60%
Susp. Solids (TSS) 104 Deg C	> 40%

Benefits Using Brimac Charcoal

a) Removal of organic and inorganic contaminants in one process, often without any need for chemical pre-treatment.

b) Virtually maintenance free operation, suitable for remote or un-manned sites.

c) Unique buffering action which maintains alkalinity in the adsorbate.

d) Significant reduction in potable water chlorine demand thereby minimizing the amount of chlorine used for final chlorination and producing a much more stable chlorine residual that is easier to maintain.

e) Remove the heavy metals

This also results in lower levels of Trihalomethanes in the treated water.

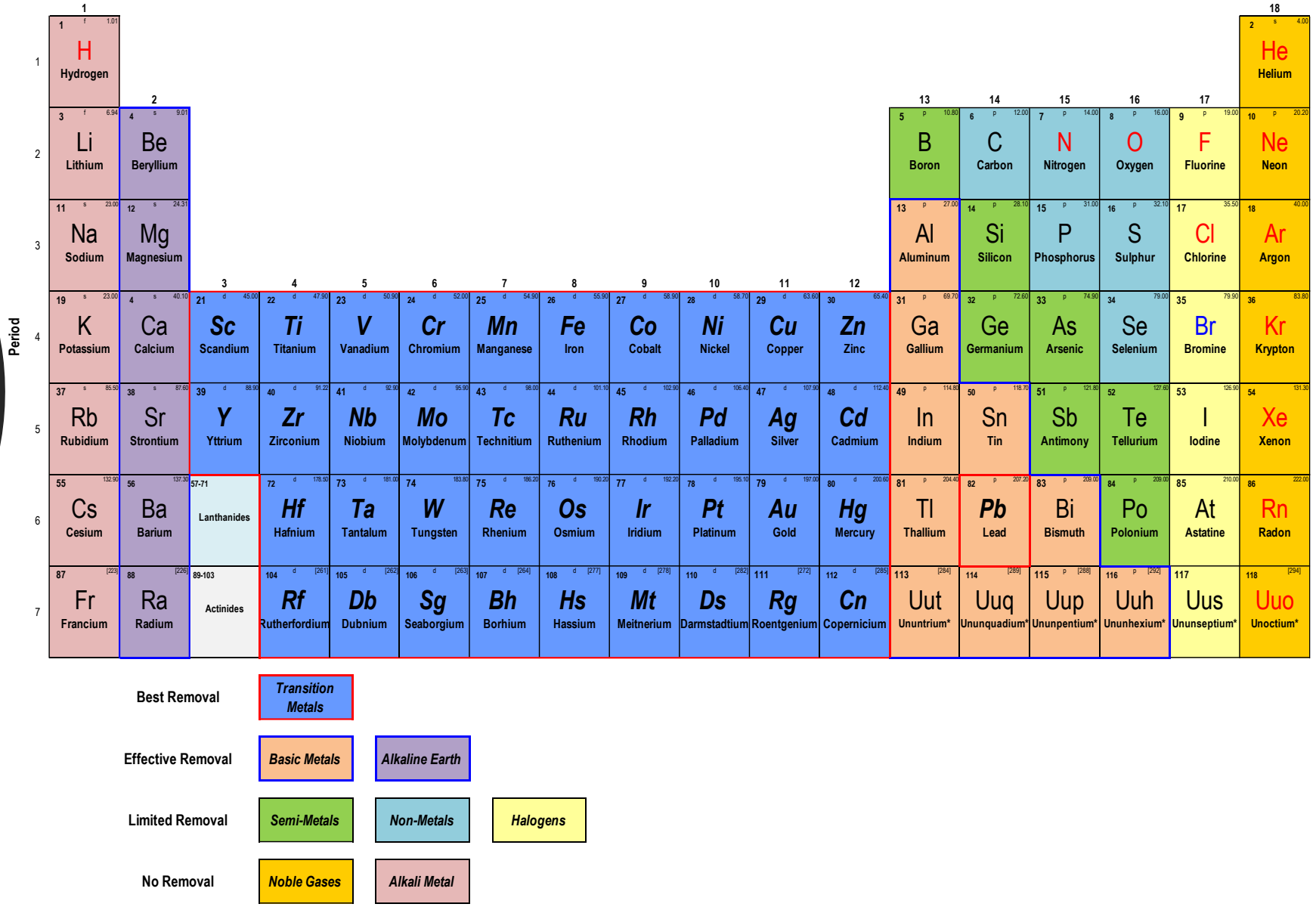
e) BRIMAC Charcoal meets the approval standards: NSF, FDA, KOSHER.

Applications

BRIMAC charcoal is a cost-effective adsorbent for use in :

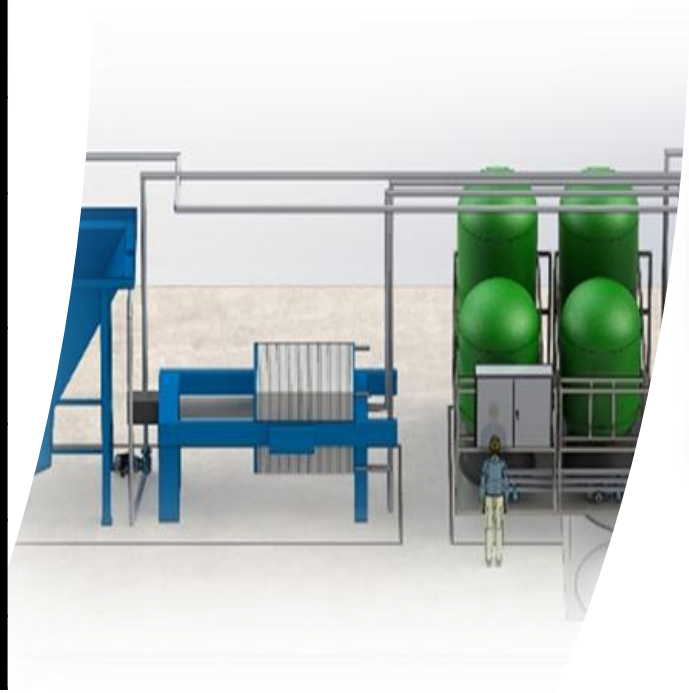
- ❑ Potable Water Treatment
- ❑ Drinking Water and Food process
- ❑ Wastewater Treatment
- ❑ Industrial Process
- ❑ Sugar Refinery
- ❑ Aquaculture
- ❑ Fertilizer

Contaminant Removal



Granulate Brimac Char

Parameter	Brimac Char		Membranes		Chemical Systems	
Capital Cost	Moderate	-	High	x	Moderate	-
Through Life Cost	Moderate	-	Moderate	-	High	x
Treatment Efficiency	Excellent	✓	Moderate	-	Poor	x
Cleaning Regime	Minimal	✓	Frequent CIP	-	Moderate	-
Waste Stream	OK for discharge	✓	Concentrated – disposal difficult	x	Concentrated – disposal difficult	x
Re-uses	Many possibilities	✓	Many possibilities	✓	Few possibilities	x
Treatment Streams	Treats combined streams	✓	Treats only rinse streams	✓	Treats combined streams	✓
Influent Quality Tolerance	High	✓	Moderate	-	Low	x
Maintenance Level	Low	✓	High	x	High	x
Environmental Impact	Low	✓	Moderate	-	High	x
Overall	Excellent	✓	Moderate	-	Poor	x



Granulate Brimac Char (GAC) Water Grade

- **Potable Water and Drink Water**

- Remove Manganese
- Remove Iron
- Remove Fluorine
- Remove Arsenic
- Remove Copper
- Remove Aluminum
- Remove Chlorine
- Remove Color
- Remove Odor

Granulate Brimac Char(GAC) Sugar Grade

- **Sugar Refinery**

- Color Removal
- Ash Removal
- Great Performance

Brimac

Bone Char Media

For the Cost-Effective Removal of Metals,

Colour and Large Organics

About Brimac Char Inc

Brimac Char Inc. is a unique industrial consultancy with a strong history in the areas of organics & heavy metals removal from potable water and industrial effluent streams.

Our aim is to give businesses the ability to turn environmental and technical problems into business benefits by improving performance and efficiency.

The services we offer (from consultancy, innovation and implementation) are backed by the expertise of our people, partners, laboratory, and manufacturing facilities.

Benefits of using Brimac Char:

- Removal of organic and inorganic contaminants in one process, often without any need for chemical pre-treatment
- Removes metals, naturally occurring colour and large organics (humic and fulvic acids) that can blind the pores of GAC(Granular Activated Carbon).
- Significant though-life cost saving against Ion Exchange.
- Robust, low maintenance process suitable for remote or un-manned sites
- Can reduce chlorine demand and levels of Trihalomethanes in potable water.

Applications

INDUSTRIAL WATER

- Metallurgical
- Chemicals
- Polishing of industrial and trade effluents

prior to disposal to sewer, river or re-cycling.

POTABLE WATER

- Pharmaceutical
- Foodstuffs
- Beverages
- Dairies
- Municipal treatment works
- Remote sites
- Private supplies
- Farms
- Domestic point of entry and point of use

FEATURES OF BRIMAC CHAR

Key Features

- Unique properties of adsorbing large organic molecules, colour and dissolved metals.
- Unique combination of ion exchange and adsorption characteristics
- Brimac Char is not activated carbon and can address contaminants that GAC handles poorly.
- Brimac Char contact time is typically 3 times longer than Carbon/GAC
- Brimac Char is a unique material consisting of a mixture of elemental carbon and calcium hydroxyapatite with a predominantly mesoporous to macroporous structure which has the unique properties of adsorbing large organic molecules, color and dissolved metals from effluent waters.

- Brimac Char comprises two complementary components:

  1) A carbon surface (around 10% by weight of the finished product) which adsorbs weakly anionic molecules

  2) A hydroxyapatite lattice - $Ca_{10}(PO_4)_6(OH)_2$ which adsorbs strongly charged molecules together with many inorganic ions

- The manufacturing process creates a porous structure of a wide range of pore sizes within both the carbon and hydroxyapatite components. The total surface of Brimac HA is approximately 100 m2 /g (50% of which is attributable to the carbon content) with a larger pore size range than GAC. Unlike charcoals and activated carbons this porosity is achieved totally by thermal means without the use of any other chemical additives

- Brimac Char (Potable Water Grade) is further processed to ensure no taste is added to the water. See page 6

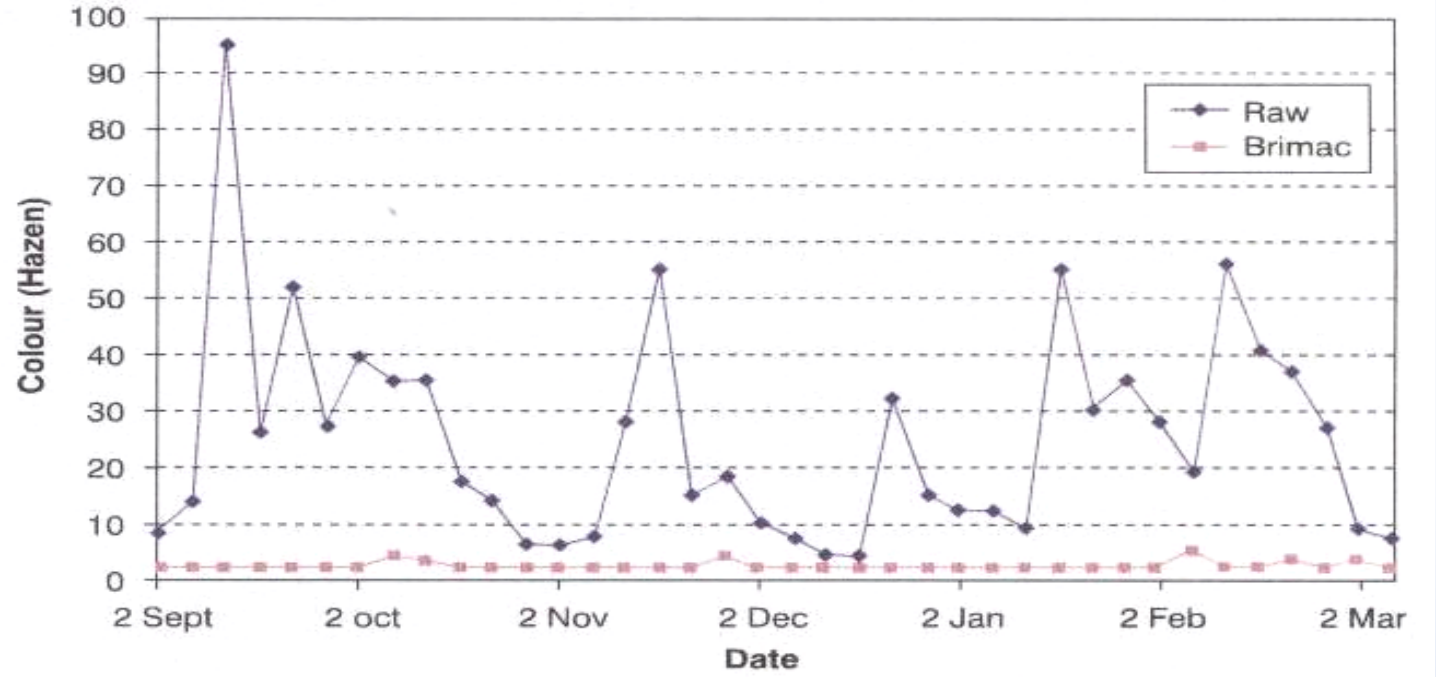
- Because Brimac Char adsorption process is different to GAC, a Mass Transfer Zone model is used to size the plant. Empty bed contact times are typically 3 times that of GAC.

- Combinations of metals will change Brimac Char performance characteristics. Brimac can conduct characterization trials in our in-house laboratory to determine specific removal rates of combined contaminants.

METAL REMOVAL

Metal	Capacity mg/g	Linear velocity m/hr	Removal efficiency
Aluminium	24	1	>80
Arsenic III	30	0.5	>80
ArsenicV	26	0.5	>80
Cadmium	15	0.5	>80
Chromium III	15	0.5	>80
Chromium IV	8	0.5	~50
Copper	50	3	>90
Iron	30	3	>80
Lead	151	3	>80
Manganese	50	3	>80
Nickel	45	3	>90
Silver	**	0.5	~50#
Zinc	37	3	>90

COLOUR REMOVAL



Comparison of Brimac HA with GAC and Ion Exchange

	Brimac Char	**GAC**	**Ion exchange**
Flow rate (m/hr)	Up to 3	Up to 12	Typically 25
Surface area(m^2/g)	100	1000	Up to 750
Pore size (nm)	7.5 – 60000	0.5 - 5000	2 - 50
Process Waste	Land fill	Regenerable / Landfill	Liquid effluent

How Brimac Char is used?:

Brimac Char can be used in granular form in fixed bed systems, either by itself or in conjunction with other media e.g. sand or granular activated carbon as in:

- Rapid gravity filters
- Pressure filters
- Slow sand filters
- Cartridges
- Small modular containers

Powdered material may also be used in conjunction with suitable dosing and filtration systems.

Are there pH limits?:

For optimal performance the stream pH should be > 4.5. Lower pH will attack the hydroxyapatite structure. The upper pH limit will be determined by the point at which precipitation starts.

What is the maximum level of suspended solids allowed?:

Suspended solids must be < 50 ppm and smaller than 10 µm to prevent the bed becoming blocked with particulates.

Pre-filtration may be needed to achieve this, depending on the nature of the suspended solids in the feed stream.

What level of contaminants will Brimac Char treat?:

Brimac Char is most economic when used as a polishing adsorbent. Contaminants at levels above 20 ppm will typically require pre – treatment by other means such as flocculation, clarification, precipitation or filtration.

What backwash flows are used?:

Backwashing is not required if the influent stream is properly filtered. Backwashing will tumble the bed and disrupt the mass transfer zone, adversely affecting performance and operational life.

Can Brimac Char be reactivated like GAC?:

Brimac Char is different to GAC and due to the mechanisms of adsorption is not easily reactivated.

What is the best way to dispose of Brimac Char?:

As contaminants are firmly bound to the Brimac Char, it is highly resistant to leaching. Spent material can be disposed of in landfill disposal sites subject to local statutory regulations.

BRIMAC Char

Europe:	Manufactured in accordance with BS EN14456:2004 for Potable Water Treatment Certified by EDQM – European Directorate for the Quality of Medicines
USA :	Certified by NSF to NSF/ANSI standard 61 for Potable Water treatment

PROCESS DESIGN GUIDELINES

- Brimac Char is normally used at minimum bed depth of 500 mm.

- Underbed and strainers are used in the same way as for GAC or ion exchange media.

- For single metal removal the velocity through the bed is dependent on the metal species to be removed and is typically one third that through GAC.
- For colour removal in potable water systems, velocities are in the same range as used in slow sand filters, 0.1 to 0.5 m/hr. Metals will also be removed.

- A liquid cushion should be maintained above the Brimac Char to minimise the disturbance of the media by the influent stream.

LEAD/LAG SYSTEMS

As with non regenerable mixed bed systems, Brimac Char can be used in dual Adsorber with a sampling point between the two. The primary Adsorber is run until influent concentration of the contaminant is measured at the sampling point between the two units. At this point the second unit is switched over to become the primary Adsorber and a fresh Adsorber is installed in the secondary position.

QUALITY ASSURANCE

Brimac Char Media is manufactured under an ISO 9001:2018 approved quality system.

TECHNICAL SERVICES

A full technical back up service is available in the form of technical advice, research and development, laboratory trial and pilot plant facilities.

Technical Data Sheets, Material Safety Data Sheets and “In to service” specifications are available separately.

Brimac Case Studies

1. Colour Removal

1. Colour, Iron & Aluminum Removal

1. Manganese Removal

1. Colour removal

Brimac Bone Char compared with carbon (GAC)

The Challenge

A large water sample was taken from a raw surface water source containing high levels of humic and fulvic acid colorants. The chosen samples colour level was exceptionally high (165 hazen) and therefore provided an accelerated test comparison between carbon and Brimac media.

The water sample was fed at a constant velocity of 0.2m/hr through separate columns of GAC and ***Brimac Bone Char***. The GAC used is sold widely in the UK for drinking water treatment.

Conclusion

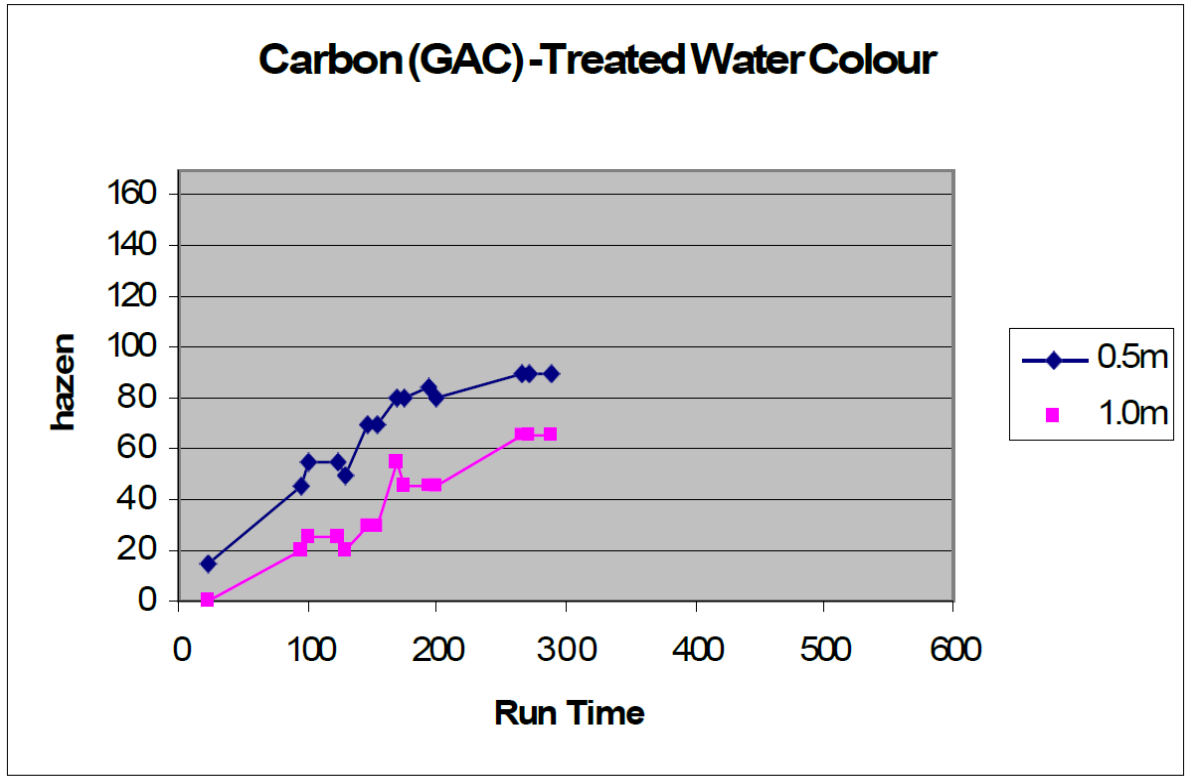
- Rapid, almost immediate breakthrough of colour was observed in the GAC column.
- For this water sample, ***Brimac Bone Char*** has a colour removal capacity of up to 5 times that of GAC.
- As most operating cost (OPEX) is associated with the labor and equipment used to change out granular media, ***Brimac Bone Char*** can provide dramatic savings in operating costs over GAC.

Results

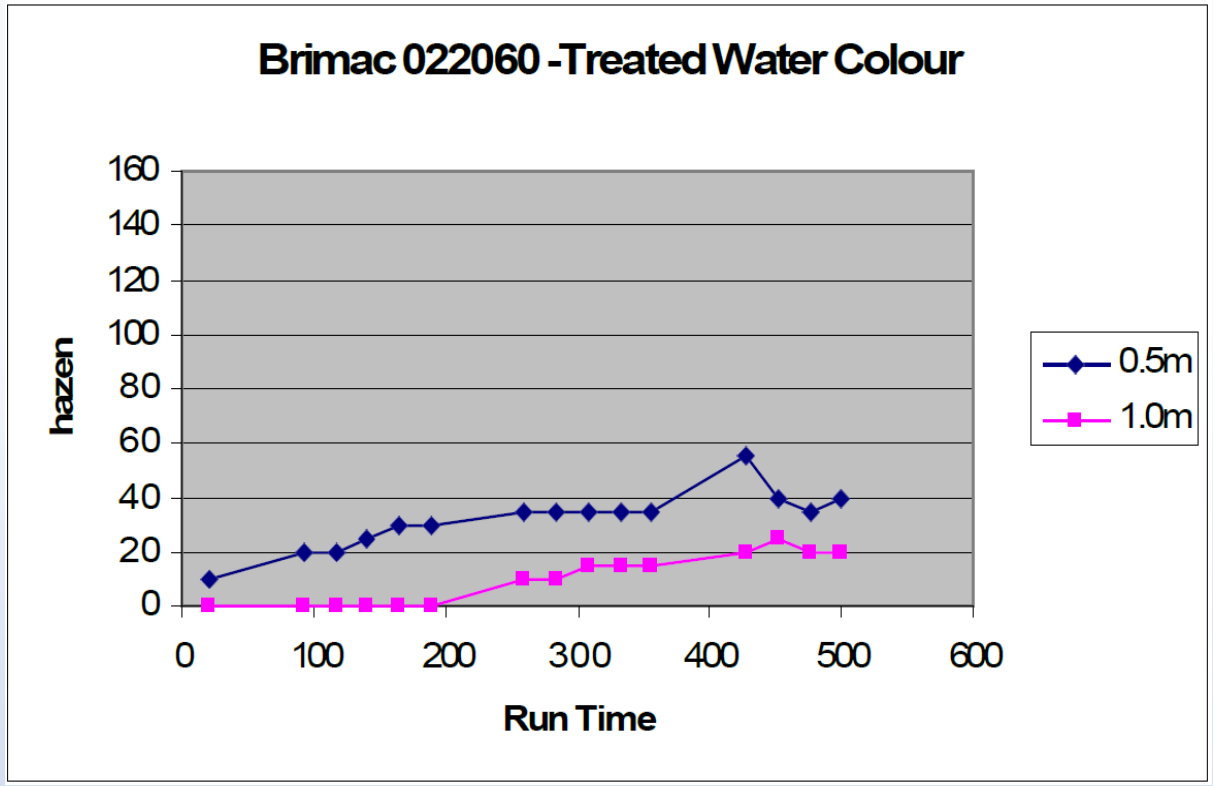
The graphed results show measured colour (in hazen) at 0.5m and 1.0m bed depth for GAC and ***Brimac Bone Char***

Colour Removal

Carbon GAC



Brimac Bone Char



1. Colour, iron and aluminum removal

The Company

A large municipal water company providing water and sewerage services over a wide area with difficult geography.

Challenge

Several unconnected, remote water treatment works with high colour, iron and aluminium levels. The works supplies the local population through small community distribution. Current treatment and raw water condition meant that the water quality regularly failed drinking water standards.

Solution

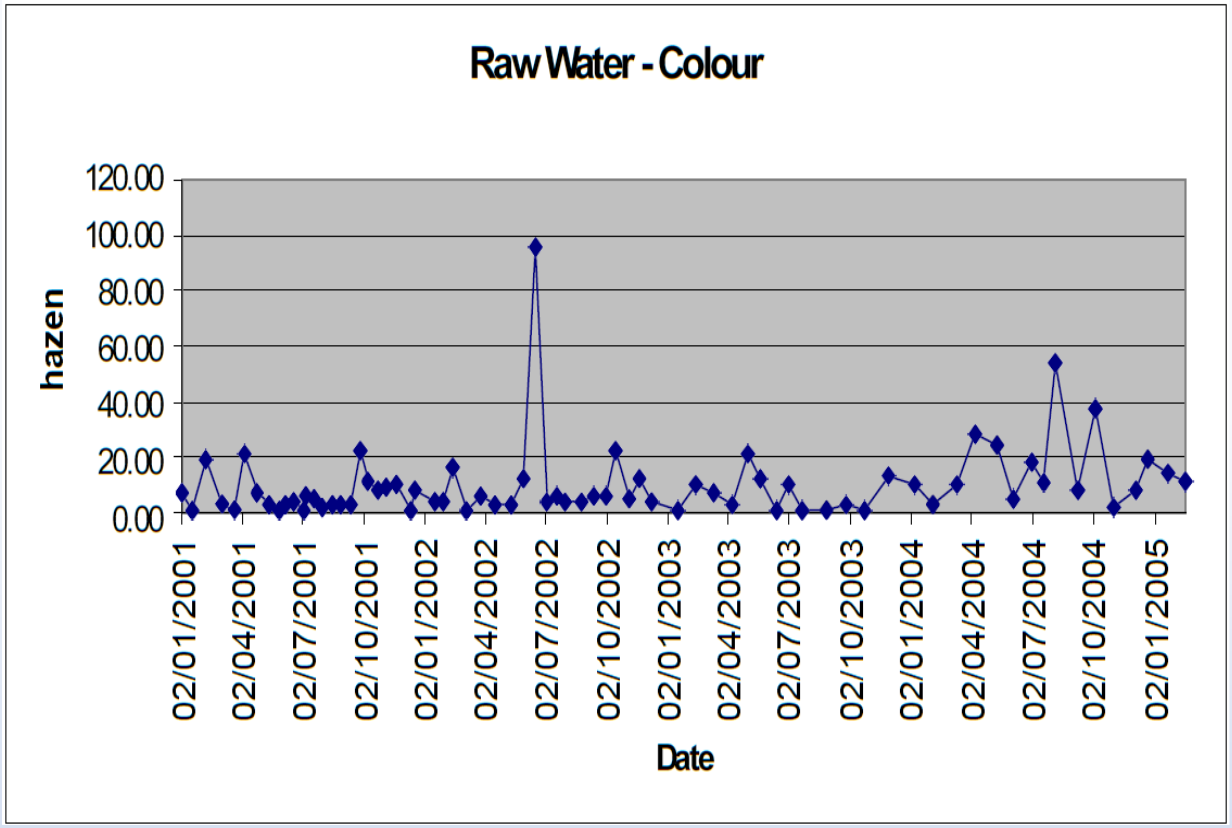
Six slow sand filters containing ***Brimac Bone Char*** adsorption media were installed in the mid 1990's. ***Brimac Bone Char*** is manufactured specifically for the removal of colour, dissolved heavy metals and THM precursors for potable water applications. It is approved for drinking water purification throughout Europe and the USA.

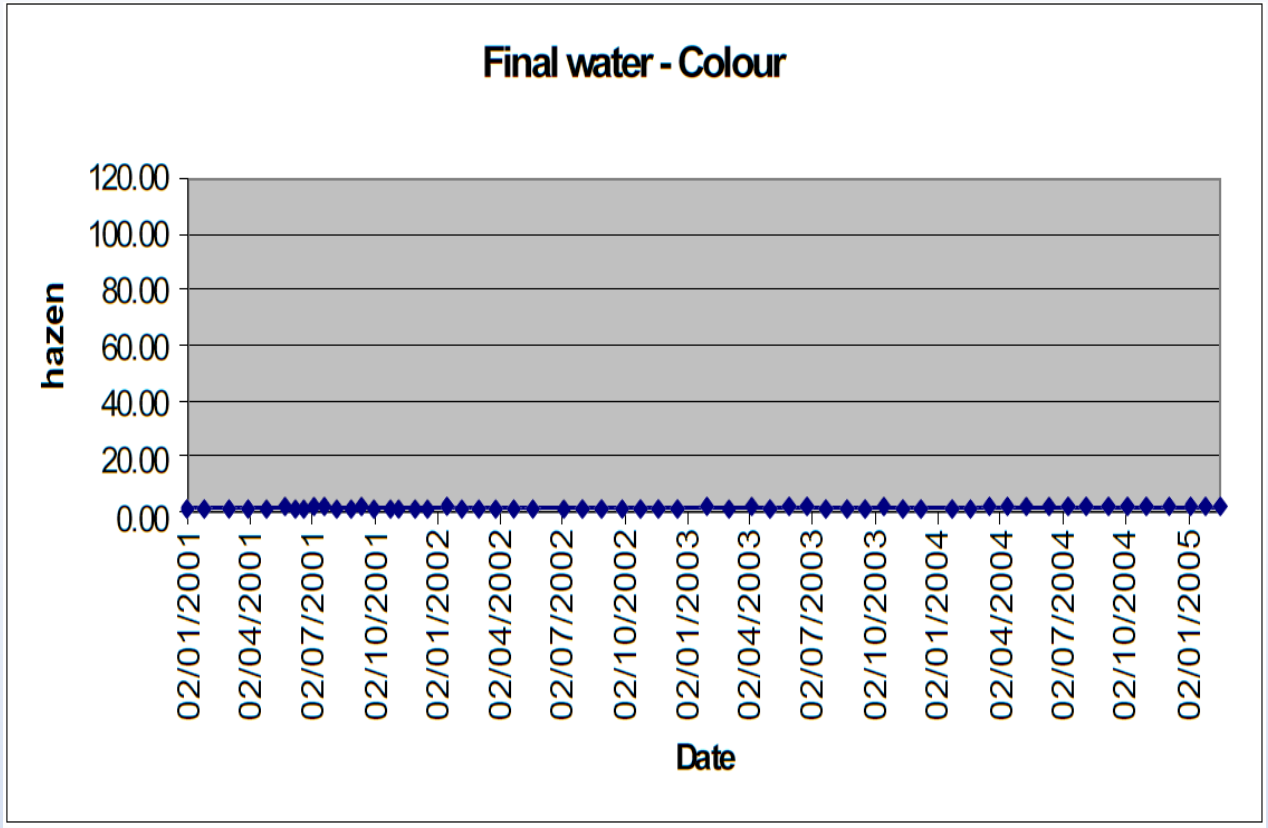
Results and conclusion

- Consistent colour, iron and aluminum removal even when levels spike
- ***Brimac Bone Char*** is a reliable solution for removing colour, heavy metals or both - all in one granular material.

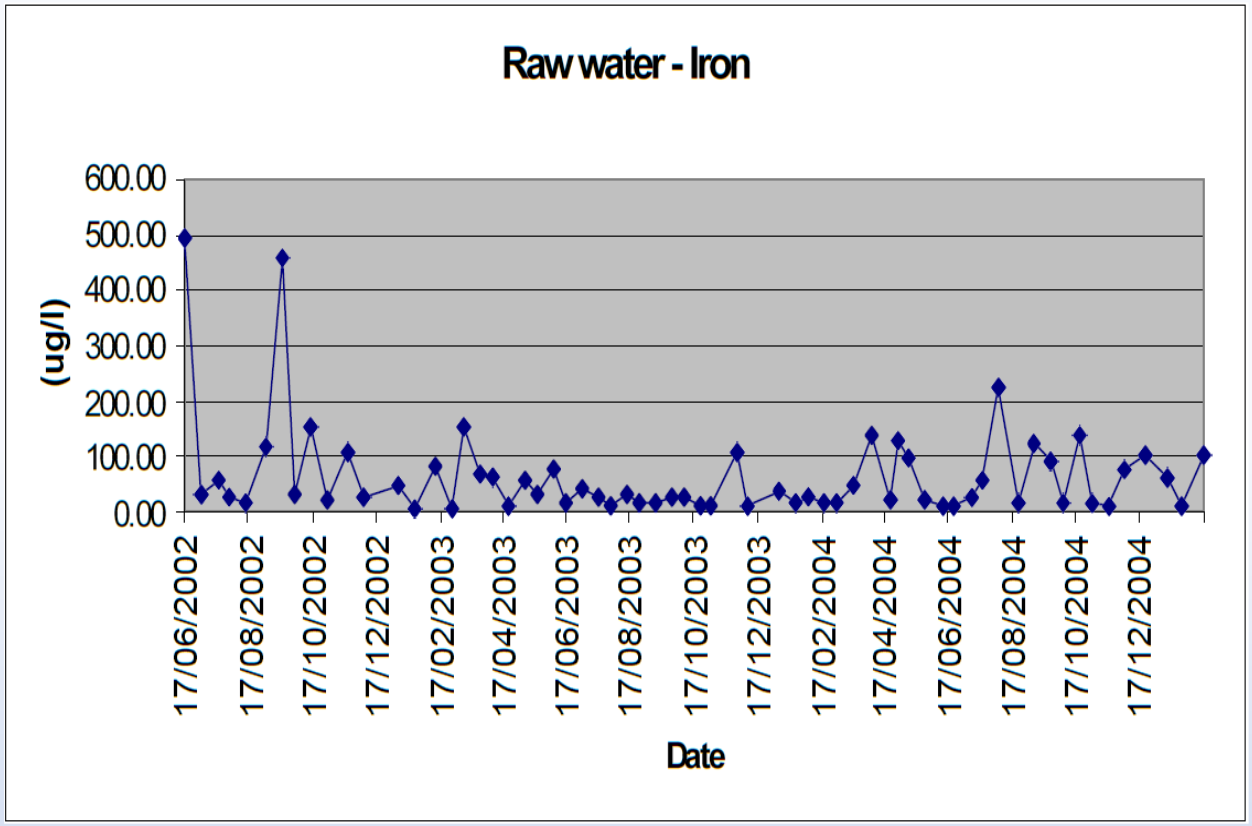
The graphed results show raw water quality, and final water quality after treatment with ***Brimac Bone Char*****.**

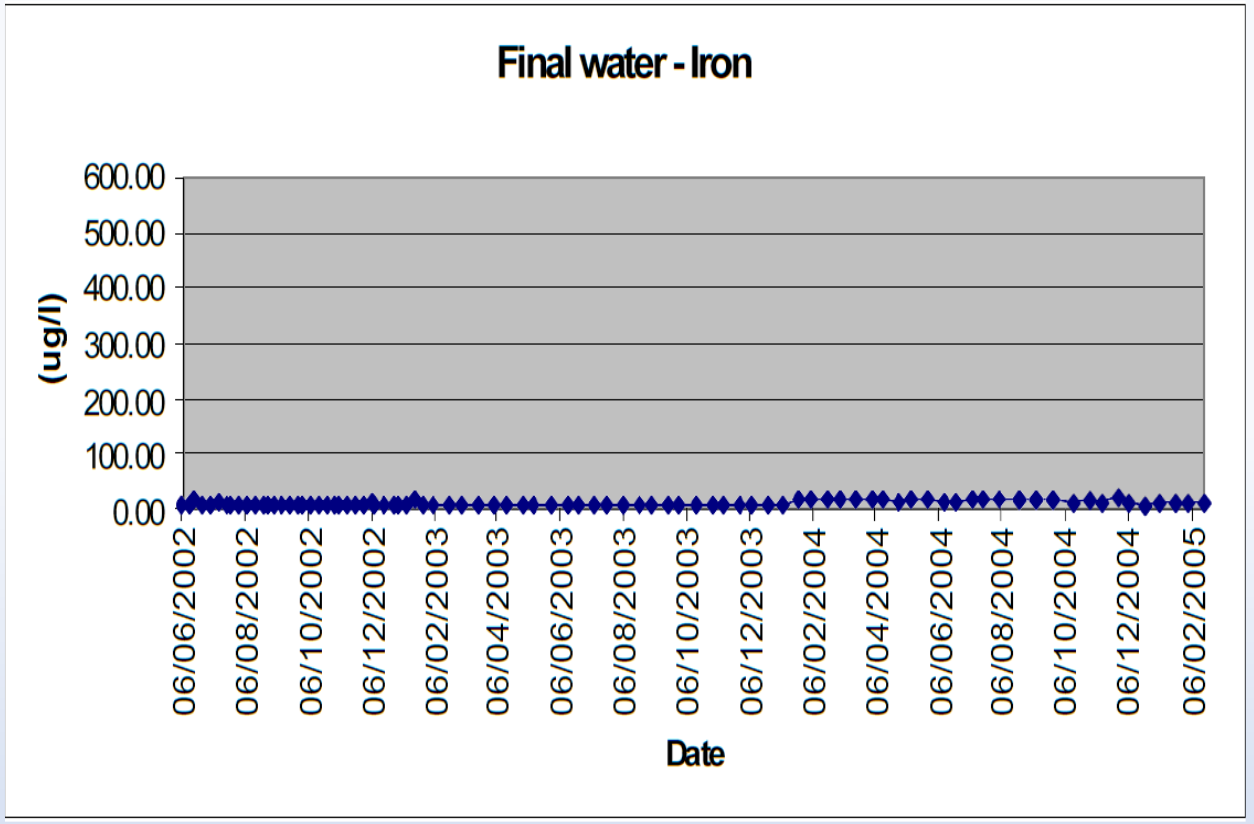
Colour Removal



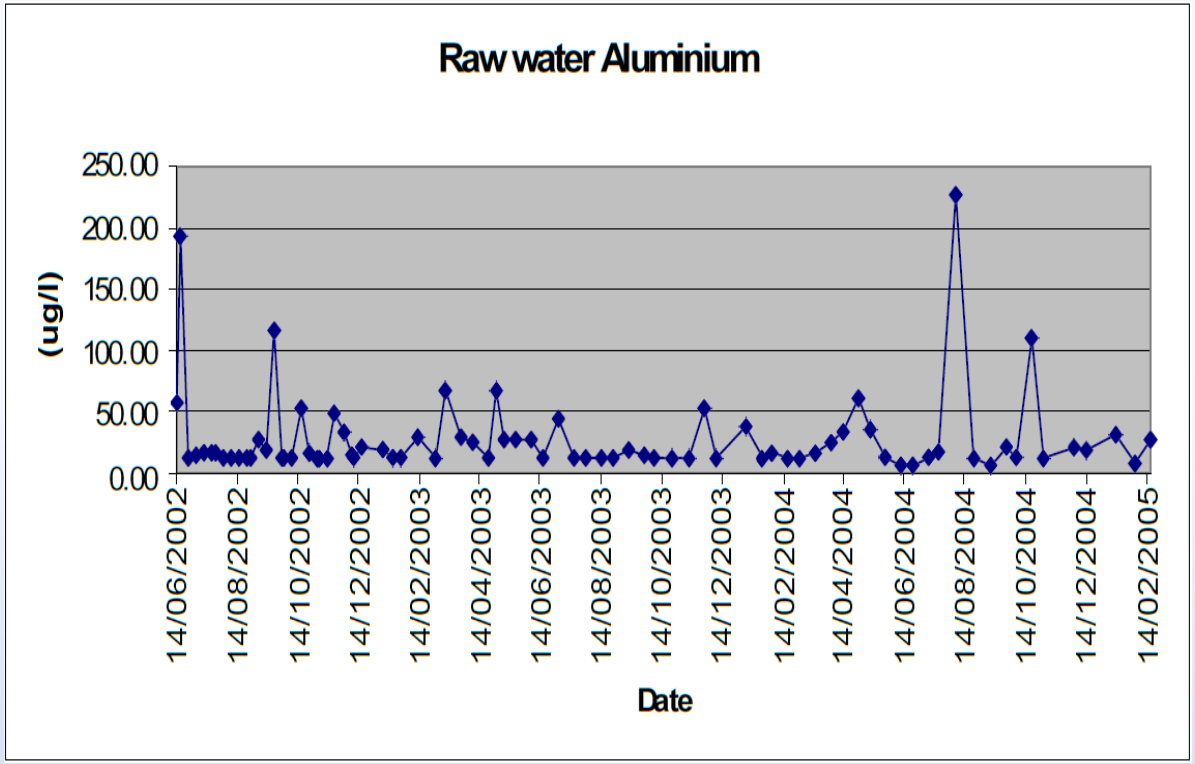


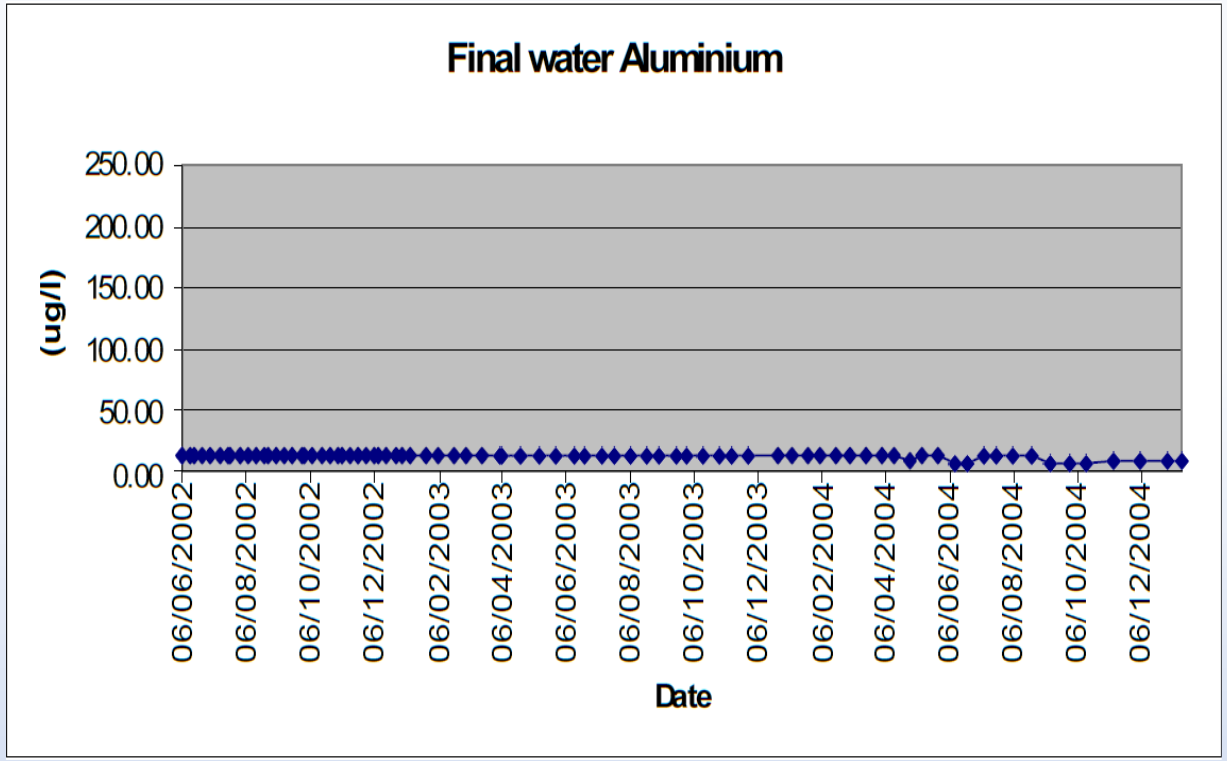
Iron Removal





Aluminum Removal





1. Manganese Removal

The Company

A large water company based in the south of England, providing water and sewerage services to a large population.

Challenge

A number of isolated properties in southern England had been having problems with high manganese levels in their potable water supply. The water often failed to meet drinking water standards.

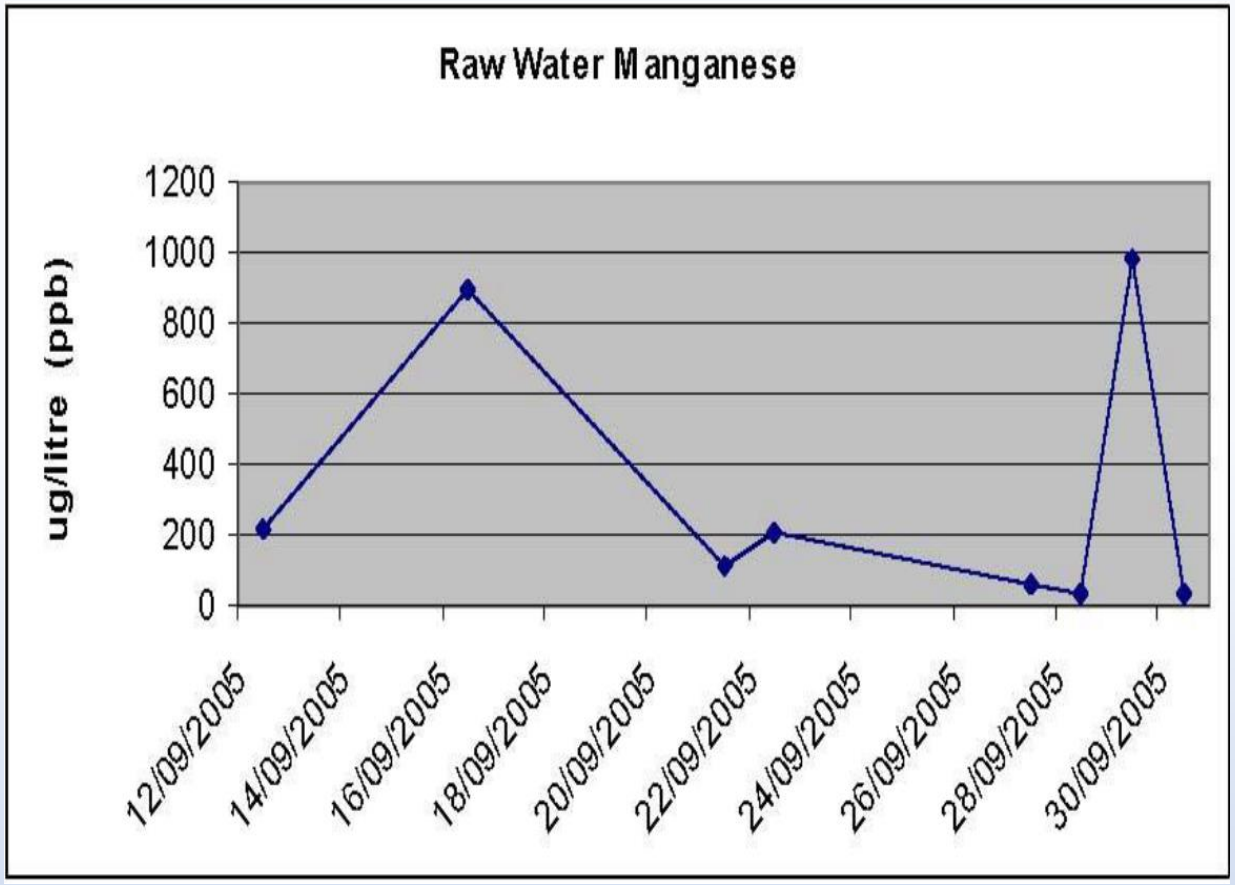
Solution

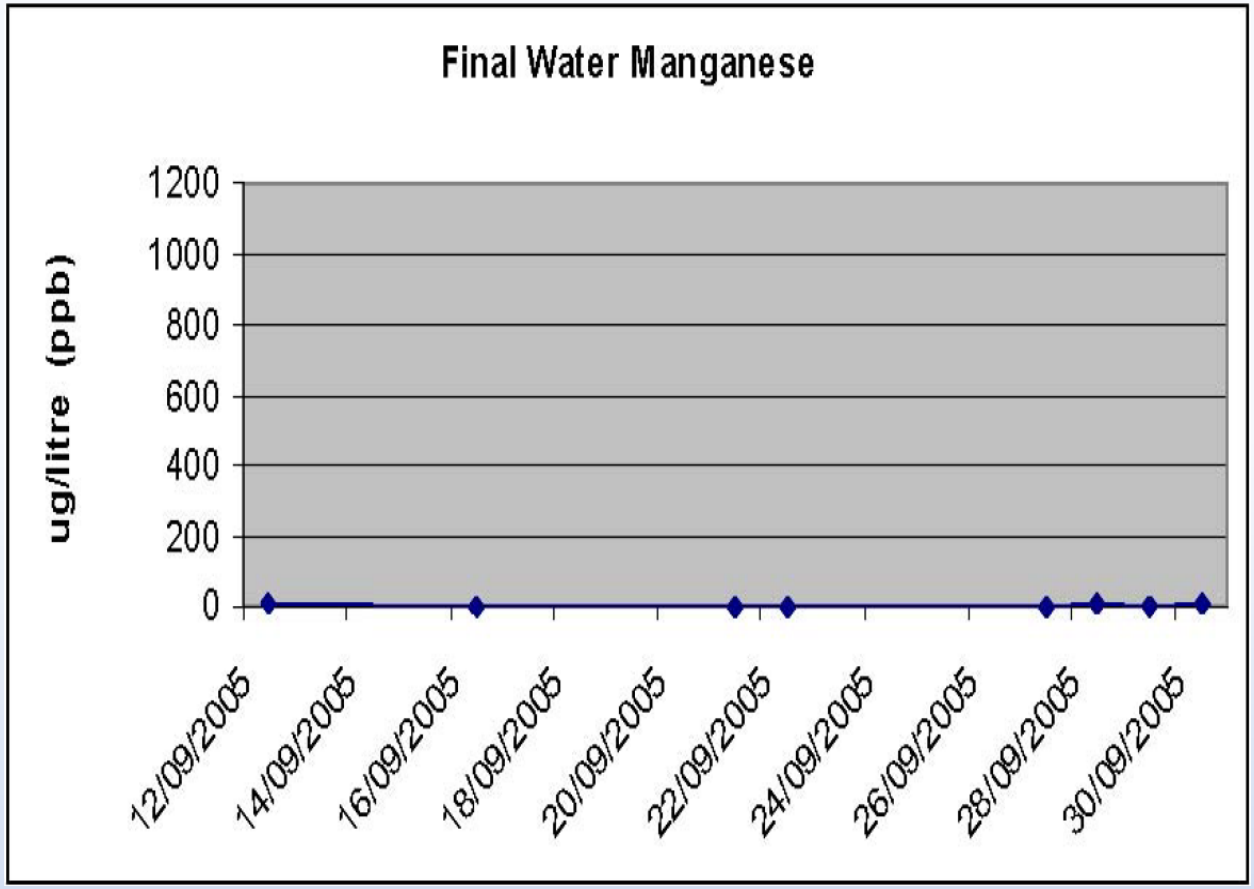
A small pilot plant was installed to determine the efficacy of ***Brimac Bone Char*** in removing manganese from raw reservoir water. ***Brimac Bone Char*** is manufactured specifically for the removal of colour, dissolved heavy metals and THM precursors for potable water applications. It is approved for drinking water purification throughout Europe.

Results and conclusion

- Consistent manganese, colour and iron and removal was achieved even when raw water levels spiked.
- ***Brimac Bone Char*** is a reliable solution for removing colour, heavy metals or both - all in one granular material.
- As a result of the pilot study, six point of use treatment plant were ordered for installation during the first quarter of 2006.

Manganese Removal





Fluride Removal

The ability of bone meal to sorb fluoride has been known since the early 1900's. The use of bone meal in a South Dakota water treatment plant from 1940-1971 to remove fluoride showed the potential bone charcoal should have for removal of fluoride. Bone meal imparts an unpleasant taste to water and has the potential for bacterial contamination (Mwaniki, 1990), and was the main reason for the plants closure. Bone charcoal however does not have the taste problems or significant bacteriological problems. Much of the limited research regarding bone charcoal as a water cleanup treatment has focused on its ability to remove fluoride. It is hoped that bone charcoal may be a cheap method to defluoridate drinking water in many developing countries and help prevent fluorosis (Mwaniki, 1992). Discussion in the literature regarding fluoride sorption by bone charcoal has considered the type of charcoal, amount of sorption possible, and the influence of pH, surface area and other possible contaminants in the water. Mwaniki (1992), and Larsen et al. (1994) found that bone charcoal became more crystalline when heated to high temperatures and was therefore better at sorbing fluoride when bone was heated to around 350-400°C instead of over 600°C.

The influence of calcium oxides and carbon content were considered influential also. Abdel-Fattah and Selim (1982) compared the surface areas of bone charcoals produced at different temperatures and concluded that if the bone was ground first material with a higher surface area was produced allowing greater sorption. The amount of fluoride sorbed by bone charcoal described in literature has varied. Some commentators have found only 2.5 mg g-1 of fluoride sorbed onto bone charcoal (Mwaniki, 1990), while in 1992 Mwaniki noted that between 0.3 mg g-1 and 11.3 mg g-1 were sorbed depending on the type of bone charcoal used in the sorption. Most investigators found that a pH <7 provided greater sorption of the ion (Bhargava and Killedar, 1991, Mwaniki, 1992, Larsen and Pearce, 1993). Only Bhargava and Killedar, (1991) suggested pH 7 was the optimum pH for maximum fluoride sorption. He also found that the presence of Cl^-, I^-, K^+ or Na^+ had no effect on the sorption of F^-. The main mechanism of sorption for fluoride attenuation by bone charcoal was proposed by Christoffersen et al. (1991). They suggested a dissolution / precipitation type reaction with any ion-exchange supplementary to this. Larsen and Pearce (1992) also concurred that dissolution/precipitation was the main mechanism.

Brimac Char Inc

May 2010
NSF 10/33/EPADWCTR
EPA/600/R-10/099

Environmental Technology Verification Report

Removal of Uranium in Drinking Water

Brimac Environmental Services, Inc.
Brimac HA 216 Adsorptive Media

Prepared by

NSF International

Under a Cooperative Agreement with
U.S. Environmental Protection Agency

ETV ETV ETV

THE ENVIRONMENTAL TECHNOLOGY VERIFICATION PROGRAM

U.S. Environmental Protection Agency

NSF International

ETV Joint Verification Statement

TECHNOLOGY TYPE:	ADSORBTIVE MEDIA
APPLICATION:	REMOVAL OF URANIUM IN DRINKING WATER
PRODUCT NAME:	BRIMAC HA 216 ADSORPTIVE MEDIA
VENDOR:	BRIMAC ENVIRONMENTAL SERVICES, INC.
ADDRESS:	318 GRALAKE AVE. ANN ARBOR, MI 48103
PHONE:	734-998-0763
WEBSITE:	HTTP://WWW.BRIMACSERVICES.COM
EMAIL:	INFO@BRIMACSERVICES.COM

NSF International (NSF) manages the Drinking Water systems (DWS) Center under the U.S. Environmental Protection Agency's (EPA) Environmental Technology Verification (ETV) Program. The DWS Center recently evaluated the performance of the Brimac Environmental Services, Inc. (Brimac) HA 216 Adsorptive Media. The New Hampshire Department of Environmental Services (NHDES) monitored the operation of the pilot unit containing the media, collected water samples, and provided some laboratory services. NSF also analyzed samples and authored the verification report and this verification statement. The verification report contains a comprehensive description of the test.

EPA created the ETV Program to facilitate the deployment of innovative or improved environmental technologies through performance verification and dissemination of information. The ETV Program's goal is to further environmental protection by accelerating the acceptance and use of improved and more cost-effective technologies. ETV seeks to achieve this goal by providing high quality, peer-reviewed data on technology performance to those involved in the design, distribution, permitting, purchase, and use of environmental technologies.

ETV works in partnership with recognized standards and testing organizations, stakeholder groups (consisting of buyers, vendor organizations, and permitters), and with the full participation of individual technology developers. The program evaluates the performance of innovative technologies by developing test plans that are responsive to the needs of stakeholders, conducting field or laboratory tests (as appropriate), collecting and analyzing data, and preparing peer-reviewed reports. All evaluations are conducted in accordance with rigorous quality assurance protocols to ensure that data of known and adequate quality are generated and that the results are defensible.

Certifications

Certificado Kosher

KASHRUT
MAGUÉN DAVID

ועד הכשרות
ק''ק מגן דוד יכב''ץ

Los siguientes productos elaborados por: **HA2 Natural de México, S de R.L. de C.V**

Fecha de emisión: **10 de Octubre del 2019**

Ubicado en: **-, -, Mexico**

Están certificados Kosher con las restricciones señaladas en la siguiente lista:

Código: 837

Marca	Clave	Nombre	Código Kosher	Status	Restricciones	Observaciones
		Carbon de Hueso de Bovino	837-38259	Parve		

Este certificado es válido hasta el: 09 de Octubre del 2020

Rabino David Abourmad

Horacio 1008, 2do piso, Col. Polanco, C.P. 11560 México D.F. Tel. +52 (55) 3872-5050 Fax. (55) 3872-0177 Email: kmd@kosher.com.mx www.kosher.com.mx

Certifications

NSF International

789 N. Dixboro Road, Ann Arbor, MI 48105 USA

RECOGNIZES

Ha2 Natural de Mexico, S. de R.L. de C.V.

Facility: Reynosa, Tamaulipas, México

AS COMPLYING WITH NSF/ANSI/CAN 61 AND ALL APPLICABLE REQUIREMENTS.
PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE
AUTHORIZED TO BEAR THE NSF MARK.

NSF

ANSI ACCREDITED
ISO/IEC 17065
Product Certification Body
#0216

Certification Program
Accredited by the
American National
Standards Institute

SCC Accredited
CAN/P-15
OCIPS
Accredited CCN

Certification Program
Accredited by the
Standards Council
of Canada

This certificate is the property of NSF International and must be returned upon request. This certificate remains valid as long as this client has products in Listing for the referenced standards. For the most current and complete Listing information, please access NSF's website (www.nsf.org).

Theresa Bellish

May 22, 2020
Certificate# C0549848 - 01

Theresa Bellish
General Manager, Water Systems

Certifications

ABS Quality Evaluations

Certificate Of Conformance

This is to certify that the Quality Management System of:

HA2 Natural de Mexico S. de R.L. de C.V.

Ave. El Puente SN Lote 15
Col. Parque Industrial El Puente C.P.
Reynosa, Tamaulipas 88743
México

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

ISO 9001:2015

The Quality Management System is applicable to:

MANUFACTURE OF FILTER MEDIA AND ABSORPTION MEDIA

This certificate may be found on the ABS QE Website (www.abs-qe.com). For certificates issued in the People's Republic of China information may also be verified on the CNCA website (www.cnca.gov.cn).

Certificate No:	51508
Certification Date:	08 July 2015
Effective Date:	06 July 2018
Expiration Date:	07 July 2021
Issue Date:	06 July 2018

Alex Weisselberg, President

Lockwood Remediation Technologies, LLC
89 Crawford Street
Leominster, Massachusetts 01453
O: 774-450-7177
F: 888-835-0617

Back to HS-200 page

HS-200

Media to Remove Oil, Heavy Metals and Similar Organics from Water Safety Data Sheet

Revision date : 2017

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 - Product Identifier

Product Name: HS-200

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

Use of the substance/mixture : Filtration

1.3 - Details of the supplier of the safety data sheet

Hydrosil International Ltd.
125 Prairie Lake Rd
East Dundee, IL 60118

T 847-844-0680 - F 847-844-0799
www.hydrosilintl.com

1.4 - Emergency telephone number

Emergency number : 1-847-844-0680

Section 2: Hazards Identification

2.1 - Classification of the substance or mixture

GHS-US classification
Eye Dam. 1 H318
STOT SE 3 H335

2.2 - Label Elements

GHS-US labeling
Hazard pictograms (GHS-US) :

Signal word (GHS-US) : Danger
Hazard statements (GHS-US) :

H318 - Causes serious eye damage
H335 - May cause respiratory irritation

Precautionary statements (GHS-US) :

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER/doctor/…
P312 - Call a POISON CENTER/doctor/…/if you feel unwell
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P405 - Store locked up
P501 - Dispose of contents/container to ...

2.3 - Other Hazards

No additional information available

2.4 - Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/information on ingredients

3.1 - Substances

Not applicable

3.2 - Mixture

Name	Product Identifier	%	GHS-US Classification
Zeolite	(CAS No.) 1318-02-1	85.2 - 86.2	STOT SE 3, H335
Water	(CAS No.) 7732-18-5	8.4 - 11.4	Not classified
N,N,N-Trimethyl-1-hexadecanaminium chloride	(CAS No.) 112-02-7	3.4 - 5.4	Skin Irrit. 2, H315 Eye Dam. 1, H318 Aquatic Acute 1, H400

SECTION 4: First aid measures

4.1 - Description of first aid measures

First-aid measures after inhalation : Remove person to fresh air. If not breathing, administer CPR or artificial respiration. Get immediate medical attention.
First-aid measures after skin contact : If skin reddening or irritation develops, seek medical attention.
First-aid measures after eye contact : Immediately flush eyes with plenty of water for at least 15 minutes. If irritation persists get medical attention.
First-aid measures after ingestion : If the material is swallowed, get immediate medical attention or advice. DO NOT induce vomiting unless directed to do so by medical personnel.

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

Symptoms/injuries after inhalation : May cause respiratory irritation.
Symptoms/injuries after skin contact : Causes skin irritation.
Symptoms/injuries after eye contact : Causes serious eye irritation.
Symptoms/injuries after ingestion : May be harmful if swallowed.

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

No additional information available

SECTION 5: Firefighting measures

5.1 - Extinguishing media

Suitable extinguishing media : If involved with fire, flood with plenty of water.
Unsuitable extinguishing media : None.

5.2 - Special hazards arising from the substance or mixture

Fire hazard : None known.
Explosion hazard : None known.

5.3 - Advice for firefighters

Protection during firefighting : Firefighters should wear full protective gear.

SECTION 6: Accidental release measures

6.1 - Personal precautions, protective equipment and emergency procedures

General measures : Avoid contact with the skin and the eyes.
For non-emergency personnel : No additional information available
For emergency responders : No additional information available

6.2 - Environmental precautions

None.

6.3 - Methods and material for containment and cleaning up

For containment : If possible, stop flow of product.
Methods for cleaning up : Shovel or sweep up and put in a closed container for disposal.

6.4 - Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1 - Precautions for safe handling

Precautions for safe handling : Wet carbon/coal removes oxygen from air causing a severe hazard to workers inside carbon vessels or confined spaces.

7.2 - Conditions for safe storage, including any incompatibilities

Storage conditions : Protect containers from physical damage. Store in dry, cool, well-ventilated area.

7.3 - Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1 - Control parameters

No additional information available

8.2 - Exposure controls

Appropriate engineering controls : Local exhaust and general ventilation must be adequate to meet exposure standards.
Hand protection : Use impervious gloves.
Eye protection : Safety glasses.
Skin and body protection : Wear suitable working clothes.
Respiratory protection : If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

SECTION 9: Physical and chemical properties

9.1 - Information on basic physical and chemical properties

Physical state : Solid
Appearance : Irregular shaped.
Color : White
Odor : No data available
Odor threshold : No data available
pH : No data available
Relative evaporation rate (butyl acetate=1) : No data available
Melting point : No data available
Freezing point : No data available
Boiling point : No data available
Flash point : No data available
Self ignition temperature : No data available
Decomposition temperature : No data available
Flammability (solid, gas) : No data available
Vapor pressure : No data available
Relative vapor density at 20 °C : No data available
Relative density : 57-59 lb/ft3
Solubility : No data available
Log Pow : No data available
Log Kow : No data available
Viscosity, kinematics : No data available
Viscosity, dynamic : No data available
Explosive properties : No data available
Oxidizing properties : No data available
Explosive limits : No data available

9.1 - Other information

No additional information available

SECTION 10: Stability and Reactivity

10.1 - Reactivity

No additional information available

10.2 - Chemical stability

Stable under normal conditions.

10.3 - Possibility of hazardous reactions

Will not occur

10.4 - Conditions to avoid

None

10.5 - Incompatible materials

Strong oxidizing and reducing agents.

10.6 - Hazardous decomposition products

Organic chlorides, amines, hydrogen chloride may be produced.

SECTION 11: Toxicological information

11.1 - Information on toxicological effects

Acute toxicity : Not classified

Zeolite (1318-02-1)	
LD50 oral rat	5000 mg/kg
LD50 dermal rabbit	> 2000 mg/kg
LC50 inhalation rat (mg/l)	2.4 mg/l (Exposure time: 1 h)
ATE (oral)	5000 mg/kg

Skin corrosion/irritation : Not classified
Serious eye damage/irritation : Causes serious eye damage.
Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified

Zeolite (1318-02-1)	
IARC group	3

Reproductive toxicity : Not classified
Specific target organ toxicity (single exposure) : May cause respiratory irritation.
Specific target organ toxicity (repeated exposure) : Not classified
Aspiration hazard : Not classified

SECTION 12: Ecological information

12.1 - Toxicity

Zeolite (1318-02-1)	
LC50 fishes 1	1800 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [semi-static])
EC50 Daphnia 1	1000 - 1800 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 other aquatic organisms 1	18 mg/l (Exposure time: 96 h - Species: Desmodesmus subspicatus)
LC50 fish 2	3200 - 5600 mg/l (Exposure time: 96 h - Species: Oryzias latipes [semi-static])

12.2 - Persistence and degradability

No additional information available

12.3 - Bioaccumulative potential

No additional information available

12.4 - Mobility in soil

No additional information available

12.5 - Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1 - Waste treatment methods

Waste disposal recommendations : Dispose of contents/container in accordance with local/regional/national/international regulations.

SECTION 14: Transport information

In accordance with DOT / ADR / RID / ADNR / IMDG / ICAO / IATA

14.1 - UN number

Not applicable

14.2 - UN proper shipping name

Not applicable

SECTION 15: Regulatory information

15.1 - US Federal regulations

15.2 - US State regulations

No additional information available

SECTION 16: Other information

Full text of H-phrases:

Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Skin Irrit. 2	skin corrosion/irritation Category 2
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H315	Causes skin irritation
H318	Causes serious eye damage
H335	May cause respiratory irritation
H400	Very toxic to aquatic life

NFPA health hazard : 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt
medical attention is given.
NFPA fire hazard : 0 - Materials that will not burn.
NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water

SBG1

ANION EXCHANGE RESIN TYPE ONE GEL Cl OR OH FORM

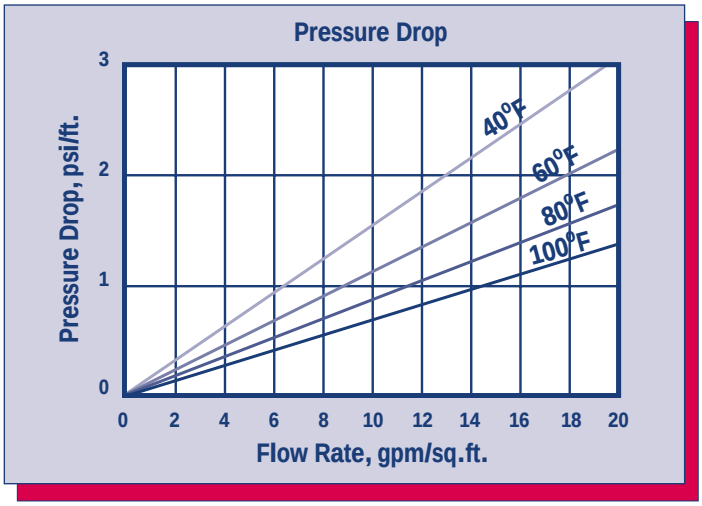
ResinTech SBG1 is a high capacity, shock resistant, gelular, Type 1, strongly basic anion exchange resin supplied in the chloride or hydroxide form as moist, tough, uniform, spherical beads. *ResinTech SBG1* is intended for use in all types of deionization systems and chemical processing applications.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

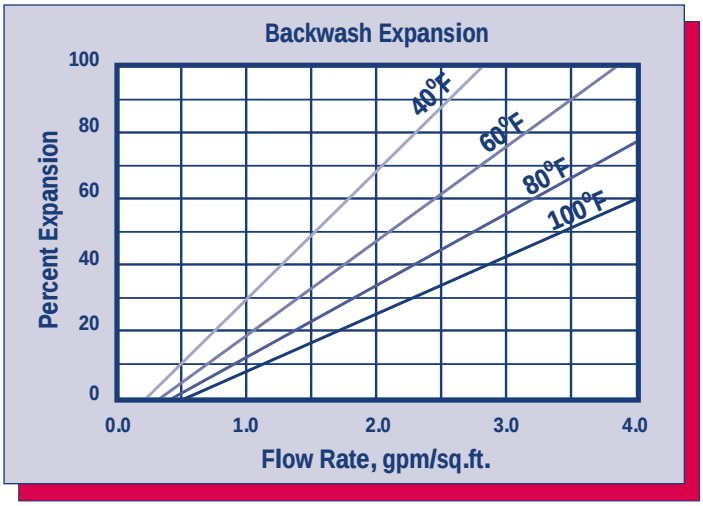
FEATURES & BENEFITS

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

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

HYDRAULIC PROPERTIES





PRESSURE DROP

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

BACKWASH

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

RESINTECH® SBG1

PHYSICAL PROPERTIES

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

SUGGESTED OPERATING CONDITIONS

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

OPERATING CAPACITY

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

Pounds $NaOH/ft^3$	Capacity Kilograms per cubic foot			
	HCl	H_2SO_4	H_2SiO_3	H_2CO_3
4	11.3	14.0	14.7	18.6
6	12.8	16.3	17.3	19.8
8	14.3	13.3	19.5	21.6
10	15.5	20.0	22.2	22.2

APPLICATIONS

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

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

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

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

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

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

RESINTECH INC
INNOVATIONS IN ION EXCHANGE

CGS

CATION EXCHANGE RESIN
SOFTENING GRADE
Na FORM

RESINTECH CGS is a sodium form standard crosslinked gel strong acid cation resin. *CGS* is optimized for residential applications that require good regeneration efficiency and high capacity. *RESINTECH CGS* is intended for use in all residential and commercial softening applications that do not have significant amounts of chlorine in the feedwater. *CGS* is supplied in the sodium form.

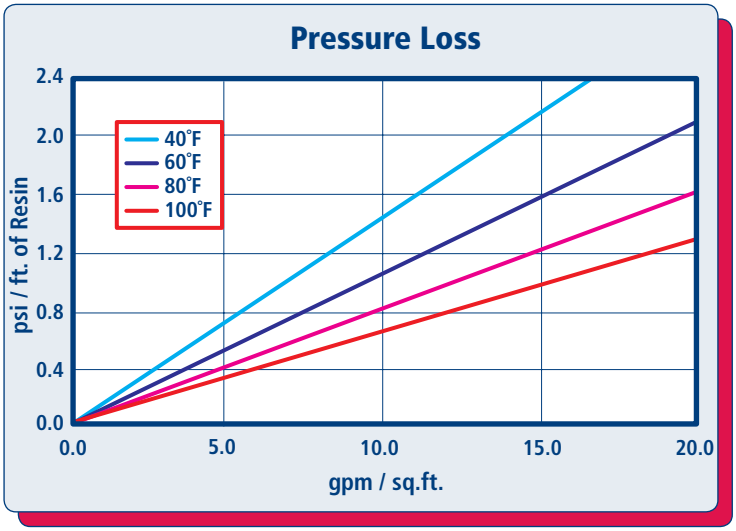
NSF/ANSI 44-61 CERTIFIED FOR MATERIAL SAFETY

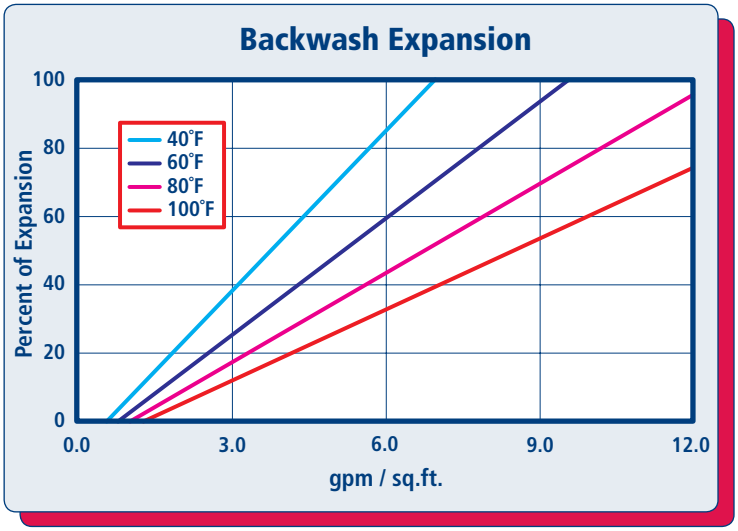
FEATURES & BENEFITS

- **RESIDENTIAL SOFTENING APPLICATIONS**
  Resin parameters are optimized for residential softeners
- **LOW COLOR THROW**
- **SUPERIOR PHYSICAL STABILITY**
  93% plus sphericity and high crush strengths together with carefully controlled particle distribution provides long life and low pressure drop
- **COMPLIES WITH US FDA REGULATIONS**
  Conforms to paragraph 21CFR173.25 of the Food Additives Regulations of the US FDA

Prior to first use for potable water, resin should be backwashed for a minimum of 20 minutes, followed by 10 bed volumes of downflow rinse.

HYDRAULIC PROPERTIES





PRESSURE LOSS

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

BACKWASH

The graph above shows the expansion characteristics of *ResinTech CGS* as a function of flow rate at various temperatures.

160 Cooper Road • West Berlin, NJ 08091 USA • p: 856.768.9600 • f: 856.768.9601 • e: ixresin@resintech.com • w: resintech.com

RESINTECH® CGS

PHYSICAL PROPERTIES

Polymer Structure	Styrene/DVB
Polymer Type	Gel
Functional Group	Sulfonic Acid
Physical Form	Spherical beads
Ionic Form as shipped	Sodium
Total Capacity	
Sodium form	>1.8 meq/mL
Water Retention	
Sodium form	40 to 52 percent
Approximate Shipping Weight	
Sodium form	50 lbs./cu.ft.
Screen Size Distribution (U.S. mesh)	16 to 50
Maximum Fines Content (<50 mesh)	1 percent
Minimum Sphericity	90 percent
Uniformity Coefficient	1.6 approx.
Resin Color	Amber

Note: Physical properties can be certified on a per lot basis, available upon request

SUGGESTED OPERATING CONDITIONS

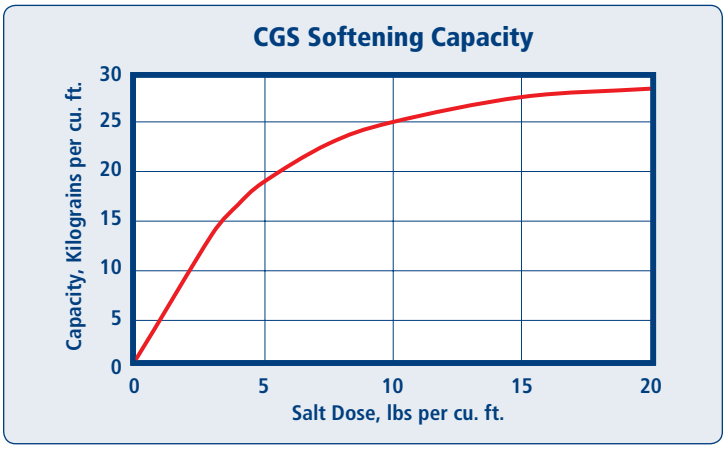
Maximum continuous temperature	
Sodium form	250˚F
Minimum bed depth	24 inches
Backwash expansion	25 to 50 percent
Maximum pressure loss	25 psi
Operating pH range	0 to 14 SU
Regenerant Concentration	
Salt cycle	10 to 15 percent NaCl
Regenerant level	4 to 15 lbs./cu.ft.
Regenerant flow rate.	0.5 to 1.5 gpm/cu.ft.
Regenerant contact time	>20 minutes
Displacement flow rate	Same as dilution water
Displacement volume	10 to 15 gallons/cu.ft.
Rinse flow rate	Same as service flow
Rinse volume	35 to 60 gallons/cu.ft.
Service flow rate	1 to 10 gpm/cu.ft.

Note: These guidelines describe average low risk operating conditions. They are not intended to be absolute minimums or maximums.
For operation outside these guidelines, contact ResinTech Technical Support

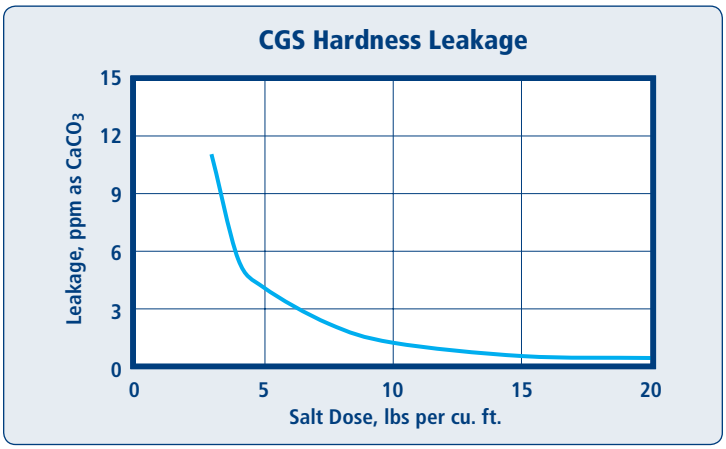
APPLICATIONS

SOFTENING

ResinTech CGS is a standard crosslinked cation resin optimized for residential and commercial applications. This type of resin is easier to regenerate than the higher crosslinked resins. CGS has marginal resistance to chlorine and other oxidants and is not ideal for high temperature and other high stress applications.



Capacity and leakage data are based on the following: 2:1 Ca:Mg ratio, 500 ppm TDS as CaCO3, 0.2% hardness in the salt and 10% brine concentration applied co-currently through the resin over 30 minutes. No engineering downgrade has been applied.



RESINTECH INC
INNOVATIONS IN ION EXCHANGE
East Coast - West Berlin, NJ p:856.768.9600 • Midwest - Chicago, IL p:708.777.1167 • West Coast - Los Angeles, CA p:323.262.1600

GROOVED & SMOOTH-END FLOWMETER MODEL MG/MS100

SPECIFICATIONS

PERFORMANCE

ACCURACY/REPEATABILITY: ±2% of reading guaranteed throughout full range. ±1% over reduced range. Repeatability 0.25% or better.
RANGE: (see dimensions chart below)
HEAD LOSS: (see dimensions chart below)
MAXIMUM TEMPERATURE: (Standard Construction) 160°F constant
PRESSURE RATING: 150 psi

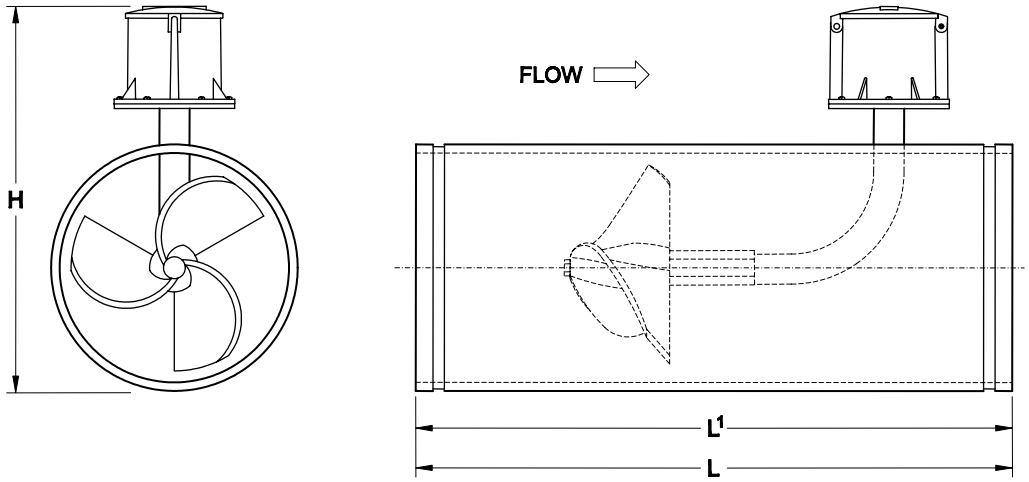
MATERIALS

TUBE: Epoxy-coated carbon steel.
BEARING ASSEMBLY: Impeller shaft is 316 stainless steel. Ball bearings are 440C stainless steel.
MAGNETS: (Permanent type) Cast or sintered alnico
BEARING HOUSING: Brass; Stainless Steel optional
IMPELLER: Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter. High temperature impeller is optional.

REGISTER: An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged lens cover with locking hasp.
COATING: Fusion-bonded epoxy

OPTIONS

- Forward/reverse flow measurement
- High temperature construction
- "Over Run" bearing assembly for higher-than-normal flowrates
- Electronic Propeller Meter available in all sizes of this model
- A complete line of flow recording/control instrumentation
- Straightening vanes and register extensions available
- Certified calibration test results



McCrometer reserves the right to change design or specifications without notice.

MG100 / MS100	DIMENSIONS												
Meter Size (inches)	**2**	**2 ½**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**
Maximum Flow U.S. GPM	250	250	250	600	1200	1500	1800	2500	3000	4000	5000	6000	8500
Minimum Flow U.S. GPM	40	40	40	50	90	100	125	150	250	275	400	475	700
Head Loss in Inches at Max. Flow	29.50	29.50	29.50	23.00	17.00	6.75	3.75	2.75	2.00	1.75	1.50	1.25	1.00
Shipping Weight, lbs.	* See Special Note		17	40	54	68	87	106	140	144	172	181	223
H (inches)			10.9	12.78	13.84	14.84	16.91	18.90	20.53	22.53	25.53	26.53	30.53
L (inches) MG100			13	20	20	20	20	20	20	22	22	22	22
L^1 (inches) MS100			13	20	22	22	22	22	22	24	24	24	24
O.D. of Meter Tube			3.50	4.500	6.625	8.625	10.750	12.750	14.00	16.00	18.00	20.00	24.00

Special Note—
Reducing fittings incorporating grooves are supplied to adapt the 3-inch model to smaller line sizes.

Larger flowmeters on special order.

SHELCO FILTERS

12FOS and 22FOS

Multi Cartridge Housings

Our twelve and twenty-two round models are designed for flow rates up to 600 GPM. Housings accept double-open-end style cartridges. Options include 304L or 316L stainless steel; band clamp or swing bolt closure. Design pressure 150 psi (10 bar) @ 300° F (149° C). Standard inlet and outlet connections for the 12FOS series is 3" flanged and the 22FOS series is 4" flanged, with many other options available by special order. Standard finish is Poly-coat over stainless. All twelve and twenty-two round models are standard with heavy duty mounting legs. Standard gasket is FDA grade Buna-N.

Features

- Designed for industrial and commercial filtration needs
- Heavy duty stainless steel construction for durability
- 304L standard and 316L stainless steel available
- Band clamp and swing-bolt closures for quick cartridge change outs
- Heavy duty mounting legs standard
- Pipe fittings readily accessible for easy installation
- Knife edge seal at both cartridge ends to eliminate by-pass
- Adjustable top plate for more cartridge options
- Adapters for 222 or 226 style cartridges available by special order.
- Complete selection of pipe fittings, flanged, sanitary, BSP, Grooved and others
- See ordering guide for a complete section of options to fit your application

Adjustable top plate accepts variable length cartriges

Standard Design Specifications

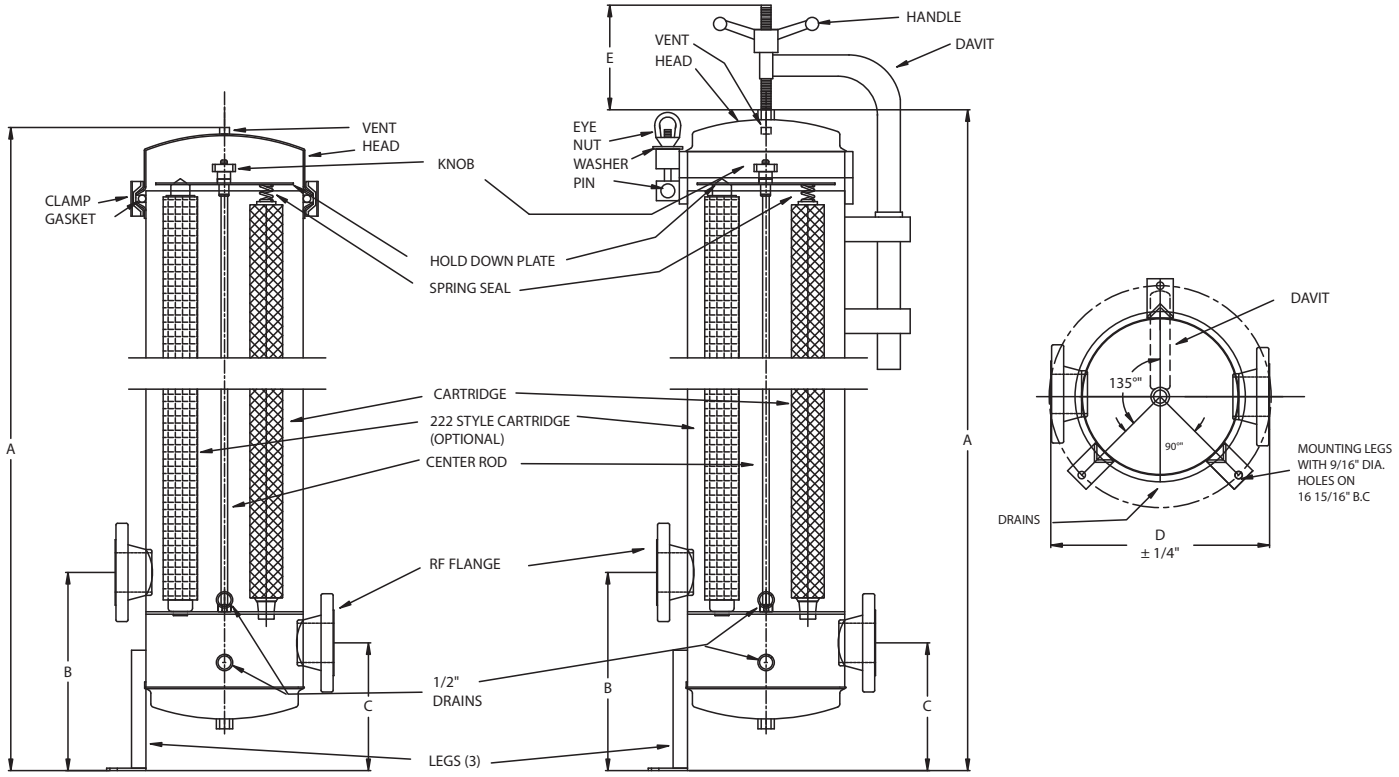
Model	No. & (length) Of Cartridges†	Flow Rate GPM*	Flange Size	Drains	Vent	Max Ctg Diameter°	Shipping Weight Clamp	Shipping Weight SB
12FOS2	12 (20")	168	3F	1/2" NPT	1/4" NPT	2 3/4" OD	86 lbs	131 lbs
12FOS3	12 (30")	252	3F	1/2" NPT	1/4" NPT	2 3/4" OD	92 lbs	142 lbs
12FOS4	12 (40")	336	3F	1/2" NPT	1/4" NPT	2 3/4" OD	100 lbs	150 lbs
22FOS3	22 (30")	462	4F	1/2" NPT	1/2" NPT	2 5/8" OD	140 lbs	205 lbs
22FOS4	22 (40")	616	4F	1/2" NPT	1/2" NPT	2 5/8" OD	165 lbs	225 lbs

† Housings will accept: 20" = (19 1/2" or 20") 30" = (29 1/4" or 30") 40" = (39" or 40") Lengths

*Based on 7 gpm per 10" length with a 25 mocron wound cartridge at 2 psid clean and a viscosity of 1 cps. Flow rates are for guide lines only. Actual flow rates are based on fluid, viscosity, cartridge type, micron ratings and other factors.

° When using 222 or 226 adapters with the 22 FOS series housing you must change it to a 21 FOS (21 Round) max catridge OD 2 3/4"

Dimensions



MODEL	CLAMP STYLE	SWING BOLT STYLE				
	DIM. A	DIM. A	B	C	D	E
12FOS2	20 1/2"	40 1/2"	15 1/8"	9 3/4"	16 11/16"	8"
12FOS3	49 1/2"	50 1/2"	15 1/8"	9 3/4"	16 11/16"	8"
12FOS4	59 1/2"	60 1/2"	15 1/8"	9 3/4"	16 11/16"	8"
22FOS3	50 3/16"	50 3/16"	15 1/4"	9 1/2"	21"	10"
22FOS4	60 3/16"	50 3/16"	15 1/4"	9 1/2"	21"	10"

ORDERING GUIDE

12	FOS	3	- SB	- 316	- 222	- 3F	- EP	- GP	- E
No. of Columns	Product Code	No. of Stacks	Closure Style	Material	Cartridge Configuration	Connection Type	Finish	Options	Gasket
12 22	FOS	12 FOS 2 = 2 High 3 = 3 High 4 = 4 High 22 FOS 3 = 3 High 4 = 4 High	Blank = V-Band Clamp SB = Swing Bolt	Blank = 304L 316 = 316L	Blank = Double Open Ended 222 = 222 Style Cartridge Fin or Flat 226 = 226 Style Cartridge Fin or Flat	12 FOS Blank = 3" Flanged 22 FOS Blank = 4" Flanged OPTIONS 2F = 2" Flanged 2TC = 2" Ferrules 2GF = 2" Grooved Fittings 3F = 3" Flanged 3TC = 3" Ferrules 3GF = 3" Grooved Fittings 4F = 4" Flanged 4TC = 4" Ferrules 4GF = 4" Grooved Fittings	Blank = Standard Poly Coat EP = Electro-Polished GB = Glass Bead P = Passivate	Blank = None GP = Gauge ports GPA = Gauge ports with gauges	Blank = Buna E = EPR S = Silicone V = Viton TS = Teflon Encapsulated Silicone

SHELCO FILTERS

tel: 860.854.6121
800.543.5843
fax: 860.854.6120
e-mail: info@shelco.com
www.shelco.com

SHELCO FILTERS

100 Bradley Street . Middletown, CT 06457 . USA

Bulletin: 12-22FOS-500-4

Crystal MBF Series Filter Cartridges

Ordering Information

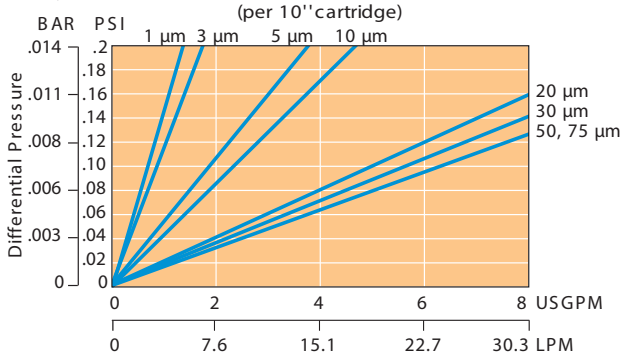
Crystal MBF Nomenclature Information

CMBF	10	-20	N	N	-BB
Filter Type Crystal MBF Series Filters	Retention Rating (microns) 0.5, 1, 3, 5, 10, 20, 30, 50, 75	Nominal Length (inches) -4, -5, -9.75, -10, -19.5, -20, -29.25, -30, -39, -40, -50	End Configuration P Double Open End P2 226/Flat Single Open End P3 222/Flat Single Open End P6 Self-Seal Spring on One End P7 226/Fin Single Open End P8 222/Fin Single Open End PX Extended Core N None (Cut Ends) DBG Direct Bond Santoprene Gaskets	Gasket or O-Ring S Silicone B Buna-N E EPDM V Viton T Teflon endcap. Viton (O-Rings only) N None	Blank Individually bagged -BB Single bulk bag

Example: CMBF 10-20NN-BB

Crystal MBF FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature (per 10''cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

NSF®

Certified to NSF/ANSI Standard 61 for materials requirements only.

COMPONENT

Lockwood Remediation Technologies, LLC
89 Crawford Street • Leominster, MA 01453 • (T) 774-450-7177 • (F) 888-835-0617

Appendix D

Supporting Information

MassDEP - Bureau of Waste Site Cleanup

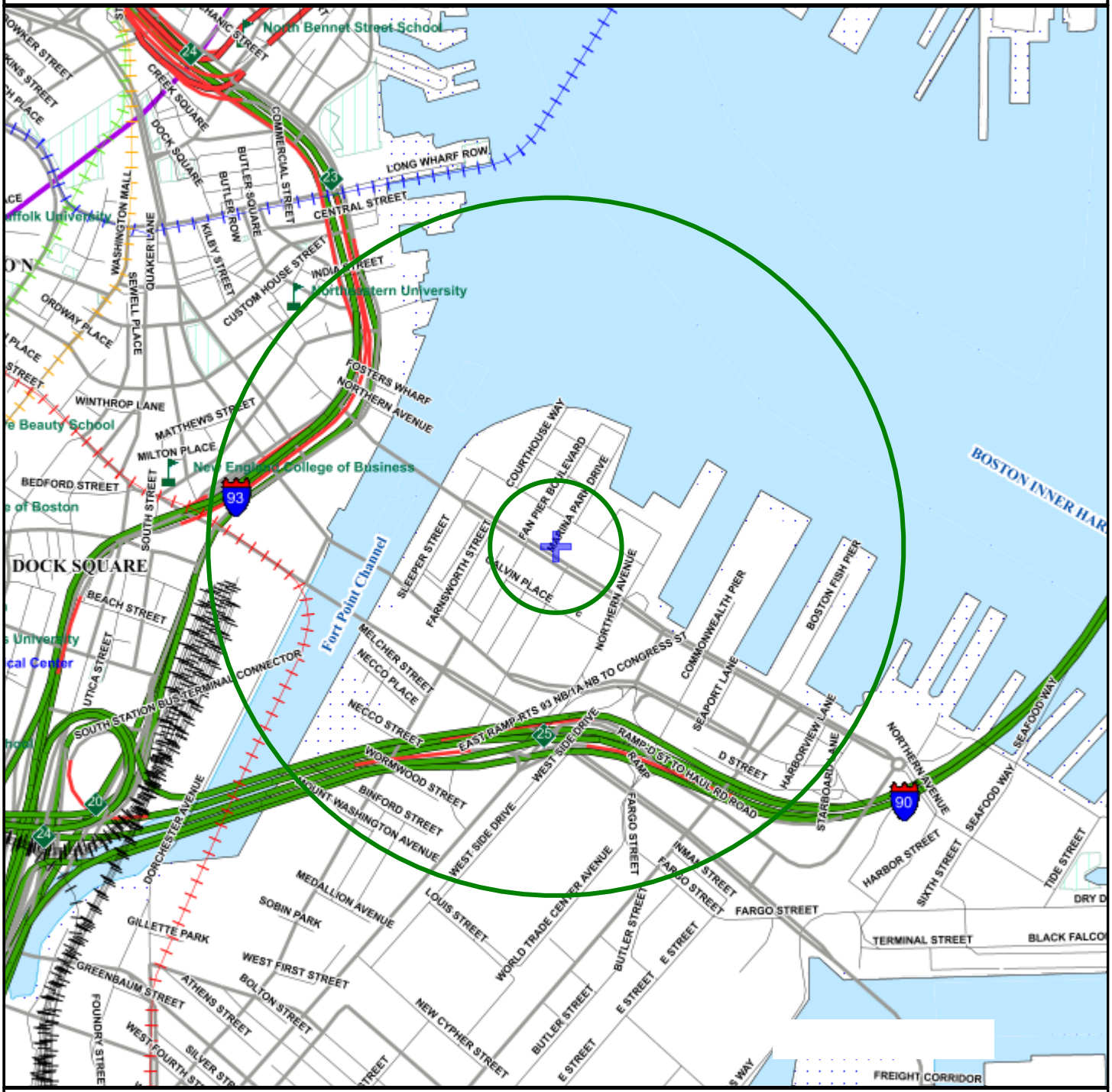
Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

Site Information:
MBTA HEAD HOUSE
85 SEAPORT BLVD BOSTON, MA

NAD83 UTM Meters:
4690908mN , 331504mE (Zone: 19)
June 8, 2021

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at: https://www.mass.gov/orgs/massgis-bureau-of-geographic-information.

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection



Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail

Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct

Basins: Major, PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam

Aquifers: Medium Yield, High Yield, EPA Sole Source

Non Potential Drinking Water Source Area: Medium, High (Yield)

PWS Protection Areas: Zone II, IWPA, Zone A

Hydrography: Open Water, PWS Reservoir, Tidal Flat

Wetlands: Freshwater, Saltwater, Cranberry Bog

FEMA 100yr Floodplain; Protected Open Space; ACEC

Est. Rare Wetland Wildlife Hab; Vernal Pool: Cert., Potential

Solid Waste Landfill; PWS: Com.GW,SW, Emerg., Non-Com.

Documentation of the Results of the ESA Eligibility Determination:

Using information in Appendix II of the NPDES RGP, the project located on Seaport Blvd, Boston, MA is eligible for coverage under this general permit under FWS Criterion A. This project is located in Suffolk County. No designated critical habitats were listed in the project area. An Endangered Species Consultation was conducted on the U.S. Fish & Wildlife Service New England Field Office ECOS IPaC webpage for the Site:

No Endangered species found at this location.

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: June 08, 2021
Consultation Code: 05E1NE00-2021-SLI-3755
Event Code: 05E1NE00-2021-E-11241
Project Name: MBTA Head House

Subject: List of threatened and endangered species that may occur in your proposed project location 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: 05E1NE00-2021-SLI-3755
Event Code: 05E1NE00-2021-E-11241
Project Name: MBTA Head House
Project Type: Water Withdrawal / Depletion
Project Description: Construction Dewatering
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.35215365,-71.04584480565586,14z

Counties: Suffolk County, Massachusetts

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.

Documentation of the National Historic Preservation Act Eligibility Determination:

As part of this permit, a determination was made as to whether there were any historic properties or places listed on the national register in the path of the discharge or in the vicinity of the construction of treatment systems or BMPs related to the discharge. A search on the Massachusetts Cultural Resource Information System Database and the National Register of Historic Places found no properties are located on or near the project route. In addition, construction and dewatering / water treatment work will be conducted on and along the roadway and will not impact surrounding areas. Therefore, the proposed discharge will not have the potential to cause effects on historical properties.

Massachusetts Cultural Resource Information System

MACRIS

MACRIS Search Results

Search Criteria: Town(s): Boston; Street No: 85; Street Name: Seaport BlVD; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year

Appendix E

BWSC DischargePermit

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

DEWATERING DISCHARGE PERMIT APPLICATION

OWNER / AUTHORIZED APPLICANT PROVIDE INFORMATION HERE:

Company Name: McCourt Construction Address: 60 K Street Boston, MA 02127

Phone Number: (617) 269-2330 Fax number: _____

Contact person name: Steve Winn Title: Project Manager

Cell number: (617) 735-7413 Email address: swinn@mccourtconstruction.com

Permit Request (check one): ☑ New Application ☐ Permit Extension ☐ Other (Specify): _____

Owner's Information (if different from above):

Owner of property being dewatered: Massachusetts Bay Transport Authority

Owner's mailing address: 10 Park Plaza Suite 5170 Phone number: 617-780-8136

Location of Discharge & Proposed Treatment System(s):

Street number and name: Seaport Blvd Neighborhood _____

Discharge is to a: ☐ Sanitary Sewer ☐ Combined Sewer ☑ Storm Drain ☐ Other (specify): _____

Describe Proposed Pre-Treatment System(s): Bag filtration and Carbon Treatment / ion exchange and pH if required

BWSC Outfall No. SDO195 Receiving Waters Boston Inner Harbor

Temporary Discharges (Provide Anticipated Dates of Discharge): From 08/01/2021 To 07/31/2022

☑ Groundwater Remediation	☐ Tank Removal/Installation	☑ Foundation Excavation
☐ Utility/Manhole Pumping	☐ Test Pipe	☐ Trench Excavation
☐ Accumulated Surface Water	☐ Hydrogeologic Testing	☐ Other _____

Permanent Discharges

☐ Foundation Drainage	☐ Crawl Space/Footing Drain
☐ Accumulated Surface Water	☐ Non-contact/Uncontaminated Cooling
☐ Non-contact/Uncontaminated Process	☐ Other; _____

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1. Attach a Site Plan showing the source of the discharge and the location of the point of discharge (i.e. the sewer pipe or catch basin). Include meter type, meter number, size, make and start reading. Note. All discharges to the Commission's sewer system will be assessed current sewer charges.
2. If discharging to a sanitary or combined sewer, attach a copy of MWRA's Sewer Use Discharge permit or application.
3. If discharging to a separate storm drain, attach a copy of EPA's NPDES Permit or NOI application, or NPDES Permit exclusion letter for the discharge, as well as other relevant information.
4. Dewatering Drainage Permit will be denied or revoked if applicant fails to obtain the necessary permits from MWRA or EPA.

Submit Completed Application to: Boston Water and Sewer Commission
Engineering Customer Services
980 Harrison Avenue, Boston, MA 02119
Attn: Jodi Dobay, Engineering Customer Service
E-mail: beginj@bwsc.org
Phone: 617-989-7259 Fax: 617-989-7716

Signature of Authorized Representative for Property Owner: Thomas Rovero, RA Date: 07/29/2021